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Supporting Document

3.3.3 Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during last five years.

Year	2015-16	2016-17	2017-18	2018-19	2019-20		
Total Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings	37	14	17	18	21	**Total Publications 107**	**No of Publications per Teacher 0.52**
No of Full Time Teachers	216	222	207	198	190	**Average No of Teachers 206.6**	

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Fantasy Versus Authenticity in Doris Lessing's the Fifth Child

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Abstract
Doris Lessing, the Nobel Laureate, is known as one of the most prominent British novelists. Adorned with many achievements she focuses on the identity as a major issue though here both the protagonists (Harriet and David) fail to build their own identity. The aim of this paper is to show the importance of dreams or fantasies in our practical life. In *The Fifth Child* the novelist has merged reality and imagination altogether. David and Harriet have fantasy or earlier dreams to have a big (traditional) family.

Though in the era of sixties the bulk of society had changed its mind in relation to women and the family but Harriet and David neglect the drawbacks of a big family. And they also feel good with their family until they get the fifth child, Ben, who is abnormal. Even with the pregnancy of Ben Harriet feels much trouble and unnatural. Due to this child the relation between Harriet and David becomes bitter and troublesome. They feel the reality of life that is quite different from their imagination. Ben is sent to an orphanage but Harriet takes him back to home that is more problematic. Neither of the parents can love Ben because they are afraid of him and his monstrous activities. Thus this paper relates subconscious state of mind to the consciousness through the fantasies or dreams.

Keywords- Fantasies, reality, unnatural, drawbacks, abnormal, problematic, sub consciousness, identity, consciousness.

Introduction

Doris May Lessing, the Nobel Laureate, is a British novelist, poet, playwright, librettist, biographer and short story writer. The Nobel Prize in Literature 2007 was awarded to Doris Lessing "that epicist of the female experience, who with scepticism, fire and visionary power has subjected a divided civilization to scrutiny"[1]. Lessing was the eleventh woman and the oldest person to ever receive the Nobel Prize in Literature. Born on 22 October 1919, in Kermanshah, Iran, (then known as Persia), was the daughter of Captain Alfred Tayler and Emily Maude Tayler, who were both English and of British nationality. Adorned with 'David Cohen Prize' (2001) for a lifetime's achievement in British Literature, Lessing was ranked fifth by *The Times* (2008) on a list of "The 50 greatest British writers since 1945".[2]

Educated at the Dominican Convent High School, a Roma Catholic convent all-girls school in Salisbury, Lessing left school at the age of 14, and was self-educated from then on; she left home at 15 and worked as a nursemaid. She started reading material that her employer gave her on politics and sociology and began writing around this time. In 1937, Lessing moved to Salisbury to work as a telephone operator, and she soon married her first husband, Frank Wisdom, with whom she had two children (John and Jean), before the marriage ended in 1943.

After her first divorce and many ups and downs of the life when Lessing fled to London to pursue her writing career and communist beliefs, she left two toddlers with their father in South Africa and took the another one, who was from her second marriage, with her. As a writer and as a mother she expresses her experiences: "For a long time I felt I had done a very brave thing. There is nothing more boring for an intelligent woman than to spend endless amounts of time with small children. I felt I wasn't the best person to bring them up. I would have ended up an alcoholic or a frustrated intellectual like my mother."[3] It is her matchless effort in writing that has made her reach to the crest of popularity and she has made a deep and permanent place in the hearts of her readers.

Aim of Writing

The aim of this paper is to show the importance of dreams and fantasies in our practical life. Obviously these qualities are considered as the state of subconscious mind but they are related to one's consciousness or practical life- directly or indirectly. Dreams or fantasies capture one's mind so effectively that his life can move in any direction, positive or negative. "With a few symbols a dream can define the whole of one's life, and warn us of the future, too."[4]

Fantasizing about another person may seem like a harmless indulgence, but in self-case it actually draws us closer to temptation and can increase the risk of being unfaithful. In the same way that dwelling on worries and possible catastrophes fuels anxiety and makes fears more vivid, immersion in fantasy can enhance, rather than quench, our longings. Dreaming provides a familiar example of how imagination has the power to cross the line and blend into real life. We all can relate to having an intense dream about someone, and finding the feelings from the dream temporarily spilling into our waking experience.

Classification of the Genes Responsible for Stem Cells Differentiation and Regeneration by Rotation Forest: An Ensemble Method

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Abstract

Characteristic features of stem cells are to regenerate and differentiate into any adult cells. To explore the insight mechanism of self renewal and differentiation, identification of involved genes or transcription factors becomes important from therapeutic point of view. Analysis of microarray data is required to identify the relevant gene expression and their function. Some of the machine learning approaches like SVM, ANN etc. are being used to classify the important genes for the above said process. It is reported that ensemble classifiers like Rotation Forest gives (RF) better classification result as compared to single classifiers. In this study different ensemble classification techniques have been used to classify the embryonic stem cell microarray data in to two classes i.e. they are participating into differentiation and regeneration and nonparticipating. In our experiment RF has given better result as compared to others. A comparative analysis has also been done among ensemble classifiers and single classifiers.

Keywords Support Vector Machine, Artificial Neural Network, Rotation Forest

1. Introduction

Embryonic stem cells (ESC) are extracted from inner cell mass of blastocyst which is developed after five-six days of the fertilization. ESC are pluripotent cells which can differentiate into any type of adult cell [1]. The ability of the ESC to regenerate and differentiate to all germ layers is quite useful in regenerative and transplantation medicine to cure various disease and injury [2]. So better understanding of the insight mechanism for the genes taking part in the stem cell differentiation and regeneration is required. After the generation of tremendous amount of genetic expression data from Microarray, Chi-Seq, Next Generation Sequencing etc., high computational approach is required to analyze these data. Apart from traditional statistical technique, new machine learning approaches are being used to classify the biological data and the analysis of their functional relevance [3].Machine learning is an area of the Artificial Intelligence which learns from the known properties of the given instance and can be used for the classification and prediction type of tasks [4]. It can be categorized into various classes mainly supervised and unsupervised learning. Supervised learning trains the systems with labeled classes whereas unsupervised learning trains the systems with unlabeled classes of the data [5]. Till now various machine learning classifiers like Support Vector Machine, Artificial Neural Network, Decision tree learning, Association rule mining, Bayesian Network etc. are being used as a single classifier. It has been reported in many artificial intelligence area in last few years that multiple or ensemble classifiers gives better accuracy as compared to the single classifiers [6]. In this study, ensemble classifiers like Rotation Forest, Bagging, Boosting, Random forest etc. were used and comparative analysis was done on microarray data of the embryonic stem cells. Microarray array technique gives the genetic expression values of the multiple genes simultaneously and can be monitored in a different condition or in a different time interval [7]. To analyze the multiple expression data simultaneously, advanced statistical techniques are required. Support Vector Machine has already been used widely to analyze these kind of data and perform various tasks like prediction of the different cancer stages [8], function prediction of the genes[9], identification of the protein homology [10], diagnosis of the disease [11] etc. In this study, multiple classifiers like Rotation Forest algorithm have proves to be better as compared to the other classifiers.

2. Methodology

2.1 Data description

The microarray expression data of embryonic stem cells with 79 features of 347 genes were taken from Gene Expression Omnibus database of the NCBI [12-13]. The expression data consist of genetic expression of the various transcription factors like NANOG, Oct4, Sox2 etc. which are well known for their role in stem cell differentiation and regeneration at different time series [13].

2.2 Data generation

For any supervised machine learning approach prior information of the class label is required for training dataset. In our case training data set class label were collected from the extensive literature survey [13]. The first row of the dataset consists of the class information like 1 or 0, where 1 indicates that the particular data comes under that kind of gene which are taking part into stem cell differentiation and regeneration and 0 indicates that they are not taking part into differentiation and regeneration process. 70% of the dataset was divided into training set and 30% was divided into test dataset.

2.3 Selection of the Machine Learning Algorithms

Machine Learning algorithm can be categorized into supervised and unsupervised algorithm on the basis of their data input and algorithm's out put. In the case of supervised machine learning approach, expected results are already known like SVM, Bagging, Boosting etc. whereas in the case of unsupervised algorithms, expected results are unknown like clustering. In this study, supervised machine learning algorithms were used to classify the genes responsible for stem cells differentiation and regeneration. Same datasets of the genetic expression were used for each algorithms of the supervised machine learning approaches and various parameters of the algorithms were analyzed.

2.4 Ensemble Methods

Ensemble classifier usually gives the better accuracy as compared to single one because it combines the prediction of multiple

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Virtual Modelling and Simulation of Functionally Graded Material Component using FDM Technique

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Abstract

Functionally graded materials (FGM) which are also called tailor made materials, are composites with continuously varying mechanical properties. The limitations on the component materials available for specific RP processes calls for the development of tailor made material properties in the available material options. This paper proposes a technique to develop and fabricate FGM using Fused Deposition Modelling (FDM) technique. An attempt is made to relate the FDM process parameters with the material properties for the given ABS material. These relations are used to assign tailor made properties to the component in various regions. By actual CAD modeling and analysis using ANSYS 14, it is established that the deformation due to given load is considerably reduced for the component made by assigning unique set of parameters in a customized fashion.

Keywords: Layered manufacturing (LM), Fused Deposition Modelling, Functionally Graded Materials

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1. Introduction

LM is a three decade old technology. Product development cycle time reduction is a key concern in industries to remain competitive in the marketplace shifting the focus from traditional product development methodology to rapid fabrication techniques like rapid prototyping (RP)or Layered Manufacturing(LM)[1]. The RP process is capable of building any complicated geometry parts in least possible time without incurring extra cost due of absence of tooling[2]. Although RP is an efficient technology, full scale application has not gained much emphasis because of compatibility of presently available materials with RP technologies [3, 4]. To overcome this limitation, one approach may be suitably adjusting the process parameters during fabrication stage for properties improvement.

A good number of researchers have devoted towards this approach [5-7]. Literature reveals that properties of RP parts are function of various process related parameters and can be significantly improved with proper adjustment. Part build mechanism in LM is a complex phenomenon. Effect of various factors and their interactions can be observed but comprehending or assigning the exact reasons is difficult [8]. Another convenient approach may be development of new materials having superior characteristics than conventional materials and its compatibility with technology. Development of FGMs with customized properties is an answer to this approach. There is appreciable ongoing research in the direction of development, fabrication and testing of FGMs.[9-12]

Nomenclature

LM	Layered manufacturing
RP	Rapid Prototyping
FGM	Functionally Graded materials
FDM	Fused Deposition Modelling
ρ	Density
V	Volume

1.1. Functionally Graded Materials

Functionally graded materials (FGMs) or graded materials or tailor made materials, are generally multi-phase composites with continuously varying mechanical properties in a customized fashion. An engineered heterogeneous object can be classified into three categories[13]. First, a multi-material object constructed by pieces of different materials with clear boundary between them [14]. Second, functionally graded material objects where different material portions do not have clear boundary. Instead, they have a continuous transmission between them[15, 16]. Third, an object with digital materials, in which different types of materials can be freely distributed in the object. The modeling and fabrication of such objects using digitally designed materials is the focus of this paper.

The main fabrication methods that can build the third type of heterogeneous objects are the Layered Manufacturing (LM) processes. Design issues in CAD for design of FGMs and integration with LM processes need attention and have been studied by various researchers[11]. Significant efforts have been made in the study of the physical and mechanical responses of FGMs developed using LM Processes. [9, 12]

1.2 Fused Deposition Modelling Process

FDM is one of the most promising and robust RP techniques owing to its ability to build prototypes of complex and intricate shapes with appreciably reasonable time requirements.
The FDM process works as follows: first, a 3D solid model exported to the FDM Quickslice™ software using the STL format [17]. The software generates the process plan to control FDM machine's hardware. The hardware for the FDM machine is represented in Fig. 1. The concept is that an ABS filament is fed through a heating element,

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Analysis of Microstructural Changes in Enhancement of Surface Properties in Sheet Forming of Al alloys via Friction Stir Processing

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Abstract

Weight reduction is one of the major objectives in engineering design and manufacturing, especially in automotive and aircraft industries. Aluminium (Al) alloys provide the solution for weight reduction in various structural applications. Forfurther enhancement ofsurface properties of these alloys, their surface composites are fabricated which exhibit high strength - weight ratio, better corrosion resistance, improved mechanical & wear properties as compared to base alloys. In this work, an attempt has been made to enhance the processed-layerhardness of AA 6063 sheets by synthesizing AA 6063/SiC surface composites using friction stir processing (FSP). Single pass FSP was performed on AA 6063 sheets using tool rotational speedat three levels of 900, 1120and 1400 rpm respectively.Traverse speed was maintained at a constant level of 40 millimetres/minute and tool tilt angle was kept at 2°. Optical microscopy was employed for observing microstructureof fabricated composites. Uniform distribution of SiC particles in the metal matrix was achieved.The Combination of 1120 rpm, 40 mm/min and 2° gave most homogeneous distribution and highest microhardness of 87 Hv. No interfacial reaction was observed between the aluminium matrix and SiC particles.

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Keywords: Aluminiumalloy;friction stir processing; SiC; microstructure; microhardness; rotational speed.

1. Introduction

The demand for weight reduction in various engineering applications like aerospace, automobiles, marines and other structural applications necessitates the use of lightweight materials like aluminium, magnesium, titanium etc. in place of ferrous alloys. Furthermore, apart from the weight reduction several other functional characteristics such as corrosion and wear resistance etc.are of added advantage.Aluminium alloy sheets are quite promising

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engineering materials due to higher specific strength, corrosion resistance etc. Interestingly, some of the desirable properties which are inherent in the Al alloys can be further enhanced through thedevelopment of metal matrix composites and grain refinement etc.Aluminium metal based composites exhibit excellent specific strength, stiffness, hardness and wear resistance [1]. Metal matrix composites (MMCs) can be synthesized using various techniques like high energy laser treatment [2], high energy electron beam irradiation [3], plasma spraying, cast sinter and casting [4], etc. These techniques are generally based on liquid-phase processing at elevated temperatures which results in intermetallic reactions, theformationof deleterious phases between themetal substrate and reinforcementand unfavourable microstructure[5]. Friction stir processing (FSP) is a solid state processing technique which is employed below themetal matrix melting point and overcomes the problem of formation of deleterious phases. Fabrication of surface composites and modification of light metal alloy surfacesis best achieved employing FSP [5, 6].

FSP is basically the derivative of friction stir weldingprocess which was developed at "The Welding Institute" in 1991 [7]. In its basic operation, a specially designed rotating tool insertsinto themetal matrix and traverses in the desired direction. This rotating tool generates the frictional heat and stirs and plasticizes the metal matrix. FSP is among severe plastic deformation (SPD) processes in which ultrafine-grained structures are produced. There are alot of other well-established techniques for grain refinement like multi-directional forging [8], accumulative roll bonding [9], high-pressure torsion [10], equal-channel angular pressing [11]etc. Most of the SPD processes modify bulk properties of the material. In contrast, to that FSP has unique features to modify surface characteristics along with the same material structure and properties in the bulk of the material. It evolves dynamically recrystallized microstructure possessing an appreciable number of high angle grain boundaries [12].

The main objective of current work is to modify surface properties of 6063 aluminium alloy sheets by synthesizing the surface composites of AA 6063/SiC sheets using FSP. In addition, to composite fabrication, theeffect of rotational speed on powder distribution is also investigated and observations are reported.

Fig. 1(a) SEM image of as-received SiC powder

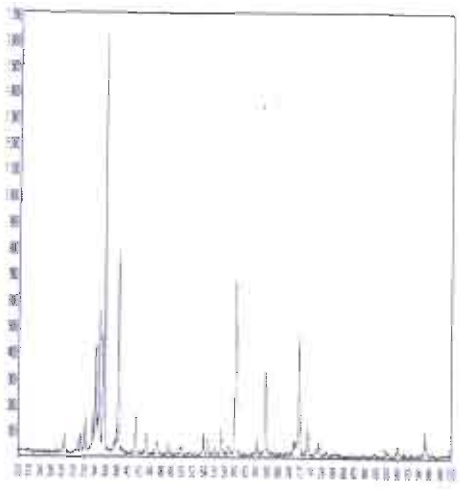

Fig. 1 (b) XRD image of as-received SiC powder

Experimental Study & Analysis of Genetic Operators for Alignment of Multiple Biological Sequences

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Abstract— This paper presents an experimental work to observe the effect of various genetic algorithm (GA) operators for alignment of multiple biological sequences which is a classical NP complete problem popularly known as multiple sequence alignment (MSA) problem with its application area in computational molecular biology. We have tried to solve the problem by varying various GA parameters in multiple ways and observed the effect of these on alignment. It is to be noted that the purpose of the presented work is not at all to propose an efficient GA based method for solving MSA problem but just to observe the effect of varying GA parameters. The proposed observations can surely help those who wish to apply GA method to solve the MSA problem by choosing the correct operators & parameters.

Key words : Multiple Sequence Alignment, Molecular Biology, Genetic Algorithm, GA Parameters

I. Introduction

Multiple Sequence Alignment (MSA) is one of the important and challenging problem to be solved in the field of computational biology. AMultiple Sequence Alignment (MSA) is a sequence alignment of three or more biological sequences, generally Protein, DNA, or RNA. Being able to align multiple sequences of DNA, RNA, or amino acids is essential for biologists to determine similarity in sequences which often leads to similarity in function and provides valuable evolutionary information. There are a variety of algorithms that exist for finding the most optimal alignment of a given set of sequences, including the Needleman-Wunsch Algorithm, the Smith-Waterman Algorithm, and the use of Hidden Markov Models to name a few.

Multiple sequence alignment is a computational intensive problem characterized by very high computational complexity.

Needleman and Wunsch [1] first used dynamic programming to align two sequences. This method was later extended directly to the comparison of three sequences using a three-dimensional matrix [2] reduced by Murata et al. [3] with $O(n^3)$ computational complexity, where n is the longest length of sequences to be aligned. Dynamic programming takes $O(n^k)$ time complexity for simultaneous multiple sequence alignment, where k is the number of sequences. Stochastic optimization methods were applied to solve multiple sequence alignment such as simulated annealing [5]. Gibbs sampling [6], genetic algorithms [7, 8, 9, 10, 11]. Simulated annealing can be quite slow. Gibbs sampling works quite well in finding local multiple alignment block with no gaps but is not good at in gapped situations. Isokawa et al. [7] and Wayama et al.[8] applied simple genetic algorithms [12] with bit matrices. Zhang and Wong [10] developed a method combining the techniques of genetic algorithms and pairwise dynamic programming. Notredame et al. [9] used a genetic algorithm for aligning two homologous RNA sequences through their secondary structure.

This paper explains about our project which aims at designing approaches based on GAs for finding globally optimal multiple alignments in reasonable time, starting from completely unaligned sequences. Project basically aims at understanding the effect of applying various GA operators on aligning multiple sequences

II. Proposed Work

A. We have implemented the various GA operators & recorded the experimental observations by varying the operators in number of ways as depicted in the table below.

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TABLE I. Variations of GA Operators

No. of Sequences	No. of Generations	Selection	CrossOver	Mutation	Gap Penalty	Scoring Matrix	Observations
20	Variable	Elitism	Single Point	Gap shuffle	-3	PAM 250	Alignment score improves with increase in generations
20	Variable	Random selection	Double point	Random Insert Delete	-2	PAM 250	Alignment score improves with increase in generations
20	Variable	Elitism	Max-Min	Gap Shuffle	-3	PAM 250	Alignment score improves with increase in generations
20	Variable	Elitism	Max-Min	Random Insert Delete	-3	PAM 250	Alignment score improves with increase in generations
Variable	2000	Elitism	Single Point	Gap Shuffle	-3	PAM 250	Better scores for lesser number of sequences as expected
Variable	2000	Random selection	Double Point	Random Insert Delete	-2	PAM 250	Better scores for lesser number of sequences as expected
Variable	2000	Elitism	Min-Max	Gap Shuffle	-3	GONNET	
Variable	2000	Random selection	Single Point	Random Insert Delete	-2	BLOSSUM	
20	1000	Elitism	Single Point (variable crossover rate)	Gap Shuffle	-3	PAM 250	Best results are obtained at cross over rate of 0.5
20	1000	Elitism	double Point	Gap Shuffle(Variable Mutation rate)	-3	PAM 250	Best results are obtained at mutation rate of 0.5
20	1000	Random selection	double Point	Gap Shuffle	Variable Gap Penalty	BLOSSUM	Better results shown for smaller values of Gap penalty
20	1000	Elitism	Single Point	Gap Shuffle	Variable Gap Penalty	PAM 250	Better results shown for smaller values of Gap penalty
20	1000	Random selection	Single Point	Random Insert Delete(Variable mutation rate)	-2	BLOSSUM	Best results are obtained at mutation rate of 0.5
20	1000	Random selection	Double Point(variable crossover rate)	Random Insert Delete	-2	PAM 250	Best results are obtained at cross over rate of 0.5

Recent Advancements in Requirement Elicitation and Prioritization Techniques

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Abstract— Requirement Elicitation identify as one of the most crucial knowledge intensive activities of software development. Most of the system fails due to use of wrong elicitation practice. A requirement is defined as a demand or needs. A System may have a dozen to thousands of requirement. Without the Elicitation technique it is impossible to find out the requirement and need of developing system. After Elicitation Technique we need to prioritize their requirements. This Research paper is based on understanding technique and their usage in the real time applications by using the Elicitation Technique and Prioritization Technique we know that it is important for knowing the need of the stakeholder so that the system developer can get a clear view of requirement for the developing system.

Keywords—Elicitation Techniques, Prioritization Techniques, Stakeholders.

I. INTRODUCTION

Elicitation is all about determining the need of stakeholder and learning uncovering, extracting and or discovering need of the user and other potential stakeholder [1]. Requirement Elicitation is all about knowing the desire of stakeholders [2]. The important goal of requirement elicitation is to find out what problem need to be solved. It can be defined as the process of identifying needs and bridging the disparities among the involved communities for the purpose of defining and distilling requirement to meet the constraints to these communities. Requirement Engineering is the branch of system engineering concerned with the real world goal for services provided by and constraints on a large and complex software intensive system. Once requirement are identified there is a need to prioritize them. Requirement should be prioritized so that the ones that are most likely to achieve customer satisfaction can be selected for implementation. Requirement Elicitation is one of the critical activities in the requirement engineering process. Prioritization is a Repetitive process that has to be performed during SDLC at different abstraction level and at different phases.

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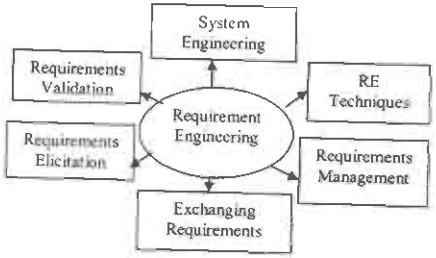

Fig. 1. Process of requirement engineering

II REQUIREMENT ELICITATION TECHNIQUE

Requirements elicitation technique will improve the quality of the Requirement Elicitation process and increase the success of software development.

A. Requirement Elicitation

Requirements elicitation includes learning, understanding the need of users; ultimate aim is to cope up the requirement between user and developer.

Requirement Elicitation is an iterative activity that depends on the communication skills of the requirement engineers and the commitment and corporation of the system stakeholders.

B. Elicitation Techniques

A technique can be defined as the way of doing something or practical method applied to some particular task. Elicitation techniques are tools of finding & exact understanding for the sake of stakeholders. The goal of Elicitation technique is to find out as many problems as possible so that it could become easier for stakeholder to get the best suitable application according to the requirements.

C Types of Elicitation Techniques

There are different ways to achieve the required information in Requirement Elicitation include direct approach, and indirect approach. Direct approach in this we interact with the domain expert and indirect approach it classifies on the basis of what type of information obtained.

- *Direct Approach:* In direct approach the purpose is to enhance the understanding of the problems of system that is currently in used. Most common techniques used are Interviews, case study, Prototyping. With these tools a comprehensive and comprehensive analysis of total procedure can been done. In this loom it is good to get the more knowledge about system and genuine data. In order for these methods to be victorious, the domain expert has to be reasonably coherent and willing to share information [3].
- *Indirect Approach:* In Indirect approach is to gather information is not easy task because the information is available in distributed form. Questioners, documents analysis are its examples. It has large quantity of data can be gathered from analyzing the documents. The results acquire from this type of investigation are easy to measure and an applicable test suggestion can be driven from them.

D Various Requirement Elicitation Techniques

Requirement Elicitation techniques are method used by analyst to determine the need of stakeholder and user, so with the help this system can have higher chances of satisfying those needs. Various requirement elicitation techniques are:

- *Task Analysis:* Task analysis is a top down approach where high level tasks are broken down into subtask until some events are described [4]. The basic aim is to build a hierarchy of task that should be performed by user and to tell which kind of knowledge is used to perform it. Task analysis provides basic information such as interaction between the user and system [5].
- Interviews: An interview is the most traditional and commonly used technique for Requirement elicitation [6].Interviews provides an efficient way to collect large amount of data quickly. Interviews basically depend on the quality of interaction among the participants. Types of interviews include unstructured interview, structured interview. Unstructured interviews are conversational in nature where the interviewer enforces only limited control over the direction of discussions [7]. Structured interview are conducted with the help of predetermined set of questions to collect information. The success of structured interviews depends upon what are the right questions to ask, when should they be asked, and who should answer them [8].Structured interviews tend to limit the investigation of new innovative ideas, they are generally considered to be more effective.

TABLE I. INTERVIEWING METHODS

Method	*Type*	*Output*	*Reference*
Interviewing	Direct	Procedures followed Knowledge used	[Hudlicka,1997] [Geiwitz,etal,1990]
Concept Mapping	Direct	Procedures Followed	[Hudlicka,1997], [Thordsen,1991], [Gowin& novak,1984]
Interruption Analysis	Direct	Procedures, Problem-Solving Strategy , Rationale	[Hudlicka,1997]
ARK (ACT based representation of knowledge)	Direct	Goal-subgoal network includes production rules describing goal/sub goal relationship	[Geiwitz,etal .,1990]
Cognitive Structure Anrlysis(CSA)	Direct	Representation format of expert knowledge, content of knowledge structure	[Geiwitz,etal .,1990]
Problem Discussion	Direct	Solution Strategies	[Geiwitz,etal .,1990]
Tutorial Interview	Direct	Experts taught	[Geiwitz,etal .,1990]
Uncertain Information Elicitation		Uncertainty About Problems	[Geiwitz,etal.,1990]
Data flow modelling	Direct	Data flow diagram (data items and data flow between them no sequence information)	[OTT.1998],[Gane & Sarson,1977]
Entity Relationship Modelling	Direct	Entity Relationship Diagram(Entities ,Attribute and relationship)	[OTT.1998], [Swaffield & Knight,1990]
Entity Life Modelling	Direct	Entity Life Cycle Diagram(Entities and State Diagram)	[OTT.1998],[Swaffiel d & Knight, 1990]
Object Oriented Modelling	Direct	Network of Object (types, attribute, relation)	[OTT.1998],[Rockett .,1991]

- *Introspection:* Introspection requires the analyst to develop requirements based on what he or she believes the users and other stakeholders want and need from the system [9].Introspection is really effective when the analyst is not only very familiar with the domain and goals of the system, but also expert in the business processes performed by the users.
- *Protocol Analysis:* Protocol analysis is that in which participants perform a task whilst talking it through aloud, describing the actions being conducted and the thought process behind them [10].This technique can provide the analyst with the specific information on and rationale for the processes the target system must support [7].

Web service discovery and Integration with QOS parameter using SOA based Repository

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Abstract—Any Organization needs to manage and analyze its information. The source of this information may not be the same, organizations use different information system to support their different area of work. Different departments of organization use their specific information system and platform to maintain their own data. But some information is needed by different departments for co-ordination between these departments. The distributed Web Service is managed by registries is issue in the circumstances of a Web Services which is on distributed system. The recent registry is managed and offer for distributed service registries are explained. By this explanation, it was created that none of any given offer that the requirements of flexibility, availability and scalability is proved in terms of the management of the registries. Therefore, a QoS based registry is introduced in current paper. The system uses tmodel(technical model) for storing of the service registries. In this paper involves design and implementation of a UDDI with QoS parameter. It helps to find quality web services using SOAP (Simple Object Access Protocol) message. . It serves two fold purposes; first to register quality web services. Second, find that service. A Software for the implementation of these aspects is contributed in this work.

Keywords—WSDL, SOAP ,tModel ,UDDI ,web services

I. INTRODUCTION

All organization is interested to develop such an application architecture which is flexible enough to deal with continuously varying requirements in a dynamic IT world. The problem that IT industry trying to deal dynamic environment caused by incessant changes. Though change is inevitable, but in the ongoing scenario requirements of users are changing frequently with change in environment (technology, business rules etc.). So the system design must be loosely coupled so that it can adapt new and changing requirements by applying less effort. [2] Web services got advancements in recent research because the way in which user can do practically the process of publish, locate and invoke web applications over the internet. The driving reason behind the development of web application is now web services. There is a possibility that single service may not fulfill the need of user so the user needs to integrate available services to get the desired functionality. The problem of web service integration is a very complex task.

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- The existing web services are in huge amount
- Web services are dynamic due to change in the user requirement.
- Web services are usually developed by different task and by different organization so they may be rely on different platform.

So there is a high probability that more than one of the Web services provides similar functionalities. Ideas are proposed in the research literature to discover the services fulfilling the consumer's requirements. These requirements are known as functional requirement, that is, what the service are going to perform, and non-functional requirements, such as QoS guaranteed by a service. The problem is that the information advertised about QoS of a Web service may not always trustworthy. A service provider may be publishing inaccurate and insufficient QoS information to gain more money, or the published QoS information may not be updated. This provides a general and accurate estimation of the reliability of service provider. [2]

II. LITERATURE SURVEY

A. Service Oriented Architecture (SOA)

Service oriented architecture is used to provide integration and development methods for system at different platform. Functionalities are used as business processes and packaged through interoperable services systems[1]. Data communication occurs through the available service oriented architecture. The SOA is a technique to provide loose coupling between services and technologies which used for applications development. In SOA, functions are divided as individual entity and can be compose to form an application. The following figure illustrates service oriented architecture.

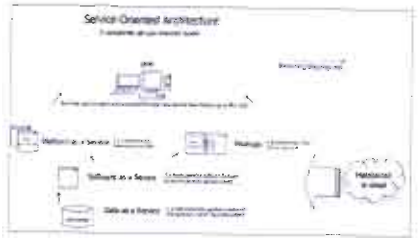

Fig. 1

"Service oriented architecture is defined as a set of services that communicate with each other." [15] According to authors of, "A service is an ascertainable, coarse-grained application with one instance and it interacts with other services in a loosely coupled, message-driven communication model." [15] SOA provides practice, not a solution. Some service-oriented terminologies are given below.

- Services: "A service is an independent entity. It shows the contract that can be enabled in published interface." [15] Services are used to encapsulate the business.
- Service provider: "It is an entity which is used to provide and publish services." [17]

Service consumer (or requestor): "It is an entity which can use the published services and also known as 'client'. It may be end user or service." [15]

- Service locator: "It is just like search engine which is used to locate service registries through the published interfaces." [15]
- Service broker: "It is a special provider which relegates the services." [15]

Applications that rely on SOA are known as set of software services. The services are independent to each other i.e. they do not use any hard code to call each others. Services can communicate through standard protocols. [16]

In comparison of existing practices that have done earlier attempts to increase modular software reuse, or by classes, SOA's objects are often more larger. [16]

In SOA, a large collection of metadata is used to describe the characteristics of the services and the data

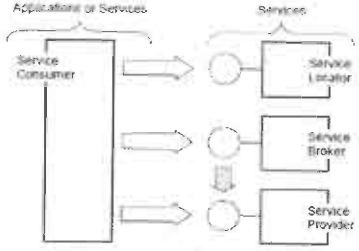

Fig. 2

that is used in activation process. Technologies such as XML, WSDL and SOAP are used to fulfill this requirement. Here one question can arise in mind whether these technologies are going to be use as long, are new coming to replace them. Followings are the standards for SOA to implement metadata.

- Metadata are used to configure application dynamically at runtime by finding and integrating the pre defined services. Integrity and consistency can also be maintained through it.
- Organization of metadata must be understood and managed at a minimal cost and effort.[17]

B. SOA Collaborations

A SOA is basically a combination of

- Service provider
- Service consumer
- Service registry.

All above collectively works to find bind and invoke. Consumer just inquires about the service in service registry[6][7]. If service found in the registry it returns the service location and interface through which one can interact. Services are published in the repository by the service providers.

C. Web service discovery

Web service discovery is a way to found appropriate web service from service repository. Service repository is a collective set of available web service with their location information and interfaces.

Web service discovery is "the way of locating a machine-process able description of a web service that may have been previously unknown and that meets certain functional criteria."[18][] the aim is to find a web service that meet user requirement. Discovery service is either provider agent or consumer agent. There are three approaches for web service discovery. [12]

D. Discovery, Registry, Index and P2P Approaches

Service information repository is an authorized registry. It is controlled centrally. Firstly we have to publish the service only after that user c

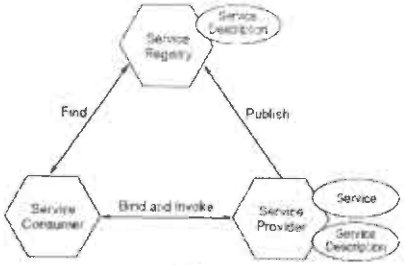

Fig 3

Black Hole Attack's Effect Mobile Ad-hoc Networks (MANET)

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Abstract—Ad-hoc network can be defined as a collection of number of mobile nodes which makes a temporary network. Black hole can be defined as a malicious node which on any request of route replies in an incorrect manner as if it has new route to the goal and then it drops all incoming packets. Loss will be very high if malicious nodes work collectively. This attack can be defined as cooperative black hole attack. This paper gives the analysis of Black Hole ADOV performance by frequently changing number of mobile nodes and by also changing black hole nodes. To analyze this various performance metrics are used which includes average end to end delay, loss of packet and packet delivery ratio and It has been seen that effect on end to end delay is higher that on loss of packet

Keywords—AODV, Ad hoc network,RRQ,Black Hole Attack,RREP, MANET

I. Introduction

A MANET is a dynamic wireless network formed by a set of mobile hosts which communicate among themselves by means of the air without any pre-existing infrastructure. For both video and data communication, mobile radio technologies has experienced a rapid growth. In term of acceptance the short range wireless systems, MANET claims widest penetration. IEEE 802.11 standard specifies "ad hoc" mode as an optional feature which allows devices to communicate directly with each other in peer- to- peer manner without any access points. Multi-hop routing by which they can extend the range of wireless networks. Range depends upon the concentration of wireless users.

II. Characterstics of MANET

Mobile ad hoc network is a collection of autonomous and mobile elements such as laptop, smart phone, tablet PC etc. The mobile nodes can dynamically self- organize in arbitrary temporary network topology. There is no preset infrastructure thus it does not have the clear boundary. Some main characteristics [2] of MANET are discussed below:

Infrastructure less:

MANET is an infrastructure less system which has no central server, or specialized hardware and fixed routers All communications between nodes are provided only by wireless connectivity.

1. Wireless links: Wireless links make Mobile Ad Hoc Network unreliable and susceptible to various kinds of attacks. Because of limited power supply of wireless nodes and mobility of nodes, the wireless links between those nodes in the mobile as hoc network are not consistent for communication participants.
2. Node movement: Mobile nodes are autonomous units in network which continuously change their position and topology independently. Due to continuous motion of nodes the topology changes frequently which mean tracking down of particular node become difficult.
3. Power limitation: The mobile hosts are small and light weight. They are supplied by limited power resources such as small batteries. This limitation causes vulnerability namely when attackers may target some nodes batteries to disconnect them, that may lead to network partition..

III. Routing Protocol

A large number of routing protocols have been proposed in the literature for the ad-hoc wireless networks. These protocols can be categorized as table driven / proactive protocols and source initiated protocols / demand- driven or reactive protocols. In proactive routing protocols, such as the optimized link state routing (OLSR), nodes obtain their routes by exchanging the topology information periodically. In reactive routing protocols, such as the ad hoc on demand distance vector protocol (AODV), nodes find routes only when they are in need.

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- Table-driven routing protocols [3] have up-to-date routing information of each node in the network. These protocols require each node to maintain one or more routing tables to store routing information. The information about any changes in the topology is informed to nodes by propagating its updates throughout the whole network.

Examples of table driven routing protocols are: Optimized Link State Routing (OLSR), Destination Sequenced Distance Vector (DSDV), etc.

- The On Demand routing protocols initiates the route discovery process within the network whenever there is a need of route to reach the destination. As soon as a route is discovered and established, it is maintained by the route maintenance procedure until any other destination by each node is inaccessible along every path or if the route is no longer desired.

Examples are: Ad-hoc On Demand Vector Routing (AODV), Dynamic Source Routing (DSR), Temporary Ordered Routing Algorithm (TORA) etc.

AODV is a reactive protocol so routes are only determined when they are needed . It allows them to choose their new destination. Different feature of AODV is that it uses destination sequence number for each route entry. The IETF (Internet Engineering Task Force) defined RFC 3561 for AODV

Other example of on demand routing protocol is Dynamic Source Routing (DSR).DSR protocol requires no administration by the network operator as it automatically finds and maintains routing in the network by storing source routes, discovered dynamically only when necessary. All the nodes act as routers and participate in the packet forwarding process. Description of DSR is available in RFC 4728.

IV. Security Issues

Security [4] is the primary concern in order to provide the protected communication between the mobile hosts in hostile environment. Similar to other networks, MANET is also vulnerable to various types of attacks. Each layer in the ad hoc network protocol communication has its own vulnerabilities. There are a wide variety of attacks that target the weakness of MANET. For example, routing messages are an essential component of mobile network communications each packet needs to be passed quickly through intermediate nodes, which the packet must traverse from a source to the destination. So attack can be from any intermediate node. Malicious routing attacks can target the routing discovery or maintenance phase by not following the specifications of the routing protocols. There are also attacks that target some particular routing protocols, such as DSR, or AODV. More sophisticated and subtle routing attacks have been identified recently in the literature, such as the black hole (or sinkhole), Byzantine, and wormhole attacks

In the physical layer, mobile nodes along with communication links are vulnerable to active and passive attacks. The mobile ad hoc networks are more prone to suffer from the malicious behaviors than the traditional wired networks because of their lack of secure boundaries. The unique characteristics of MANET present a new set of nontrivial challenges to security design.

A. Vulnerabilities of the Mobile Ad hoc Network

Reasons of vulnerability in MANET are

- Lack of secure boundaries: There is not a clear secure boundary in mobile ad hoc networks as in wired networks. This is because of the reason that any node in the mobile network has the freedom to leave, to join and to move inside the network.
- Threats from compromised nodes inside the network: As mobile nodes are autonomous units they can leave or join the network with freedom. Due to the behavioral diversity of different nodes it is hard for nodes to prevent the possible malicious behavior of all nodes it communicates.
- Lack of Management Centralized facility: The absence of centralized management makes the detection of attack very difficult as it is not easy to monitor the traffic in the highly dynamic large scale network. Due to this, failures happen such as path breakage, transmission impairment and packet dropping happens frequently. The absence of centralized management machinery can cause vulnerability that can influence several aspects of operations in the mobile ad hoc network.
- Restricted Power Supply: Due to mobility of nodes in ad hoc network the nodes have to rely on battery as their as their power supply method. But in case of wired network they do not need to consider power supply as they get their power from the outlets. In ad hoc networks nodes need to considered restricted power supply which will cause several problems like Denial of Service in which the adversary knows that the target node power restricted but it keeps on sending additional packets to the target node.

V. Classification Of Attacks

Various attacks can be broadly classified as:

- Passive attacks include packets containing secret information might be eavesdropped, violating the confidentiality principle.
- Active attacks include injecting packets to invalid destinations, deleting packets, modifying contents of packets, and impersonating other nodes.
- External attacks in which the attacker motive is to cause congestion, propagating fake routing information.
- Internal attacks are those in which the adversary [4] wants to achieve normal access to network and it participates in the network activities

Open Data Kit- Use of Smartphone Technology for Surveying

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Abstract—currently surveys are paper-based which are slow and even prone to errors. So to mitigate these problems it is useful to replace the work paper work with electronic devices such as smart phones, tablets, and laptops. To replace the paper forms with electronic devices such as smart phones or tablet, I used open data kit as an application and build a survey form for pregnant women. With the help of Open data Kit (ODK), it takes very less time and very less to prone errors. It helps us in development and improvement of the growth of notation and provides us the useful result.

Keywords— *ODK Collect, Xforms; ODK Aggregrate; ODK Server*

I. Introduction

NOW these days, we saw that the death rate of new born baby from birth to four week is growing very fast. The death rate of infants is a very sensitive topic in the social-economic development of the country. According to the survey, it had occurred at the almost one million children survive 20 -25 days of their life. According to the survey occurred in 2014, it has found that among 1000 of new baby only 20 babies can serve their life successfully. The main reason of death of neonatal had occurred before the baby is born. It had found that high rate of neonatal mortality are occurred on those mother, whose age is less than 20 years. Among hundred new born babies 33 babies lost their lives in the beginning of month. While rest, new born children lost their life within the two weeks. It is also done to the early marriage of the women due to the backward thinking of people and low rate of poverty in our country. Others reason is also the early birth and the very less weight of the new born baby. In Indian rural area due to lack of facilities and money, most of the delivery of the woman can take place at their own houses by local society housewives. As well as the environment affects a lots in which the baby is survive. It is also important to know about the father and family relative's habits such as the smoking of parents and un-hygienic or polluted water and sanitation. As part from these basic issues, the main issue is that, our paper work had not corrected. For example some typing mistake can occurred, people of our country avoid to do survey by going home to home of an individuals. It is an important factor that we can consider to develop our country and the growth of the nation as well as. Therefore, assessing data quality is essential to analysis. To analyze the real and the accurate data in which we can include all the section related to the environmental condition, family habits, new born mother and father, are taking any harmful disease or not. For doing all the process, I used the ODK server and make the simple form using X Forms and analyze the data.

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II. Related Work

The available software options that we identified are Kuboform [16] It works on designer based forms. Pureforms [17] It works on GWT designer based form. XLS2Xform [18] It used different spreadsheets to design forms. EpiSurveyor[19] It used J2ME (Symbian operating system) form to design. This is a closed source software used mainly to fixed bugs. Open Xdata: It also uses the J2ME (Symbian operating system) platform to design form. This is open source software , and used by all users. It also supported the many features of HTML5. Among all of these different platform, we have not choose EpiSurveyor and Open Xdata due to the hardware issues. Many of the system did not support the required configuration. By the constraints of time and fast and easy computation process, we had chosen ODK as a platform to design the form. In ODK has some important features such as GPS facility , capturing the images and lots of data.

III. Proposed Methodology

WE have used Open Data Kit (ODK) software that immediately digitizes data for analysis, allows for remote monitoring of the collection progress, and facilitates the gathering of data, eliminating the need for paper surveys and therefore significantly reducing survey times.
ODK implements OpenRosa subset of XForms, with OpenRosa, XForms, designers can specify a wide variety of control and data types including text, integer, decimal, select-one, select-multi, image, audio, video, barcode, and location. Designers can also create entry constraints, read-only prompts. ODK has following parts.

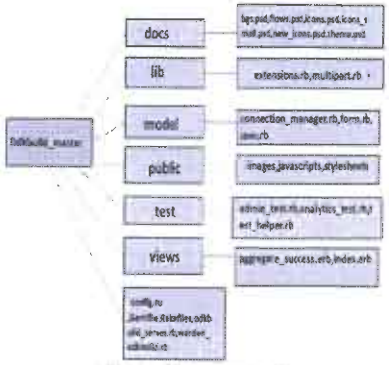

Fig. 1. Architecture of ODK

A. ODk Build

Build is a drag-and-drop application to design forms that generates the logic used by the tools. Build is implemented as an HTML5 web-based application using JavaScript and Ruby Rack.

Fig. 2. ODK Build

All the ODK's implementation is done in XForms as it is a Common Format to ensure that each of the tools could be used independently but also with each other. XForms are an XML-based form description standard designed by the W3C for the next generation of web forms. ODK implements the OpenRosa subset of XForms that makes ODK compatible with many others' tools.

B. ODk Aggregrate

Aggregate is a repository for blank forms and completed survey forms. We have deployed ODK aggregate on MUC server whose url address is: mucodk.iiitd.edu.in:8080/ODK Aggregate.

Aggregate is designed to be a generic data storage service that will run on the user's choice of computing platform. Importantly, it can receive data from any phones and servers which are Open Rosa compliant.

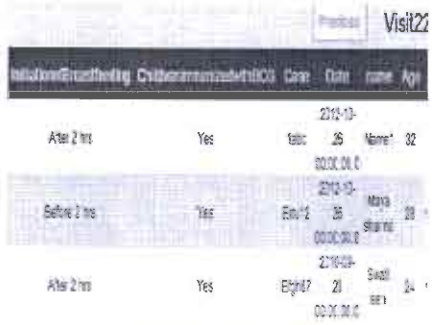

Fig. 3. ODK Aggregate implemented on MUC Server

C. ODk Collect

Collect is the application, in which we can store all the data that we can run on mobile phone with the help of ODK mobile application. It can easily converted our store data into different format such as XML format, spreadsheet etc. It wills runs on the device and interacts with the user very easily and completes all the process within few steps. For developing the form, we can use the simple XML. User can download blank forms from the ODK Aggregate server and upload completed forms to the Aggregate server as well.

1) Configuration of ODK Collect: Initially we entered all login details in the ODK server to access the ODK collect server. In ODK collect server, all the data that are taken through survey are stored. After login through ODK Aggregate server, we had switch to ODK Collect application, and after that press the Settings button and click on Change Settings. Click on URL and enter the above stated URL. Now fill the Username and Password of the Aggregate server account to access it.

An Enhanced and effective Preemption Based Scheduling For Grid Computing Enabling Backfilling Technique

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Abstract— Recent improvements in designing the schedule ing algorithms for cluster mainly focuses on the advance reservations and Backfilling algorithms. Backfilling has been proposed and launched in various flavors to have an idealistic utilization of the resources and computing capacity of the cluster. However backfilling demands the runtime prediction of the job. Preemption of process in the scheduling queue is done to reduce the starvation and to fulfill the requirements of the proposed algorithm. We have applied the proposed algorithm in the cluster designed through TORQUE and preemption support through BLCR. Another implementation is done for MPI jobs in LAM environment with BLCR as a job checkpoint and restart facility. Proposed algorithm is compared with the Backfilling techniques with preemption support. Algorithm showed around 3%-5% reduction in average turnaround time and 6%-8% increment of throughput rate.

Keywords— cluster scheduling; backfilling; preemption

I. INTRODUCTION

Fast computing is the need of every organization in now a day's scenario. This fast computing can be attained through the Supercomputers or by using very fast processors but these results into input of great amount of financial support and technical expertise. Another way to approach it to use of distributed systems, where large number of desktop machines are connected for resource sharing and computing utilization. Selection of these computing nodes for the job is the most important task because it aims that computing nodes should not be free for long time. This selection procedure is proposed by various policies. Each policy decides its scheduling queue and places the job into execution accordingly. To move ahead a job in the queue due to unavailability of resources for the higher priority job is called backfilling scheduling. Backfilling is applied mainly in two forms Conservative backfilling and Easy backfilling. Conservative backfilling does not allow a job to be backfilled until it gets the surety that it would not delay the execution of any high priority job of that job. Easy backfilling is more aggressive backfilling technique which just cares about the execution delay of first job in the queue We have proposed the update of the work presented by SJF-BF[10]. It is an greedy approach which chooses best job to schedule at the time of arrival of any job. Job are prioritize on the basis of shortest remaining time first. For achieving this some jobs can be required of preemption. These jobs are resumed at a later stage when resources are available. Cluster is maintained by PBS [5] and preemption is achieved through Berkeley Lab Checkpoint Restart [BLCR][6] facility. Basic job flow requires job submission, scheduling, execution and finalization. Proposed algorithm is also evaluated for the MPI [7] jobs. MPI is the message passing library used for sending messages between parallel processes. It is only standard library for message passing and is widely used almost on all High performance computing systems.

II. RELATED WORK

Backfilling is the method in which utilization of remaining CPU cycles are utilized by a lower priority job with the condition when current scheduled process is lacking of its resources. Author in [1] proposed that to find a suitable match to backfill a job should not be restricted to a job which would ensure its completion before scheduling of regular job. Paper suggested that backfilled job would be preempted in case it is not completed. But paper is using stop restart facility and if backfilled process is preempted then it would be started from the beginning again. Author in [2] discusses an approach which combines the approaches of backfilling and co-scheduling that is gang scheduling. Paper addresses the issues of overestimating the execution time of the processes and the job completion time estimation in gang scheduling. Authors in [3] claims that backfilling results analytics depends upon the type of workloads. For different types of workloads EASY backfilling and Conservative backfilling produces variety of results. Another approach discussed is that in case of overestimation of runtime proves to be beneficial for backfilling but author has not described that corresponding scenarios and drawbacks which can be produces by overestimation of runtimes. Strict fairness is targeted by [4]. It proposed preemption based EASY backfilling scheduling. Dynamic scheduling is done for MPI jobs in [8]. It applies process migration and automates the decision making for parallel message passing jobs. MPI jobs have been modeled as Divide and conquer approach in [9] and many popular approaches have been applied over these jobs.

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III. MODEL AND ENVIRONMENT

A. PBS and BLCR

Proposed model is the composition of a Portable batch system (PBS) resource manager, scheduler, resource pool, ready queue and waiting queue. Each job declares its estimated execution time and number of required resources of each type during the execution along with the type of job, whether it is a hard dead line job or a soft dead line job. Resource manager identifies the job and map the job requirement with the available resource types in the resource pool. We have used resource manager TORQUE in this work which is an open source implementation of PBS. Interconnection between different components is based on client-server architecture. Server executes tasks and requests on behalf of clients. Batch objects like jobs and queues are managed by batch server. Input of job to the sever is submitted by QSUB command. Output of the job can be observed by the output file written in the SPOOL directory of the TORQUE home.

B. Components of cluster

1)Server

Server maintains synchronization with resource manager, scheduler, client nodes and execution/computing nodes. Server daemon is started by PBS_SERVER command. After starting the server all the PBS_MOM daemon are started at computing nodes. When all the nodes in the cluster are available cluster status can be checked by pbsnodes command as shown in Fig.2. Each computing node specification are stated in the config file maintained by the server. Server generates cluster distribution scripts to configure each type of nodes in the cluster.

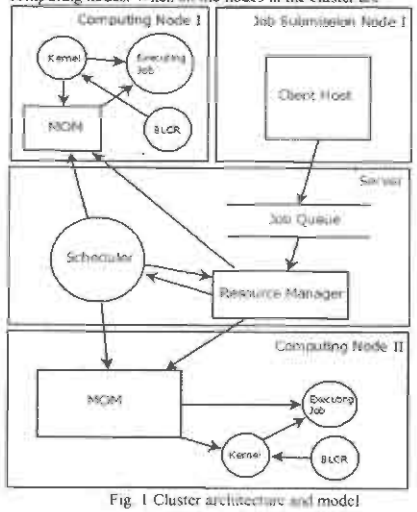

Fig. 1 Cluster architecture and model

2)Job Submission node

Client scripts are transferred to these nodes. These nodes work as client sites, job can be submitted at these nodes, job status can be tracked. Output of the completed job is transferred to the job submitting node.

3)Computing node

Computing nodes are the execution nodes which are called MOM, and the capacity of these nodes tells the specifications of the cluster. These nodes run PBS_MOM daemon.

4)Scheduler

Scheduler runs PBS_SCHED daemon and it interacts with the policy set by the server to map the cluster resources to the job. Proposed model runs the SJF-BF policy to schedule the jobs.

5)Data Management

Data management is done for the uninterrupted communication between nodes of the cluster. Each machine uses RSA authentication for communication. Server distributes its public key to all the cluster nodes and stores the public keys of all the cluster nodes.

6)Preemption support setup

Preemption is achieved through the BLCR which is a kernel level utility to stop and resume the job. It uses assembly code to store the status of execution. It allows a program to be stopped in the middle and some other program can take it's resource. It saves a status file named context.programPID. To resume the job this context file is given as input and program is resumed from that saved context only.

C. LAM and BLCR

Proposed scheduling algorithm is applied over the MPI jobs. LAM has been used to provide the environment to use MPI library and to execute MPI jobs. BLCR is integrated with LAM to support stop and resume MPI jobs.

IV. ALGORITHM

Proposed scheduler algorithm is given in Figure.3. It calls following three functions SortQueue which return a sorted queue and it is called every time a newly job is arrived in the cluster. If any present running job gets lower priority after the calling of SortQueue method, then it needs to be preempted and to save its present context. For it method Preemjob is called with to be preempted job as the argument of the method. Preempt job is an assembly code which save the registers values used by the process and use it later to resume the job. Dynamic allocation of priorities are used

```
Queue SortQueue()
{
1. Calculate Remaining execution time of currently
```

Search System: Effective Solution to Medical Problems

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Abstract– The content of web is increasing rapidly and search engines are used to search the web content. Along with this, it is also becoming a point of focus for academic research. Computer programs are needed in order to conduct any processing of web pages. Many web search engines as well as many more specialized search tools rely on web crawlers to acquire large collection of pages for indexing and analysis. Crawlers follow the hyperlinks in web pages to automatically download new and updated web pages. With the outbreak in diseases and increase in the number of people affected by it, there was a high need to make the process of treatment quite flexible through the combination of medicine and internet. In this paper, we describe the design and implementation of medical search engine which is used to fetch the web content related to medical field. It is an innovation to help the people to readily search their nearby hospitals and utilize the best treatment as soon as possible. The project will bring disease description and possible hospitals, NGOs together on a common platform. It will be an easy effort to search for the best effective treatment centre through internet.

Keyword: - Indexer; crawler; googlebot; ranker.

I. Introduction

In today's world, technology has touched every aspect of life but it is sad to hear that millions of people die every year not because of lack of medical facilities but because of lack of knowledge about the available medical facilities. The right to good health is of paramount importance. India has the most inequitable healthcare scenario feasible. On one hand, our country is becoming the hub for medical tourism where people from other countries flock to get good quality medical treatment. On the other hand, most of these facilities seem to be unavailable to the natives. The reason is the poor financial condition of the people. Many government policies and NGOs help such people but knowing about them is still a challenge for the people. One of the ways to make this search easy is by a search system. A search system is a software system that is designed to search for information on World Wide Web. The project aims at providing a search system which can be used to make searches related to medical fields including detailed information about the diseases, hospitals and NGOs providing cure for the same. The search system consists of various modules like a web crawler, an indexer and a ranker etc.

A web crawler is an internet bot that systematically browses the World Wide Web, typically for the purpose of web indexing. Web crawlers can copy all the pages they visit for later processing by search engine that indexes the downloaded pages so that users can search them much more quickly. It updates their web content or indexes of other sites' web content. Indexing in the form of information retrieval is collecting, analyzing and storing data from different textual contents to allow faster retrieval of information inside those data. The index is not an assemblage of documents in which, one can search, rather a list of terms, mostly words, being in these documents and which can be retrieved. Ranking approach to retrieval is oriented towards the end-users. The approach allows the user to input a simple query such as a sentence or a phrase and retrieve a list of documents ranked in order of likely relevance. In ranking approach, all the terms in the query are used for retrieval with the result being ranked based on co-occurrence of query.

A. Motivation

Along with the advancement in the field of medical science, increase in rate of diseases and health issues cannot go unnoticed. We know that the knowledge and identification of various diseases has never been quite common and easy for everyone. The basic problem that any individual faces is to realize the symptoms regarding the disease he's suffering from. Once the symptoms are known, one can easily search on the World Wide Web (the internet) regarding the details of the disease that he might be suffering from. The next step after detailing oneself on the suffering disease, comes the hospitals that can be found nearby the locality of the individual which Offers the healthcare facilities for the same disease are one of the major issues faced by all today. Due to the development in the area of medical science, the expense of cure including the doctor's consultation, medicines and tests have raised so much that the common man sometimes fail to avail all the healthcare facilities available these days. In this scenario, the non-governmental organizations play a vital role by helping the poor and needy. There are several NGOs in India to help cure the poor and unhealthy. The facilities provided by them are of great help to people who cannot afford to pay the heavy hospitals bills. Now suppose, in this situation what if all the information regarding the disease, nearby hospitals offering cure as well as the NGOs working for the same are found as one page result online through any search system. Wouldn't that be of great use! Therefore, our project focuses on providing a search engine that provides the result containing solutions to all the three issues discussed above, by typing just one query.

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B. Background

Google runs on a distributed network of thousands of low-cost computers and can therefore carry out fast parallel processing. Parallel processing is a method of computation in which many calculations can be performed simultaneously, significantly speeding up data processing. Google has three distinct parts: Googlebot is a web crawler that finds and fetches web pages. The indexer sorts every word on every page and stores the resulting index of words in a huge database. The query processor compares your search query to the index and recommends the documents that it considers most relevant.

1. Googlebot, Google's Web Crawler.

Google's Web Crawler: Googlebot is Google's web crawling robot, which finds and retrieves pages on the web and hands them off to the Google indexer. It's easy to imagine Googlebot as a little spider scurrying across the strands of cyberspace, but in reality Googlebot doesn't traverse the web at all. It functions much like your web browser by sending a request to a web server for a web page, downloading the entire page, and then handing it off to Google's indexer. Googlebot consists of many computers requesting and fetching pages much more quickly than you can with your web browser. In fact, Googlebot can request thousands of different pages simultaneously. To avoid overwhelming web servers, or crowding out requests from human users, Googlebot deliberately makes requests of each individual web server more slowly than it's capable of doing. Googlebot finds pages in two ways: through an add URL form, www.google.com/addurl.html, and through finding links by crawling the web [1].

Although its function is simple, Googlebot must be programmed to handle several challenges. First, since Googlebot sends out simultaneous requests for thousands of pages, the queue of "visit soon" URLs must be constantly examined and compared with URLs already in Google's index. Duplicates in the queue must be eliminated to prevent Googlebot from fetching the same page again. Googlebot must determine how often to revisit a page. On the one hand, it's a waste of resources to re-index an unchanged page. On the other hand, Google wants to re-index changed pages to deliver up-to-date results. To keep the index current, Google continuously re-crawls popular frequently changing web pages at a rate roughly proportional to how often the pages change. Such crawls keep an index current and are known as fresh crawls. Newspaper pages are downloaded daily, pages with stock quotes are downloaded much more frequently. Of course, fresh crawls return fewer pages than the deep crawl. The combination of the two types of crawls allows Google to both make efficient use of its resources and keep its index reasonably current [2].

Fig. 1 Crawling in Googlebot

2. Google's Indexer:

Googlebot gives the indexer the full text of the pages it finds. These pages are stored in Google's index database. This index is sorted alphabetically by search term, with each index entry storing a list of documents in which the term appears and the location within the text where it occurs. This data structure allows rapid access to documents that contain user query terms.

To improve search performance, Google ignores (doesn't index) common words called stop words (such as the, is, on, or, of, how, why, as well as certain single digits and single letters). Stop words are so common that they do little to narrow a search, and therefore they can safely be discarded. The indexer also ignores some punctuation and multiple spaces, as well as converting all letters to lowercase, to improve Google's performance [3].

3. Google's Query Processor:

The query processor has several parts, including the user interface (search box), the "engine" that evaluates queries and matches them to relevant documents, and the results formatter. http://www.google.com/technology/PageRank is Google's system for ranking web pages.

A page with a higher PageRank is deemed more important and is more likely to be listed above a page with a lower PageRank. Google considers over a hundred factors in computing a PageRank and determining which documents are most relevant to a query, including the popularity of the page, the position and size of the search terms within the page, and the proximity of the search terms to one another on the page

Energy efficient clustering based 3-Rank heterogeneous network model for Wireless Sensor Network

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Abstract— Now-a-days many advanced technologies have been innovated in the field of Wireless Sensor Networks (WSN). The main problem regarding wireless sensor network is the improvement of its energy efficiency in the clustering protocol. Most of the direction-finding or path finding challenges are faced by WSN in terms of node deployment, energy consumption, communication range, fault tolerance, quality of service, etc. In this paper, the impact of heterogeneity of nodes are related to their nodes energy are considered. In wireless sensor networks nodes are divided into three types (type-1, 2, 3) based on their energy. We assume that nodes of type-1 energy are equipped with the additional energy resources than type-2 nodes and type-2 is having more energy than type-3 nodes. It is also assumed that the sensor nodes are arbitrarily disseminated. The dimension and sensor field and the coordinates of sink are known in advance. In homogeneous clustering protocol, all sensor nodes have same amount of energy. In this work we worked on energy efficient heterogeneous clustered scheme for WSN. Also we have simulated the results and find that the proposed approach in heterogeneous clustering is more effective in lifetime as compared to other protocols.

Keywords—Wireless Sensor Network, Clustering, Heterogeneous Networks, 3-Rank.

I. Introduction

Wireless Sensor Network (WSN) is an arrangement of sensor nodes such that they can communicate with each other using wireless network. It consists of many sensor nodes which can sense the environment and processed this sensing data into information and sends to the user through monitoring centre. Sensing can be in the form of humidity, light, sound, vibration, etc. Many protocols and algorithms are used to gather information from these networks. There are many applications where sensor network is used like agriculture, security, military and surveillance, building monitoring and many more [1]. These nodes can be deployed in sensing field through random fashion or uniformly.

A. Various Issues Related To WSN

The major issues that are related to the issues of design and performance of a wireless sensor network are as follows[18]:

- Wireless Radio Communication Characteristics
- Deployment
- Localization
- Synchronization
- Calibration
- Network Layer
- Transport Layer
- Data Aggregation and Data Dissemination
- Database Centric and Querying
- Architecture
- Programming Models for Sensor Networks
- Middleware
- Quality of Service
- Security

B. Clustering in Wireless Sensor Networks (WSN)

The sensor nodes of WSN are divided into different clusters. Each node of a cluster is managed by a central node called cluster head (CH) [19]. The others nodes are referred as cluster nodes (CN). Cluster nodes passed the data to the cluster head and do not communicate directly with the sink node. Cluster head collects and aggregate the data, and transfers to base station. In this way it minimizes the energy consumption by reducing the communication with base station. The main advantage of this approach is to maximize the network lifetime and reducing the energy consumption [2].Sensor Nodes are the core component of WSN and can sense, process, routing etc.

Cluster Head worked as leader and responsible for various activities like data aggregation, data transmission to base station, scheduling in the cluster, etc[19].

Base Station is considered as main data collection node for the entire sensor network. Base Station creates a bridge between the sensor network and the end user. Generally Base Station is considered as a node without any power constraints.

Clusters are the organizational unit of the network to simplify the communication in the WSN.

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II. Literature Review

A research in year 2000, introduced Low-Energy Adaptive Clustering Hierarchy (LEACH) stated that minimization of global energy usage by distributing the load to all the nodes at different points in time. Low-Energy Adaptive Clustering Hierarchy uses localized coordination to enable scalability and robustness for dynamic networks. Also it incorporates data fusion into routing protocol to reduce the amount of information to be transmitted over the network. Distributing the energy among the nodes in WSN reduces energy dissipation and enhancing system lifetime [3]. Another approach in 2002 analyzed low-energy adaptive clustering hierarchy (LEACH) and experienced that it is protocol architecture for micro sensor networks. It combines cluster based routing and media access together with application specific data aggregation and achieve better performance in terms of system lifetime, latency, and application-perceived quality [4].

Every sensor node in a heterogeneous hierarchical network elects as a cluster head based on its initial energy relative to other nodes. This approach is called Stable Election Protocol (SEP) [5]. SEP is based on weighted election probabilities of each node to become cluster head based on the remaining energy at each node. SEP provides longer stability period and higher average throughput than other clustering heterogeneous protocols.

Later in 2006 a new better approach proposed namely Distributed Energy Efficient Clustering (DEEC). In DEEC, CH is chosen through a probability based on ratio between the energy (residual) of each and every node and the average network energy. The high initial and residual energy nodes will have more chances for the CH than the low energy nodes. To control the energy usage of nodes by using adaptive approach, DEEC uses the average network energy as the reference energy. Therefore, DEEC does not need any information about energy at every election round. Unlike SEP and LEACH, DEEC can perform well in multi-level heterogeneous WSNs [6].

Energy Dissipation Forecast Method (EDFM) [7] was proposed in 2009. This approach is based on energy dissipation forecast method which considers the residual energy and energy consumption rate in all nodes. This algorithm uses average energy consumptions of two types of cluster heads in previous round as energy consumptions for the next round to forecast cluster heads.

Again in 2009 Stochastic Distributed Energy Efficient Clustering (SDEEC) [8] approach developed for heterogeneous WSNs. This protocol divides the network into dynamic clusters and these cluster's nodes communicate with an elected node called cluster head (CH). CH aggregates and communicates the information to the base station. It introduces a stochastic scheme detection to prolong the network lifetime.

An Effective Data Gathering scheme was proposed in 2009 [9] for heterogeneous energy WSNs (EDGA). EDGA minimizes energy consumption for network communications and balancing the energy load. EDGA is based on weighted election probabilities of each node to become a cluster head, which can better handle the heterogeneous energy capacities. Moreover, EDGA adopt a simple but efficient method to solve the area coverage problem in a cluster range, namely intra-cluster coverage. The simulation results demonstrate that the proposed EDGA significantly outperforms LEACH, HEED in terms of network lifetime and the amount of data gathered in the heterogeneous energy network.

A new approach introduced in 2012 viz. Clustering in Wireless Sensor Network using K-MEANS and MAP REDUCE Algorithm [10]. In this approach the network is divided into different clusters. They have taken approx only 5% of the total number of nodes of a network. These nodes are assigned to the cluster having minimum distance to the cluster head having maximum energy. The distance is calculated using Euclidean Distance Formula. The results shown that placing the cluster heads using some minimal distance performs well than placing them randomly.

III. Heterogeneous Model for WSN

In this section we will discuss about various types of heterogeneous resources its impact of heterogeneity and performance factors of WSN.

A. Types of Different Heterogeneous resources

There are three common types of resource heterogeneity in the following three types of sensor nodes:

- Computational Heterogeneity: In this type of heterogeneity, the heterogeneous node has a powerful microprocessor and larger memory[11,12].
- Link Heterogeneity: In this type of heterogeneity, the heterogeneous node has high bandwidth and large network transceiver. It can provide reliable data transmission [11,12].
- Energy Heterogeneity: The heterogeneous node is line powered or has replaceable battery [11,12].

Among these types of resource heterogeneity, the main important heterogeneity is energy heterogeneity because of less

Dual Lexical Chaining for Context Based Text Classification

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Abstract—Text Classification enhances the accessibility and systematic organization of the vast reserves of data populatingthe world-wide-web. Despite great strides in the field, the domain of context driven text classification provides fresh opportunities to develop more efficient context oriented techniques with refined metrics. In this paper, we propose a novel approach to categorize text documents using a dual lexical chaining technique. The algorithm first prepares a cohesive category-keyword matrix by feeding category names into the WordNet and Wikipedia ontology, extracting lexically and semantically related keywords from them and then adding to the keywords by employing a keyword enrichment process. Next, the WordNet is referred again to find the degree of lexical cohesiveness between the tokens of a document. Terms that are strongly related are woven together into two separate lexical chains; one for their noun senses and another for their verb senses, that represent the feature set for the document. This segregation enables a better expression of word cohesiveness as concept terms and action terms are treated distinctively.We propose a new metric to calculate the strength of a lexical chain. It includes a statistical part given by Term Frequency-Inverse Document Frequency-Relative Category Frequency (TF-IDF-RCF) which itself is an improvement upon the conventional TF-IDF measure. The chain's contextual strength is determined by the degree of its lexical matching with the category-keyword matrix as well as by the relative positions of its constituent terms. Results indicate the efficacy of our approach. We obtained an average accuracy of 90% on 6 categories derived from the 20 News Group and the Reuters corpora. Lexical chaining has been applied successfully to text summarization. Our results indicate a positive direction towards its usefulness for text classification.

Keywords—Context based TC, Category-keyword strength, Lexical Chaining, Term Frequency-Category Frequency, Position Parameter, Cohesiveness.

I. INTRODUCTION

The corner stone for the progress of modern civilization is the ready availability of intelligible information. The World Wide Web (www) is a vast repository of structured as well as unstructured data contained within an ever-evolving collection of documents. Text Classification (TC) performs the first step in deriving sense out of this morass of data and extracting meaningful information by categorizing documents into a set of cohesive topics or themes. This finds applications in organizing corporate data [1], medical records [2], scientific data [3], news feeds [4], emails [5] and a range of such data-centric applications [6].

The very successful and popular statistical approach to TC [7] [8] [9] is based on the premise that frequently occurring non-trivial words represent the underlying concept expressed by the contents of a document. A different viewpoint projects that it is the correlation between words rather than their repetitiveness that is a more intuitive way of discerning the meaning of a text document. This approach has opened up a new channel for research on *context based TC*, exploring an interesting array of context-driven features to ascribe a thematic category to the document. These features include distance between words, Parts of Speech (POS), hierarchical relationship between domain terms and repeated co-occurrence of significant words, lexical cohesion, referential pronouns and substitution [10] [11]. The context based approach utilizes the underlying semantics in a document, lending itself well to applications that are pivoted around word meanings such as text summarization, essay evaluation, word puzzle solvers and business intelligence.

In this paper, we utilize the concept of lexical cohesion to construct a linkage of connected words. Lexical cohesion refers to the linguistic relationships between words that bind them together so that they function together to signify some common concept. The lexical references of a word include its synonyms, hypernyms, hyponyms, meronyms and coordinate terms [12]. We combine the statistical route using word-frequencies with a context approach by scooping out groups of lexically related words spanning different parts of a document to extract a chain of lexical references. The aim is to cull out meaningful linkages of salient words to form a lexical chain that indicates one cohesive thread for describing the document's discourse. A document may contain many such threads. The dominant ones are those that contribute to its topic significantly. The distribution and density of such chains indicate the coherence of text and provide clues for determining the discourse structure and underlying semantics and therefore the document's higher-level meaning. The challenge is to extract all lexical chains and evolve a method to measure their contribution towards the document's core theme

Dedicated research groups have pooled together a vast repertoire of English words and organized them in semantic formations. Prominent among these is the lexical database Word Net [13] that knits together English words into a fabric of synonym-sets, hypernyms, hyponyms, coordinate terms, meronyms, holonyms etc The specialization of concepts (nouns) allows Word Net to be used as an ontology [14] The Wikipedia itself can be tapped as an ontology from which concepts related to a topic can be culled [15][16][17]. In our work, we tap the power of Word Net and Wikipedia to extract the semantic togetherness of multiple words within a document forming lexical chains, evaluate their *strength* and slot them with different categories to find the best match. We build two kinds of lexical chains for the words; one with their noun senses and another with their verb senses. This refines the resolution of semantic coherence by discriminating between words relations in the concepts domain (nouns) and in the activity domain (verbs). We have used the 20Newsgroup corpus and the Reuters corpus to train and test our algorithms for TC [18][19]. Experimental results indicate an average accuracy of 90% on the chosen corpora.

In the next section, we present in detail our proposed dual lexical chain based TC scheme. We explore the results of various experiments in section 3. In section 4, we evaluate our approach with respect to existing approaches reported in the literature. We conclude and explore future scope for our work in section 5.

II. PROPOSED SCHEME FOR TC

Our previous work on document categorization [20] employed fuzzy logic to categorize documents. We try a different approach in this paper with lexical chaining coupled with other improvements which we will elaborate on in this section. Figure 1 illustrates the overall flow of the Dual Lexical Chain DC system. The DC system follows a supervised learning process. It undergoes two phases:

Training phase: Two third of the documents in each category are allocated as training documents D_{train}. During the training phase, the proposed DC scheme automatically prepares an initial list of keywords for each category with the help of Word Net[13] and Wikipedia [15]. This acts as a fast bootstrapping step to quickly provide an initial basis for building relevant category features. The DC system calculates the *Belongingness* of each training document, even though they are all labeled. This is done to assess their potential as alternative and reliable sources for enriching keywords. The algorithm enriches the raw initial keyword list by scooping out relevant terms from those labeled documents in the training set which *exhibit high Fidelity* towards their respective categories. This Fidelity condition is defined in equation 4.16 in this section's sub part C-3.

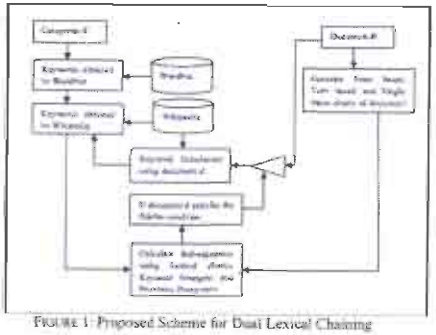

FIGURE 1: Proposed Scheme for Dual Lexical Chaining

Each category-keyword matrix is a document in itself with keywords as its tokens. These documents change dynamically during the keyword enrichment process. The Keyword Strengths (refer Equation 1) of the keywords are updated as and when such changes occur.

Testing phase: The trained classifier enters the testing phase during which it classifies the remaining one thirdD_{test} documents. The classification results measure the performance of the classifier.

The step-by-step procedure for DLC based DC system is explained below. These steps are largely similar during the training and testing phases. However, there are significant differences that must be clarified at the outset.

(i) Even though labeled documents are considered during the training phase, their overall *Belongingness* to their respective categories is calculated and those that reflect the strong *Belongingness* are utilized to enrich keywords for their category.

(ii) The *Relative Category Frequencies (RCF)* of tokens are calculated only during the training phase. They are stored to be subsequently utilized during the testing phase.

A. Inputs

The inputs to the DC system are,

(i) A set of category names C. This is a set of n names denoting the categories, $\{C = C_1, C_2, .., C_j, .. C_n\}$.

(ii) A set of documents D. This is the corpus of m

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A Methodology to overcome Challenges and Risks associated with Ambient Intelligent Systems

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Abstract: Ambient Intelligence is the vision of future in which environments support the people living in them. This environment is self-effacing, interconnected, adaptable, dynamic, embedded, and intelligent. The vision is to disappear the technology instead processors and sensors are integrated in everyday objects. To develop such an environment wherein technology is invisible to the user and environment directly communicates with the user. A completely interactive environment that could assists the users in every possible manner. In order to design and develop such an environment, there is a need to shift technology from machine to human communication to machine to machine communication (M2M). For such communication there is the requirement of real time data, energy and the decision making concepts which are considered as the main objectives that needs to be fulfilled. In this paper we present the major contribution of various researchers in this field. Further we have also discussed the major challenges and risks associated with such intelligent environment and a methodology to overcome with the challenges in AmI environment.

Keywords—ambient; machine to machine communication; intelligent system.

I. INTRODUCTION

This Ambient Intelligence is considered as the future of artificial intelligence. The evolution of artificial intelligence can is represented by the parallel evolution of three layers. These layers include.

Hardware Layer: This layer is also termed as the Operational layer. This layer is evolved from the analog devices to the modern interactive devices. Back then these devices connected through the networks. With the emergence of internet digital computers get connected to the web which becomes possible only by miniaturization of electronic. These smaller devices have the better computational capabilities which can be bought at affordable prices.

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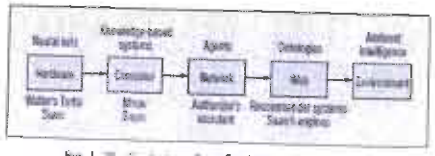

Fig. 1. The Evolution of Artificial Intelligence

AI Tools and Techniques: This layer makes use of the hardware layer to generate intelligence Knowledge representation, Artificial Neural Network as Bayesian networks, fuzzy logic, and rough sets and many other AI concepts are implemented for the decision making. Here in this layer AI concepts are used to build the Knowledge based systems.

Networks: With the rapid growth of web and networks systems got connected in network and intelligent agents were used to create collaborative applications.

For example, The Stochastic Neural Analog Reinforcement Computer (SNARC), a self-learning calculator a neural network based machine implemented using vacuum tubes as a hardware platform. MYCIN was an expert system that recognized infections, identified bacteria that caused them.

Current trend points to incorporating intelligence into our environments and Ambient Intelligence (AmI) is the way to achieve this.

II. LITERATURE REVIEW

The paradigms of Ambient Intelligence states that the environment should consist of embedded network devices which are integrated into the environment. These devices should be capable of recognizing the person and their situational context that inhabit in that environment. AmI environments can be tailored according to the users needs. Also these environments should be adaptive that is it can change in response to the user. The environment need to be anticipatory as desires of humans change it can anticipate the desires without any conscious meditation.

In order to achieve these key features Ambient Intelligence comprises of three main components [6] which makes it smarter and intelligent. These components include

Ubiquitous Computing: these are those devices which can build dynamic models of its various environments. Also theses devices are capable enough of learning from its environment and take intelligent decisions.

Ubiquitous Communication: It refers to the advanced wireless communication wherein communication is flexible.

User Adaptive Interfaces: This is the third integral part of the AmI which deals with the Human- Centric Computer Interaction designs.

Because of these three components AmI is defined as convergence of ubiquitous computing, Ubiquitous communication and interfaces adapting according to the users requirement.

Although the vision of future is beautiful with ambient intelligence but the biggest milestone in achieving this goal is the its difficult to know what human wants that is its hard to provide context aware services in smart environment. The challenges related to context aware environment includes costs, risks of intrusion, security issues, and the high system complexity [7]

For the rational context-aware decisions in the changing environmental conditions even the nature-inspired algorithms are integrated with AmI [10]. The main aim of integrating two disciples is to make human life simpler and secure.

Another difficulty is the power consumption by these smart systems [11]. Optimizing their energy consumption requires the ubiquitous monitoring of the building complexes.

Based on the user activity recognition prominent international intelligent buildings were built [12]. These buildings were designed based on the valuable user activities and behaviours and their impact on the on energy saving.

The decisions in these intelligent buildings are taken based o the prediction models wherein values are taken from the data from the sensors [14]. Sensors sense the environments receives the precepts and act accordingly through its actuators or effectors.

When sensors came into context there is a possibility for fault as these environments are dynamic hence the loss is also high [15]. The mapping of the percept to the action has to be perfect based on the comparison of the computed sensor values and the actual values.

Now if one is able to compare both the values then one can easily detect the potential faults. Once the fault is detected its has to be isolated in order to identify the faulty component precisely.

III. COMBINING AMI AND AI

The general architecture of the AmI environment comprises of the Sensors, Actuators, communications in the form of some middleware and the ubiquitous computing [2].

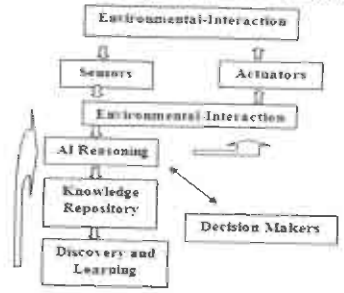

Fig. 2. Flow of Information and General architecture of AmI Environment

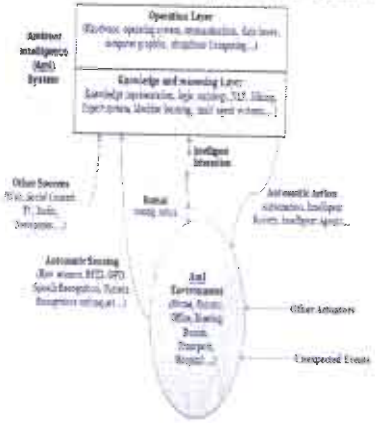

Fig 3. Vision of Ambient Intelligence

AmI systems with the help of sensors receive the precepts sequence with the help of sensors while it interacts with the users through actuators. The AmI systems can take decisions based on the AI reasoning. The precepts are received through ultrasonic devices, cameras and microphones, for example, intelligent agents and robots.

A. AI methods and Techniques in AmI

- Interpreting the Environment's State: The various technologies involved analyzing various sensing inputs are Speech Recognition, Natural Language Processing and Computer Vision. These technologies involve pattern recognition, the syntax analysis of written sequence, followed by semantic analysis. Vision refers to the perception of the environment by the agents.
- Knowledge Representation: The data sensed by the sensors has to be represented using AI tools and techniques. As these systems deals with the real time data, hence there are possibilities that this data

Comprehensive set of Mutation Operators for the determination of adequacy of Test Set

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Abstract— A mutation system possess the extensive theoretical components called mutation operators that are designed to evaluate the effectiveness of fault detection. Mutation testing of a software system rely extremely on the kinds of faults detected that the mutation operators are designed to represent. Therefore, the quality of the mutation operators is very significant to mutation testing. The interaction mutation provides criteria for the determination of the adequacy of tests generated for the software system. It helps in determining whether the test cases that have been created effectively detect all the possible faults in the software with sufficient mutation operators. The types of faults that the mutation operators are designed to represent plays a key role in determining the effectiveness of a test case. Therefore, the mutation testing heavily relies on the quality of the mutation operators. This work targets this issue by providing a set of additional mutation operators for creating mutants of the source code of few modules of an existing software system.

Keywords— Test adequacy criteria; mutation testing; mutation analysis; integration testing; testing tool

I. INTRODUCTION

Mutation testing is a fault-based testing technique that is initially proposed in 1978. The effectiveness of test cases is measured and is based on the assumption that a program will be well tested if all simple faults are detected and removed.

A set of faulty versions, called mutants, are generated by inducing faults into software component. This process of creating faulty codes is known as Mutation Analysis. It uses various mutation operators to implement faults. These mutants are created from the original source code of modules by applying some mutation operators that describe syntactic modifications to the original code. The test set is then used to execute these generated mutants and to measure how well it is able to find faults in the system. A test case that distinguishes (returning a different result) the program from one or more of its mutants is viewed as effective in detecting faults. The objective is to make mutants fail as many as possible and thus demonstrating the adequacy of our test cases. To assess the adequacy of a test set T, each mutant, as well as original piece of code has to be executed against the cases in T. If the observed output of mutant Q is the same as that of P or all the test cases in T, then Q is considered live, otherwise it is considered killed.

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A mutation score is a quantitative measurement of the quality of the test suite and is defined as a ratio of the number of killed mutants to the total number of non-equivalent mutants. Test adequacy is measured by the mutation score computed as follows:

Mutation Score = Number of killed mutants/Number of total mutants

A low score means that most of the faults cannot be detected accurately by the test set. A higher score indicates that majority of the faults have been identified with this particular test set. A good test set will have a mutation score close to 100% or ideally 100%

II. BACKGROUND

Software testing is performed using test cases. These make use of some variables and determine the actual output of the program against the expected output. Good test cases help determine faults that occur rarely. Mutation testing is one of the many types of methodologies used for testing a program. While other software testing techniques focus on the correct functionality of the program, mutation testing focuses on the test cases used to test the programs. The notion is to create good test cases which are able to discover all the easy and hard-to-find faults in the program with the help of mutation operators. The method-level and class-level operators considered for MuJava:

TABLE I. METHOD LEVEL OPERATORS

Method level	Operator	Description
Arithmetic	AORB	Arithmetic Operator Replacement (binary)
	AORU	Arithmetic Operator Replacement (unary)
	AORS	Arithmetic Operator Replacement (short-cut)
	AOIU	Arithmetic Operator Insertion (unary)
	AOIS	Arithmetic Operator Insertion (short-cut)
	AODU	Arithmetic Operator Deletion (unary)
	AODS	Arithmetic Operator Deletion (short-cut)
Relational	ROR	Relational Operator Replacement
Conditional	COR	Conditional Operator Replacement
	COI	Conditional Operator Insertion
	COD	Conditional Operator Deletion
Shift	SOR	Shift Operator Replacement
Logical	LOR	Logical Operator Replacement
	LOI	Logical Operator Insertion
	LOD	Logical Operator Deletion
Assignment	ASRS	Assignment Operator Replacement (short-cut)

TABLE II. CLASS LEVEL OPERATORS

Class level	Operator	Description
Encapsulation	AMC	Access modifier change
Inheritance	IHD	Hiding variable deletion
	IHI	Hiding variable insertion
	IOD	Overriding method deletion
	IOP	Overriding method calling position change
	IOR	Overriding method rename
	ISI	Super keyword insertion
	ISD	Super keyword deletion
	IPC	Explicit call to parent's constructor deletion
Polymorphism	PNC	New method call with child class type
	PMD	Member variable declaration with parent class type
	PPD	Member variable declaration with child class type
	PCI	Type cast operator insertion
	PCC	Cast type change
	PCD	Type cast operator deletion
	PRV	Reference assignment with other comparable variable
	OMR	Overloading method contents replace
	OMD	Overloading method deletion
	OAN	Arguments of overloading method call change
Java-specific Features	JTI	this keyword insertion
	JTD	this keyword deletion
	JSI	static modifier insertion
	JSD	static modifier deletion
	JID	Member variable initialization deletion
	JDC	Java-supported default constructor creation
	EOA	Reference assignment & content assignment replacement
	EOC	Reference comparison & content assignment replacement
	EAM	Accessor method change
	EMM	Modifier method change

III. FOCUS OF WORK

Mutation operators make syntactic changes to the program under test. These syntactic changes depict usual syntactical mistakes made by programmers while writing code

Before explaining the strategy adopted for this project, it is imperative to know the working of Mutation testing as shown in figure1

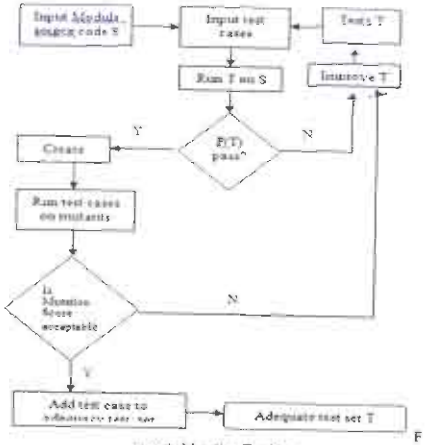

figure1: Mutation Testing

A test case is adequate if it is useful in detecting faults in a program. A test case can be shown to be adequate by finding at least one mutant program that generates a different output than does the original program for that test case. If the original program and all mutant programs generate the same output, the test case is inadequate.

For this project, an empirical analysis is carried out for each type of existing mutation operators and some additional mutation operators that contribute in improving the effectiveness of test cases generated in a free Java-based mutation testing tool, called MuJava.

MuJava (Mutation System for Java), which is developed, is a mutation system that supports the entire mutation process for Java programs. MuJava implements both traditional mutation operators (adapted for OO programs) and class mutation operators. For the operators, it automatically generates mutants, runs the mutants against a suite of tests, and reports the mutation score of the test set. MuJava has three major functions: (1) generate mutants, (2) analyze mutants, and (3) run test cases supplied by the tester.

The aim is to add mutation operators that are probable to create mutants and contribute in the determination of adequacy of test set. The test cases created for each of these operators ensure that branch coverage is achieved.

IV. IMPLEMENTATION

This work presents a comprehensive set of mutation operators to test for faults that targets to evaluate the adequacy of test set for a software system by using mutation operators, thereby determining whether the test cases that have been created, effectively detect all the possible faults in the software with sufficient mutation operators. In this project, the effectiveness of test cases has been improved by mutating the source code with few more mutation operators.

A. Algorithm

The mutation system follows the following steps:

1. Test cases generation for the Java project.
2. Test Case Execution against original source code of java project.
3. Generate mutants with MuJava with five new mutation operators.
4. Test Case Execution against mutants.
5. Evaluate test set adequacy by mutation scores.
6. Compare scores with original tool scores.

B. Method level mutation operators

Method level operators have been used in previous mutation tools for other programming languages besides Java (e.g., the Mothra tool set for mutating Fortran programs). These operators are applied to statements, operands and operators.

- Operators applied to statements perform actions such as modification, replacement, and deletion.
- Operators applied to operands primarily are replacements.
- Operators applied to operators include insertion, deletion, and replacement.

The following additional method mutation operators are implemented in MuJava tool.

1. SVR (Scalar Variable Replacement)

Comparison of RC6, Modified RC6 & Enhancement of RC6

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Abstract— In this paper we are going to compare the symmetric Block cipher RC6 with the two more versions of RC6. Modified RC6 and Enhanced RC6 provide some improvements of RC6, which is latest version of AES. The basic difference between the three algorithms is that RC6 works on block size of 128 bits, Enhancement of RC6 (RC6e) works on block size of 256 bits and Modified RC6 (MRC6) works on block size of 512 bits. The basic operations used in the three algorithms are same. All the three algorithms consist of three parts encryption, decryption and key expansion. In this paper we are going to compare these algorithms on the basis of encryption and decryption time on the basis of different file size and file types

Keywords-RC6; RC6e; MRC6; Symmetric Algorithms; Encryption; Decryption; Block Cipher; AES

I. INTRODUCTION

Confidentiality and data Integrity are the two most important features of the cryptography that can be achieved by the use of symmetric ciphers. RC6 is a symmetric block cipher based on RC5 and developed by Rivest, Sydney, and Yin for RSA security [1]. Like RC5, RC6 is a parameterized algorithm where the block size, the key size, and the number of rounds are variable, again, the upper limit on the key size is 2040 bits [2]. RC6 was developed to meet the requirements of AES

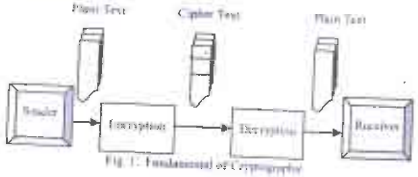

Fig. 1: Fundamental of Cryptography

II. DETAILS OF RC6 [3]

RC6 proper has a block size of 128 bits and supports key sizes of 128, 192 and 256 bits like RC5. It also uses an extra multiplication operation that is not there in RC5. This multiplication operation is used to make the rotation operation dependent on every bit in a word.

RC6 [3] can be more accurately specified as RC6-w/r/b where the word size is w bits, encryption consists of a nonnegative number of rounds r, and b represents the length of the encryption key in bytes. The standard value of w = 32, b=16 and r = 20, RC6 is used as the shorthand to refer these versions. When some other value of w, b or r is used, the parameter values will be specified as RC6-w/r/b. [4]

For all variants, RC6-w r b operates on units of four w-bit words using the following basic operations.

$A + B$ integer addition modulo $2w$
$A - B$ integer subtraction modulo $2w$
$A \oplus B$ bitwise exclusive-or of w-bit words
$A \times B$ integer multiplication modulo $2w$
$A \lll B$ Rotate A to the left by the amount given by the least significant $\log w$ bits of B
$A \ggg B$ Rotate A to the right, similarly
$(A, B, C, D) = (B, C, D, A)$ parallel assignment
$F(x) = x(2x + 1) \bmod 2^w$

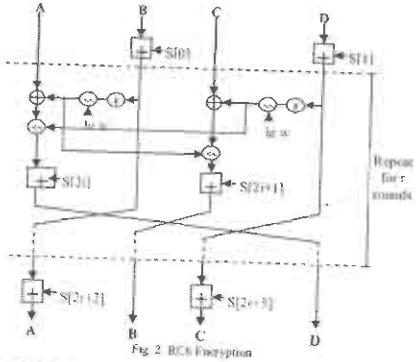

Fig. 2 RC6 Encryption

A. Key Expansion

Use two magic constants:-
$Pw = Odd((e - 2)2^w)$
$Qw = Odd((t - 1)2^w)$
Where:-
$e = 2.71828182845904 \ldots$ (base of natural logarithm)
$t = 1.61803398874989 \ldots$ (golden ratio $= (1 + \sqrt{5})/2$)

$Odd(x)$ is the odd integer nearest to x.

INPUT
b Byte key that is preloaded into c word array $L[0,1, \ldots, c-1]$
r denotes the no of rounds

OUTPUT
$(2r + 4)$ w-bit round keys $S[0,1, \ldots, 2r + 2,2r + 3]$

ALGORITHM
1. $S[0] = Pw$
2. *Repeat step* 3 *for* $i = 1$ to $2r + 3$ *do*
3. $S[i] = S[i - 1] + Qw$
4. $X = Y = a = b = 0$
5. $Iteration = 3 * max(c, 2r + 4)$
6. *Repeat Step* 7 to 10 *for* $j = 1$ to $Iteration$ *do*
7. $X = S[a] = (S[a] + X + Y) \lll 3$
8. $Y = L[b] = (L[b] + X + Y) \lll (X + Y)$
9. $i = (a + 1) \bmod (2r + 4)$
10. $j = (b + 1) \bmod c$

B. Encryption

Four w-bit registers A, B, C, D contain the initial input plain-text as well as the output ciphertext at the end of encryption. The first byte of plaintext is placed in the least significant byte of A; the last byte of plaintext is placed into the most significant byte of D [6]

INPUT
Plaintext stored in four w-bit input registers $A; B; C; D$
Number r of rounds w-bit round keys $S[0; \ldots; 2r + 3]$

OUTPUT
Ciphertext stored in $A; B; C; D$

ALGORITHM
1. $B = B + S[0]$
2. $D = D + S[1]$
3. *Repeat step* 4 to 8 *for* $i = 1$ to r *do*
4. $t = (B \times (2B + 1)) \lll \log w$
5. $u = (D \times (2D + 1)) \lll \log w$
6. $A = ((A \oplus t) \lll u) + S[2i]$
7. $C = ((C \oplus u) \lll t) + S[2i + 1]$
8. $(A, B, C, D) = (B, C, D, A)$
9. $A = A + S[2r + 2]$
10. $C = C + S[2r + 3]$

C. Decryption

For decryption of cipher-text load these cipher text into registers A, B, C, D Algorithm uses integer subtraction modulo 2w and right rotation on registers for getting plain text.

INPUT
Ciphertext stored in four w-bit input registers $A; B; C; D$
Number r of rounds
w-bit round keys $S[0, \ldots; 2r + 3]$

OUTPUT
Plaintext stored in $A; B; C; D$

ALGORITHM
1. $C = C - S[2r + 3]$
2. $A = A - S[2r + 2]$
3. *Repeat step* 4 to 8 *for* $i = r$ *down to* 1 *do*
4. $(A; B; C; D) = (D; A; B; C)$
5. $u = (D \times (2D + 1)) \lll \log w$
6. $t = (B \times (2B + 1)) \lll \log w$
7. $C = ((C \times S[2i + 1]) \ggg t) \oplus u$
8. $A = ((A \times S[2i]) \ggg u) \oplus t$
9. $D = D - S[1]$
10. $B = B - S[0]$

III. ENHANCED RC6 [4]

The enhanced version of RC6 (RC6e) is a symmetric key block cipher that uses data-dependent rotations, modular addition and exclusive-or operations. RC6e works with 256-bit block size, (128,192 or 256)-bit key size and 20 rounds. RC6 works with four word input and output block size while RC6e works with eight-word input (plain text) block size and eight-word (cipher text) output block size.

This enhanced version (RC6e) is more accurately specified as RC6e-w/r/b in this section. Where

w: the word size in bits,
r: non-negative number of rounds r and
b : the length of the encryption key in bytes

The basic operations that are used by the RC6e are the same as the RC6 except the transformation function. This is as follows:

$F(x, y) = (x^2 + y^2 - xy - 7) \bmod 2^w$

A. Key Expansion

The key Expansion of RC6e is exactly same as the RC6

B. Encryption

INPUT
Plain-text stored in eight w-bit registers A, B, C, D, E, F, G & H.
r denotes the no of rounds
2r+4 w-bit round keys stored in $S[0, 1, \ldots, 2i + 2,2r+3]$

OUTPUT
Cipher-text will be store in these eight w-bit registers A, B, C, D, E, F, G & H.

ALGORITHM
1. $B = B + S[0]$
2. $D = D \oplus S[0]$
3. $F = F + S[1]$
4. $H = H \oplus S[1]$
5. *Repeat step* 5 to 14 *For* $i = 1$ to r *do*
6. $F1 = B^2 + F^2 - BF - 7$
7. $F2 = D^2 + H^2 - DH - 7$
8. $R1 = F1 \lll F2$
9. $R2 = F2 \lll F1$
10. $A = ((A \oplus R1) \lll R2) + S[2i]$
11. $C = ((C + R2) \lll R1) \oplus S[2i]$

Handling Mutual Exclusion in a Distributed Application through Zookeeper

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Abstract—Zookeeper a powerful, feasible approach to build distributed applications implementing open APIs that enables developers to apply their own powerful co-ordination primitives. The aim of this study is twofold i) To study the anatomy and life cycle of zookeeper and make use of as a role of high-performance coordination service for distributed applications ii) a case study was presented about Zookeeper implementations in the payment process where synchronization and coordination is not meet due to dual server implementation, where orders are placed through an estore application. Finally the potentiality of Zookeeper replications is considered to address reliability and performance issues.

Keyword—Zookeeper; znode; mutual exclusion; distributed application.

I. INTRODUCTION

A distributed system consists of multiple computers that communicate through a computer network and interact with each other to achieve a common goal. Zookeeper is an open-source server which enables highly reliable distributed applications. It facilitates wait-free co-ordination in highly distributed internet scale systems where mutual exclusion is the prime concern. It is a way to implement mutual exclusion to a shared system. It allows a distributed application to coordinate with each other through a shared hierarchal namespace which is very similar to the standard file system. The name space consists of znodes similar to files and directories. Each node of zookeeper is allowed to have data associated with it along with its children.

A Zookeeper supports the following API:

- Create : creates a node at a location in the tree
- Delete : deletes a node
- Exists: checks if a node exists at a location
- GetData . reads the data from a node
- SetData : writes data to a node
- Get Children · retrieves a list of children of a node
- Sync · waits for data to be propagated

B. Anatomy of Zookeeper

Zookeeper involves the interplay of 3 fundamental entities as it offers wait-free co-ordination service for distributed applications.

- Clients are the machines which use Zookeeper service.
- Server denotes the service which uses Zookeeper service.
- Znode is the memory data node in namespace hierarchy.

C. Life Cycle of Zookeeper:

- Initiation: It creates a batch of the pending jobs. Then takes one job at a time and checks its status. In case the status of the task is not complete, it creates a parent node and child node for the pending tasks.
- Execution: Creation of the child node implies the task no. pertaining to it undergoes processing. Post creation of the child node, Zookeeper applies a lock to it until the task gets processed completely.
- Conclusion: Once task is processed completely, child node pertaining to the completed task is deleted .The creation of multiple nodes and locking ensures wait-free processing of individual tasks in a mutually exclusive way.

Zookeeper derives its robustness from a suite of reliable distributed system techniques and protocols and runs on a cluster of machines to provide seamless service

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II. METHODOLOGY

Problem Conceptualization

A State of affairs

Customers can purchase products from an estore site developed by the software developing company. On the purchase of products the settlement of the payment process was handled on a different node called settlement node. The application and the settlement node were running on two different servers on production for the purpose of load distribution. Data synchronization/ streaming were maintained between these two servers. In the settlement node the schedulers picked orders from Database which were pending for settlement, meaning that the orders which were not processed for payment. The schedulers then create a batch of unprocessed orders and process them. After processing of the orders its status changes to CLOSED in the database. The next time when schedulers runs it excludes those orders which are in CLOSED state

B Problem sphere

As it was stated in the previous section that the presence of settlement node on both the servers, forcing data streaming and schedulers to run on both of them , causes a major issue. The schedulers running on different servers in some cases picked up the same order for settlement thereby the customer was billed twice. Below is the pictorial representation of the above explained problem sphere

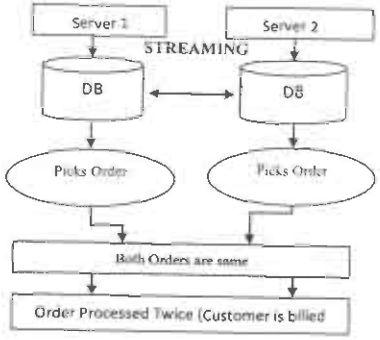

Fig 1 Problem sphere

I) Process Adopted A Zookeeper environment prevents such instances by ensuring synchronization and application of distributed locks to ensure mutual exclusion to an order under processing.

During the settlement for pending orders, scheduler checks database for the orders pending for settlement. It creates a batch of pending orders

It takes one order at a time, checks the status of the order (whether it is CLOSED or not) if the status is not closed. Zookeeper creates a parent node for the first time under which all other child nodes will be created. It treats each order as a child node. After creation of the parent node it checks that whether the child node for that order already exists or not. If the node already exists then it restricts to create any further node for that order else it creates a new child node under the parent node. On creation of the child node that specific order number undergoes further processing and settlement (payment related). On settlement of the order the status of the order is updated to 'CLOSED'. The Zookeeper deletes the created child node for that order.

The above mentioned steps assist in mutual exclusion of each order thereby preventing the customer from being billed twice. For instance settlement job is executing in two different Servers. There might be a scenario when both the schedulers running on different servers picks up the same order pending for settlement for further processing. This will cause the customer to be billed twice. Zookeeper server will prevent this by its feature of mutual exclusion. Once an order is picked up for settlement, the Zookeeper will create a node for it and will provide a lock to it until it gets processed. Once processed it will release the lock and the node will be deleted .If in case the same order is picked up by some other settlement job running on different Server then it will not be able to create a node for it and further process it, as the node already exists in Zookeeper for that order.

Below is the pictorial representation and flowchart for the above explained scenario:

Survey on Various Techniques of Tracking

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Abstract-This paper mainly focuses on different kinds of techniques for players tracking in various sports. As the number of videos in sports is increasing day by day, the need to analyse them for tracking players and identifying them also increasing. Tracking has many applications but this is a very arduous task. There are various techniques that are discovered from time to time to track the players and to make tracking more accurate. Problems in tracking arise due to occlusion, fast movement and many other complexities. This paper gives a summary of a number of research papers that are dealing with tracking. In this paper, we reviewed numerous papers of tracking from year 2003 till the year 2014.

Keywords: Tracking, Occlusion, Background Subtraction, Contextual trajectory, Kalman Filter.

I. INTRODUCTION

Interest in object tracking arises due to several reasons: firstly, there is a huge growth in the high powered computer, secondly increase in cheap video cameras, thirdly huge increase for automated analysis of videos. Use of Object tracking is relevant in various tasks like [20.]:

- For Human-Computer interaction, for example eye gaze tracking for data inputs to computer etc;
- For Traffic monitoring;
- For surveillance system, that is scene monitoring for detecting suspicious activity;
- For recognition of motion, that is human identification based on their motion, object detection.

In simplest form, tracking is mainly defined as estimating the trajectory of an object as it moves in a video or in the moving scene. In addition to this, depending on tracking domain, one can also define some information like area, orientation, shape and object's centric information. The tracking of an object is complex due to some reasons.

- Noise in videos;
- Speedy and Complex motions of object;
- Full or Partial Occlusions;
- Variation in light effects;
- Complex shapes of object.

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Number of Players tracking needed for analysis in sports video system. From countless years people have fascination towards tracking the players for examining the performance of players in sports during the education of players and in games as well. This type of information is very useful for coaches and educators, as with this they can get an idea about the problems of a player, even whole team and then according to the player's performance they can formulate new strategies and training. Apart from this, players tracking information can also help in exploring the relations between players and interact with them as sports involve lots of players as a team so it needs more interaction between players. Tracking number of players and identifying them is a very challenging task. Sports Video analysis has many applications and much research has been done in this field, some on local areas of video streams and some directly on it, but it is still a challenging one. There are a number of sports as Football, Soccer, Basketball, Tennis etc , all having different dimensions, along with varied patterns of court, varied angle position of the camera which make this task challenging.

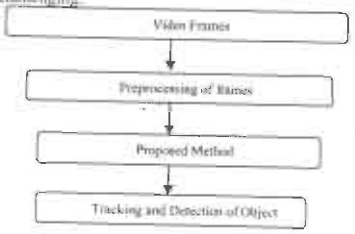

Fig. 1 An Object Tracking System for Video [19]

Above all, there are some more challenges in tracking players which arise due to some reasons: 1) Same jersey colours of same team players 2) Motion Patterns of Players in comparison to pedestrians more complicated 3) Occlusion of players are recurring. Players identification is very hard, as sometimes due to camera angle view, faces can become indistinguishable, even jersey number identification becomes impossible. In short span of time, Players move more quickly and with varying speeds, they can suddenly change their direction, which makes it hard to predict their movements. Apart from increased interest in tracking due to growth in video technology, the need to secure[22] the data also increased which introduced the concept of encryption [21], decryption and authentication (image, audio and video). Various approaches have been introduced to provide security.

II. RELATED WORK

In [1] the authors introduced a concept of an automatic framework by using cinematic and object based features for analysis of Soccer game's video. They used two types of algorithms i.e. some low level video processing algorithm and some higher level algorithm. Object features were used with Cinematic Features to improve accuracy. Cinematic features referred through common video composition and production rules like replays and shot types. Objects were described by their spatial features, e.g., motions, colour, shape, texture and interaction. Three types of summaries introduced: 1) all slow motion segments classified according to the Cinematic Features 2) all slow motion segments showed according to the Object Based Features. 3) all goals in video. They obtained effectiveness, efficiency and robustness of the framework for soccer video.

In [2] the authors introduced a vision system which was capable of learning, detecting and tracking the object. The system was demonstrated this for tracking Hockey players. They used two algorithms mixture particle filters and Adaboost. The mixture particle filter is convenient for multiple target tracking because it assigns a component of the mixture to each of the players. Design issues addressed in this paper for mixture particle filter algorithm were, the treatment of the object leaving and entering the scene and choice of the distribution of the proposal. To overcome this problem, they constructed the new proposal distribution using a mixture model that included information from the activating models of each player and the detection hypothesis obtained by Adaboost [25]. They proposed the learned Adaboost proposal distribution which allowed them to quickly detect players entering the scene and the filtering process helps to keep track of isolated players.

In [3] the authors presented a novel approach to automatically track and detect various partially occluded objects in moving and still positions with a single camera that could be still or moving. They took into consideration the body parts of humans for detection purpose. In this paper, body part detectors were learned by improving the number of weak classifiers which were based on edgelet features. They used a joint likelihood model which was formed by responses of part detectors which involve analysis of occlusions. The combined detection responses and part detection responses gave the observations for tracking. Two tracking methods were introduced: Data association and mean shift. Initialization and termination of trajectory both were automatic and depend on results computed through the detection process. The system could track humans in inter-object occlusion and scene occlusions with still or moving backgrounds. They had done an evaluation of the proposed approach on various images and videos as well. In [4] the authors presented a new architecture which consists of two layers named as General Tracking Layer and Context Layer for two games Squash and Handball. General Tracking layer gave a detailed account of a tracking process which is multipurpose for surveillance system. Context Layer involved in three stages, namely 1) Initialization 2) Updation 3) Association. Context Layer in this system helped in allotting new tracks to players, if they collide. Context Layer was designed for reasoning purpose, i.e. if any problem occurs in any tracking stage then context layer intervenes. Context layer provides the final tracking system.

In [5] the authors proposed particle filter approach with Geometric contour for tracking distorted and moving objects. They also solved the problem of occlusions by including the shape information in the steps where they calculated the importance of weight (weighting step). The technique was tested on five sequences of videos. There were several limitations as method would fail- 1) when objects completely occluded 2) restriction to track very high distorted objects when undergoes occlusion.

In [6] the authors presented an online detection method for multiple object tracking in dense visual surveillance scenarios through a single camera. They initiated two stages, namely: Local Stage and Global Stage. The two stages used together that made this algorithm attempt to find both local optimum trajectory and global optimum trajectory for all objects. In local stage, they used a particle filter with observer selection which deals with partial object occlusions which was used to generate reliable tracklets. In global stage, they collected detection responses from the temporal sliding window, so that they could deal with inexactness that was caused by full occlusion of objects to obtain potential tracklets. They related both of these tracklets (Potential and reliable) by the Hungarian algorithm on a partially changed pairwise tracklets association cost matrix to obtain global optimal association for solving data association problem. They applied this method on the pedestrian class.

In [7] the authors presented a new Multiple Object Tracking algorithm for contributing in both the tracking strategy level and observation modelling level. In the Observation modelling process instead of directly distinguish players in the playfield from another object, they used step by step process which consists of three steps 1) Classifying playfield and Non Playfield 2) classifying players and playfield 3) Classifying player and other players. For tracking, they proposed a dual-mode two-way Bayesian inference approach that moves between an offline general model and an online addressed model to handle the multiple occluded players and also isolated object tracking by using the Forward filtering and Backward smoothing. This Forward Filtering was used for rough calculation of the distribution of the current state of the system and the idea of the Backward smoothing system mentioned in this paper was simply as if the system could not able to obtain enough information for one object at the current frame, then it

Face Recognition using Back Propagation Neural Network Technique

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Abstract—The paper presents a back propagation based artificial neural networklearning algorithm for recognizing human faces. We have worked on eight features for recognition. A facial recognition system has been proposed to recognize registered faces in the database & new faces that are not part of the database. The basic objective is to understand the ability of back propagation learning algorithms for face recognition task. Few experimental observations have also been provided.

Keywords-back propagation ability; facial recogaition system; neural network technique;

I. INTRODUCTION

A back propagation neural network learning algorithm is among the most effective approaches to machine learning when the data includes complex sensory input such as images [1]. Back propagation is basically an expression for the partial derivative of the cost function with respect to any weight or bias in the network. The expression implies how quickly the cost changes with change in weights and biases. Each element in back propagation network has a natural, intuitive interpretation that makes it a fast algorithm for learning. There are "classic" networks which are widely used and on which many others are based.

Face recognition is used for automatically identifying & verifying a person from an image. In general way, face recognition consider as identification. Recognition or identifying of any person from an image is only possible with the help of facial features. Feature values are further stored in database in the computer system to create biometric application. Most of the biometric applications are used for security purpose in airport security, access control, passports, etc. One of the ways to do this is by extracting the features from the set of images and training this set of images considered as training database using some learning method. Once training is complete, the new images can be recognized using the information learnt during the training process. Most of the facial recognition methods identify facial features by extracting features, from an image face.[2] These featureswere then used in training & used to search for other images with matching features.[3] Some algorithms normalize face images and compress the face data, only recording the features in the image that is useful for face recognition.[4] One of the successful systems [5] is based on template matching techniques. [6] applied to a set of salient facial features, providing a sort of compressed face representation.

Recognition algorithms can be classified into two main approaches, geometric, which look at distinguishing features, or photometric, which is a statistical approach that distills an image into values and compares the values with templates to eliminate variances.

Some of the popular recognition algorithms include Principal Component Analysis using eigen faces, Linear Discriminate Analysis, Elastic Bunch Graph Matching using the Fisher face algorithm, the Hidden Markov model, the Multilinear Subspace Learning using tensor representation, and the neuronal based matching.

External changes can also effects the face recognition system, like environmental light, person's position and distance from the camera, make-up, expression, etc. To overcome these external changes most of the researchers have used neural network techniques for face recognition. Both supervise & unsupervised learning techniques have been used in the past. The advantage of using the neural networks is its ability to capture the complexity of patterns.

II. LITERATURE STUDY

A detailed review of existing artificial neural networks that have been applied for solving face recognition problems has been discussed. Some recent work in the literature has been specifically included.

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N.Shashank Mathur,K.Anil Ahlawa and P.Vishwakarma[1],carried out a research on illumination invariant face recognition using supervise and unsupervised learning algorithms (neural network learning rules) existing system and its performance was better than existing systems [6].

In this paper the supervised learning had been carried out by using a bi-layered artificial neural network.

This network has one input layer, two hidden layers and one output layer. The back propagation learning algorithm had been used to implement supervised learning. The unsupervised learning had been implemented with the help of modified counter propagation network. They concluded that unsupervised learning is better than supervised learning for face recognition [1].

Mayank Agarwal, Nikunj Jain, Mr.Manish kumar and Himanshu Agarwal [2],carried out a research on face recognition using Eigen faces and artificial neural network. In that proposed methodology were two stages: feature extraction using principle component analysesand recognition using back propagation neural network. The algorithm had been tested on 400 images. At the end, results were compared with K-means, fuzzy c-means and proposed technique gave better recognition rate than other two [2].

Priyanka Patidar [3], carried out a research on match the face and recognition face using neural network. The main objective of their study is to test various types of face recognition systems to identify an individual from database. Back propagation neural network measured key points of the face:nose, eyes, mouth, head angle, skin tone, and lighting etc.[3].

V Pushpaja Saudagare and D S. Chaudhari [4],carried out a research on Facial expression recognition using neural network. In this paper they used various techniques of face expression recognition system using MATLAB neural network toolbox. The approach of face recognition method involve the optical flow method, active shape model technique, principle component analysis algorithm and neural network technique[4].

Anjana Mall, Sushmita Ghosh Mazumdar [5], carried out a research on skin tone based face recognition and Training using neural network. They used skin color for detecting the face. On the basis of skin color information face is recognized from already trained database of individual persons. In this study they used back propagation neural network. Their proposed system was "83%" accurate. The project was feature based technique in which face is first detected and then by proper information of pixels variation skin is detected on that basis face is recognized and in future it can be improved embedding these proposed techniques with other improved techniques [5].

Ashwini khanade and Akhil khare [6],they used more than one datasets. Some of them are the ORL and MIT database which consists of large set of images of different people. Some of the images were used for training the system and some for testing. The result of this proposed system compared with existing system and its performance was better than existing systems [6].

Mahendra Pratap Panigrahy and Neeraj kumar [7],carried out a research on Face recognition using genetic algorithm and neural network. On the basis of genetic algorithm and back propagation neural network technique they proposed more reliable face recognition approach .Facial feature extraction was done by genetic algorithm and face recognition was done by back propagation. According to the authors back propagation is more suitable for low resolution, variable lighting and different facial expressions applied in real time video processing, single and multi threaded processing [7].

Lingyun shen [8], carried out a research on face recognition using neural network techniques.In this paper, they proposed a new method for researching on face recognition technology based on back propagation network. Experimental results show that the performance of their method was comparable and sometimes better than other face recognition technology. Their method used for face recognition on-line real-time detection. Experimental results show that network mapping time of the proposed method was very accurate. It significantly reduced the feature dimension and computational complexity [8].

N.Revathy [9],A Neural Network based face recognition system was proposed in this paper. They used back propagation neural network technique for face recognition. From their experiments, they found that the system was invariant to changes in background and illumination conditions. Their results indicate that the conventional eigen face algorithm, works well when lighting variation is small. Its performance deteriorates significantly as lighting variation increases. When such biases were large, the image distance was no longer a reliable measure. But the proposed system worked well in spite of the lighting variations [9].

Mohammad abul kashim [10], carried out a research on face recognition using Principal Component Analysis with back propagation neural network. This system consists of three basic steps which was human face detection using back propagation neural network, feature extraction and face recognition was performed based on Principal Component Analysis with back propagation. The dimensionality of face image was reduced by the Principal Component Analysis and the recognition was done by the back propagation. In this paper also focused on the face database with different sources of variations [10].

III. ALGORITHM

To implement any technique for face recognition system, there are two basic requirements:

- Extract the face values for data set.
- Train the network for recognizing the face.

Performance Evaluation of Different Versions of 2D Torus Network

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Abstract— Interconnection networks have been emerged as an efficient communication infrastructure to fulfill the heavy communication requirements of several applications. Torus is the most efficient interconnection network for current and future supercomputer systems. The packet delay and throughput are the major performance metrics for evaluating the network topologies in designing a network. This paper, evaluates the performance of different versions of torus interconnection networks viz. classical Torus, XTorus, and CCTorus under two different traffic applications i.e. CBR and FTP, in two different scenarios i.e. at varying simulation time, and varying network size, using dynamic routing. Here the main emphasis is given on the average delay and average throughput performance metrics. NS2 tool is used for designing and simulating the performance of the network. By this analysis we can design a better structure that will give better performance in terms of bandwidth and delay.

Keywords— Interconnection networks; CBR; FTP; delay; throughput

I. Introduction

Initially intended for the demanding requirements of the multicomputer, multiprocessor interconnections are starting to substitute buses as the distinctive system-level communication [1]. Torus and Mesh like interconnections have been widely used in the building of parallel computers in preceding years. Computer engineer always attempted to increase the performance of computer systems. The extreme circuitry and parallelism may give better performance. The link length, which connects number of processors, reduces as increasing density of processor connections [2].

Interconnection network architecture means arranging nodes of computer network in such a way that they form a well defined structure. Generally, a topological structure may be represented in the form of physical or logical topology [3], [4]. However two topologies may seems identical but distances between their nodes, interconnection technique i.e. physical media, and transmission rates may vary a lot. For evaluating the performance of any network, their structural parameters as well as performance metrics must be compared with one another.

The major structural properties are diameter, node degree, symmetry, path diversity, bisection width, and regularity. And the major performance parameters for interconnection networks are latency, throughput, packet loss etc [5].

In this paper we analyze the major performance metrics like average delay and average throughput. Different framework for torus interconnection networks has been designed, where the packet delay and throughput analysis during the transmission has been evaluated.

Different versions of Torus interconnection network have been evaluated under CBR over TCP and FTP over TCP traffic using NS2 simulation tool. In [15], we have analyzed and compare the performance of these different versions of Torus interconnection using both theoretical analysis and experimental simulation method for only few network sizes while simulation time kept constant i.e. 10 seconds. Here we analyze performance of these networks in two different scenarios using experimental simulation analysis.

The structure of this paper is as follows. In section II, we have discussed the related work. Section III describes the performance metrics used and traffic applications used for analysis. Section IV describes the structure of the torus interconnection. In section V, we have shown the performance evaluation in two different scenarios and also discuss the results of simulation. Finally in section VI, we have drawn conclusion based upon the simulation result.

II. Related Work

At present the Network-on-Chip (NoC) is a new research field that focuses on modeling and evaluating the network on-chip interconnection. Complicated interconnection networks that have dedicated switches, routers and definite topologies are the main NoC structures for study and optimization [6].

NS-2 simulation tool is used to build the topology and used to produce different traffic set-up using an exponential traffic generator tool [7]. Packets are transmitted at a constant rate during ON period, and during OFF period no packets are transmitted. The most important network performance metrics like delay, throughput are analyzed with the help of this traffic generator for varying buffer sizes and traffic generation rates. In [7], packet delay model is also presented, where several different parameters are considered for packet delay, and so many factors are used to deriving the packet delay.

Torus is a good interconnection structure due to better symmetry and less value of average delay [8]. Based on torus and taking advantage of high process level, it is possible to design a new topology to meet high communication performance requirements that many-core processors present, and to suit a great variety of traffic patterns.

In [9] a topology called xtorus is presented, and analyzes it by theoretical analysis as well as experimental simulation analysis. In this analysis, the mesh, xmesh, and torus are also compared using GEM5 simulation tool. The result of simulation shows that the xtorus topology has better values for parameters viz. network diameter, path diversity, delay, and throughput.

A model that uses queuing theory is discussed in [10] to analyze behavior of the traffic of Spidergon NoC. Simulations are performed to validate the model for average latency for variable message lengths and different traffic rates.

III. Performance Metrics and Traffic Application

The performance of a network can be evaluated in terms of number of performance parameters, may be structural parameter or performance metrics. The performance of any system must be evaluated using some specified criteria [11].

In this paper two major performance parameters have been considered, viz. Average Throughput (in Mbps) and Average Delay (Seconds).

The traffic applications are responsible for transporting data from source to destination [12], [13]. The traffic flow depends on the application used. In this paper two types of traffic applications are used. 1) CBR over TCP 2) FTP over TCP.

IV. Structural Description

The interconnection architectural model has an ($m \times n$) torus network of switches. The switches have a slot, in which resources can be connected. Resources like a processor, memory block, a custom hardware or some other peripheral device fits into the slot. Suppose that switches have buffer devises to control data traffic in the network. The architecture of the classical torus (4x4) model is shown in the Fig. 1 with 16 nodes.

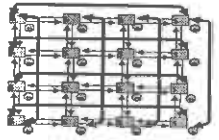

Fig. 1 4 x 4 Classical Torus Interconnection Architecture

This classical Torus topology is also applicable for higher dimensions. The three basic elements in the topology are the switches, resources and links. A communication path connecting the switches is made up of links. Every node is connected by bidirectional point-to-point links.

Torus interconnection architecture is well suited for communication in NoCs, Processor-Memory architectures and communication networks. Hence different versions of Torus interconnection have been designed and simulated using NS2 simulation tool, and analyzed for better performance.

V Performance Analysis

We have developed a simulation model for different versions of torus interconnection viz. Torus, XTorus, and CCTorus using NS2 simulation tool. It is a discrete event driven network simulation tool [14]. Tcl scripting language is used for designing the network and also for simulating the network model. The standard existing routing algorithm is used for data transmission [16].

We have modeled different versions of Torus interconnections on various scales viz. 4x4, 5x5, 6x6, 8x8. Every node is connected with bidirectional point-to-point serial links. The link bandwidth is set to 1 Mb and latency is set to 10 ms. All packets are generated using Constant Bit Rate or FTP traffic.

The following table specifies the parameter values used for simulation.

TABLE I. Parameters for Simulation

Parameters	Values
Traffic Application	CBR or FTP
Traffic Agent	TCP
Channel	Wired
Network Size	16-node, 25-node, 36-node, 64-node
Routing Protocol	Distance Vector (Dynamic Routing)
Simulation Time	5 Second, 10 Second, 15 Second, 20 Second, 25 Second

We have designed two different scenarios. In the first scenario we evaluated the performance of torus like networks at varying simulation time. The time window of simulation is varying from 5 to 25 seconds.

In the second scenario, we evaluated the performance of torus like networks for varying network size. The simulation is performed for different network sizes i.e. 16 node scale, 25 node scale, 36 node scale, and 64 node scale.

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Dynamic Load Balancing using Buffer Management in Distributed Database Environment

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Abstract- **Distributed real time database processing is still one of the most typical problems in high data computing. Complex systems have to execute millions of data accesses in each and every hours with hundreds of thousands process to executes some tens of millions of data information. This paper has focus on process with a large number of processing instances, or servers, respectively. In this paper, we proposed a dynamic Load balancing algorithm used in distributed database environment. Our basic thinking is to provide a considerable request response time and transaction per unit time instead of distributing the all workload among all servers equally. Next, new algorithm is designed and evaluated using analytical models.**

Keywords – Load balancing, Buffer Management, Critical path method and critical chain method

I. Introduction

The buffer cache surfaces contain disk pages which are buffered in the buffer cache and controlled by buffer layer mechanisms. The motive of buffer cache layer is to decrease the number of disk involvement by keeping frequently used pages in the buffer cache, thereby decreasing the average access time of disk page faults. The buffer cache management algorithm is the most important segment of buffer cache policy. The design of buffer cache policy procedure is based on participated usefulness of page reference patterns in the buffer cache. Unless some corrective actions are taken, the current state of the load balance will slightly decrease the efficiency of the solver. Here we are discussing the parallel finite element method. The distributed database comes into existence allowing people retrieve information from different locations, but there exists the case where some database servers are heavily 'loaded, others may be lightly loaded and even no workload on it, which affects the database system overall performance. So it is necessary to balance the workload among database servers, to provide users with reasonable respondent time and transaction throughput rate.

In general, load balancing algorithms [8] can be divided as static, dynamic, or adaptive. In the static algorithms decisions are hardwired using a prior knowledge of the system. Dynamic algorithms [5, 6] can use the system-state information to improve the quality of their decision. Adaptive load balancing algorithms [7] are the special class of dynamic algorithms; they adapt their activities by dynamically changing their parameters, or even their policies, to suit the changing system state. Because the arrival of tasks is not coordinated or planned, load balancing has to cope with changing, unpredictable load profiles, so dynamic and adaptive load balancing algorithms have the potential to outperform static algorithms. Most recent load balancing research has concentrated on dynamic algorithms. The algorithm is designed and realized in a distributed database system based on DM2, which is developed by [8].

The remaining part of this paper is discussed as following scheme: In section II we discuss the related work in the field of load balancing in Distributed environment, in section III we will discuss the load balancing strategy using buffer management policy and in section IV will discuss the analytical model with some considerable result found during implementation and we will conclude our paper and give future scope in section V.

II. Related Work

To learn and adopt the functionalities of page hits to pages in the buffer pool is a advanced known paradigms to the design of effective buffer cache management algorithms.

To the limit to which reference patterns contains temporal locality, pages that have been used recently tend to be used in the future. Temporal accessibility is considered in various access matching criteria, such as set of instruction page achievable [1], collection of data accesses [3], and CPU instructions sets [2]. Temporal locality is the most important design consideration of many page replacement algorithms, which are called locality algorithms.

III. Load Balancing With Buffer Management

In a distributed database management system, the database is spread among several sites over a computer network. At each site, the system should respond to read and write requests coming from users located at different sites. In order to maintain global data consistency and prevent database updates performed by users at one site from interfering with database retrievals and updates performed by users at other sites, accesses to the distributed data must be carefully controlled.

To maintain buffer coherency, copies of these updated pages in the public buffer and other private buffers should be updated accordingly as well. Basically, there are three basic buffer management issues in such a system:

- Public buffer placement problems: When a page which is not in the public buffer is read from disk into a private buffer, should the page be placed in the public buffer as well?
- Public private buffer replacement problem: When a public/private buffer frame is needed to bring in a page from disk, and all current buffer frames are in use, which page from the public/private buffer should be replaced?
- Public/Private buffer allocation problem: To minimize the number of page faults and meanwhile achieve better buffer utilization, how many frames should be allocated to the public/private buffer pool?

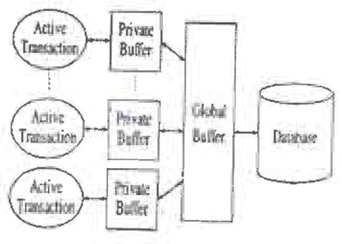

Fig. 1: Buffer Model

ALGORITHM:

DM2 is a distributed database management system (DDBMS) with C/S architecture. In DM2 distributed database system, data or information can be transferred or copied to the nodes where the transactions are issued. The precondition of transferring from one node to another is the remaining time of unfinished executing transaction should greater than the total time cost of transferring transaction's environment parameters and the data the transaction fetched and immediate results, if then, the transaction can be transferred, or else not. It can be expressed as follow.

$$T_{remainingwork}(a) > T_{transfer}(a, i, j) \qquad (1)$$

The left expression stands for remaining executing (predicted) time of transaction 'a' in the original node and its value is the difference between the transactions' average executing time and executed time of transaction 'a'. The value of right expression stands for the time cost of transferring from node i to node j of transaction 'a', which is determined by:

$$T_{transfer}(a, i, j) = T_{code}(a, i, j) + T_{data}(a, i, j) \qquad (2)$$

There into,

$$T_{code}(a, i, j) = size\_of\_code(a) / R$$

$$T_{data}(a, i, j) = size\_of\_data(a) / R$$

The value of size_of_code (a) stands for the total size of executing environment parameters and log of transaction 'a'.

The value of size_of_data (a) stands for the data size of fetched data and immediate results by transaction 'a' in the current database server node i. R stands for the average network-transferring rate.

In Our algorithm, there are three types of states of nodes:

- When the length of transaction queue $\geq T_2$, the node is a heavily load node and to be a sender automatically.
- When the length of transaction queue $\leq T_1$, the node is a lightly load node and to be a receiver automatically.
- When $T_1 \leq$ the length of transaction queue $\leq T_2$ satisfied, the node is a OK node.

IV. Performance Measures and Evaluations

Critical Path Method and Critical Chain Method provide various direction of thinking to number of issues, and thereby allow a wide range of the different tools and procedures that are easily available. It is important to learn project techniques in the process of constant changes, specified inputs, various users, and different aims. A analysis between critical chain method and critical path method project running time when activity run time ranges and number of processes in critical chain is fix is shown in table 4.1.

TABLE I Process-Critical Chain

Activity Duration		Number of activities	CPM	Critical Chain		
Safe	Aggressive		Project Duration(days)	Buffer Size (days)	Project Duration (days)	(%)
10	5	5	50	11	36	72.36
20	10	5	100	23	77	72.36
30	15	5	150	34	109	72.36
40	20	5	200	45	145	72.36
50	25	5	250	56	181	72.36

A Cognitive Model of Navigation and Path finding using Cellular Automata Agent

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Abstract— Artificial Intelligence constitute a continuum of attempts to model adaptive, learning and cognitive abilities in all the varying degrees of complexities we know from biology and psychology. The purpose of present research paper is to design cognitive cellular automata agent with conflict-level spatial problem-solving abilities. Such an agent will have the capability to reason, learn and plan in a manner similar to human being. The agent architecture has a fuzzy inference system to implement the "perceive-reason-act" decision cycle of a mobile cellular automata reflex agent. In essence the agent is expected to execute an Observe-Orient-Decide-Act (OODA) loop. A cognitive model is developed to compute the best-next-move at each time instant for the goal oriented, rational and utility-driven mobile cellular automata agent. Experiments are to be planned and conducted to evaluate the problem solving abilities of such an agent when immersed in a conflict situation.

Keywords— Fuzzy Inference System; Mental maps; Meta rules.

I. INTRODUCTION

Path finding is the art of deciding which route to take based on and expressed in terms of the current internal representation of the terrain. A path finding algorithm takes a problem as input and returns a solution in form of an action sequence. Once a solution is found the action it recommends can be carried out.

The research paper explores a cognitive model of navigation and path finding using cellular automata agent in which agent has to reach its destination by avoiding obstacles. Agent has the prior knowledge of their initial position and target positions. The agent act as an intelligent agent and action taken by it according to the environment. In general an agent with several immediate options of unknown value can decide what to do by first examining different possible sequences of actions that lead to state of known value and then choosing the best sequence. This process of looking for such a sequence is called path finding. We propose the following definition: *"Path finding is the art of deciding which route to take based on and expressed in terms of the current internal representation of the terrain."*

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II. LITERATURE SURVEY

Steven M. LaValle [1] proposes a dynamic game-theoretic framework that is used as an analytical tool and unifying perspective for a wide class of problems in motion planning. This approach is inspired by the foundation laid by configuration space concepts for basic path planning. The basic problem considered in this paper is to find a continuous path from initial position to goal position using set of configurations in which robot is not in collision with static obstacles in the world. Anthony Stentz [2] proposed a new algorithm for generating optimal paths for a robot operating with a sensor and a map of the environment. D. GARAGIC and J. B. CRUZ [3] proposed a method which utilize fuzzy set theory in order to incorporate the players' heuristic knowledge of decision making into the framework of conventional game theory or ordinal game theory. Chunyan Han, Zuofeng Gao, Yongbo Yu, Hua Zhang, Suang Zhang and Hongxin Bai [4] considered a fuzzy bimatrix games with fuzzy payoffs. The game theory when applied to some practical problems encountered in real situations requires knowing the values of payoffs exactly. However, it is difficult to know the exact values of payoffs and the values of payoffs can only be known approximately. In such situations, it is useful to model the problems as games with fuzzy payoffs. In this case, since the expected payoffs of the game should be fuzzy-valued, there are no concepts of equilibrium strategies to be accepted widely. Elisabeth Rakus-Andersson, Maria Salomonsson and Hang Zettervall [5] expanded the classical model of a two-player game to select the best strategies, whose action is expected to maintain the values of a certain variable on the neutral level. Payoff values in the game matrix are represented using fuzzy sets facilitating the procedure of formulations of payoff expectations by players. N. Javadian and Y. Maali [6] introduced a concept of solution for non cooperative with fuzzy payoffs based on the concept of credibility measure. Adem C. Cevikel and Mehmet Ahlatcioglu [7] in their paper presented new concepts of solutions for a two-person zero-sum games with fuzzy payoffs and fuzzy goals. A degree of attainment of the fuzzy goal is defined and the max-min strategy with respect to the degree of attainment of the fuzzy goal is examined. Qian Song and Abraham Kandel [8] proposed a fuzzy approach to solve the strategic game problem in which the pure strategy set for each player is already defined. Based on the concepts of fuzzy set theory, this approach uses a multicriteria decision-making method to obtain the optimal strategy in the game. Marcos A. M. Vieira and Ramesh Govindan and Gaurav S.Sukhatme [9] in their paper implemented a partition strategy where pursuers capture evaders by decomposing the game into multiple multi-pursuer single-evader games. Yifan Li, Petr Musilek and Loren Wyard-Scott [10] provided an anatomy of how agent technology, incorporated with fuzzy logic, can be applied to game design. The game design is decomposed into autonomous entities and inanimate objects. The nine types of entities considered in the design are four terrain elements, three different enemy tanks, the base, and the player's tanks. Gedson Faria and Roseli A. Francelin Romero [11] presented a sensor based navigation method that utilizes fuzzy logic into reinforcement learning algorithms for navigation of mobile robot in uncertain environment. Lori L. DeLooze and Wesley R.Viner [12] presented a variation of fuzzy Q-learning algorithm, using which an intelligent agent is trained to play Ms. Pac-Man video game. The strategy presented is a table based learning strategy, in which the intelligent agent analyzes the current situation of the game, stores various membership values for each of the several contributors to the situation and makes decisions based on these values.

III. PURPOSE

The purpose of present research paper is to design cognitive cellular automata agent with conflict-level spatial problem-solving abilities. Such an agent will have the capability to reason, learn and plan in a manner similar to a human being. Different Soft-Computing method such as artificial neural networks, reinforcement learning, and fuzzy inference system can be used to do cognitive tasks. A cognitive model is developed to compute the best-next-move at each time instant for the goal oriented, rational and utility-driven mobile cellular automata agent. Experiments are to be planned and conducted to evaluate the problem solving abilities of such an agent when immersed in a conflict situation.

IV. DESIGN OF ALGORITHM

A Assumptions

To show the Cognitive model of navigation and path finding using cellular automata agent we have considered the 320x320 cellular automata universe shown in Figure 1.

The scenario is divided into three regions as:

1) *Go-Region* – The agent can move with a fast pace in this region.

2) *Slow-go region* – The agent moves with a slower pace in this region.

3) *No-Go region* – The agent cannot enter the no-go region.

Fig. 1. 320x320 cellular automata universe.

For each simulation run two types of static obstacles are placed randomly on the entire scene. For moving the agents we have considered three zones as follows:

1) Meta Zone - It is 15 by 15 zone in which depending upon the amount of clutter density, distribution of three different regions, distribution of two types obstacle and variations in heights one of the three fuzzy inference system is selected.

2) Perceptive Zone – It is 9 by 9 zones from which we determine the values of following ten variables which are passed as inputs to the three fuzzy inference systems.

3) Movement zone – It is 3 by 3 zone from which rover selects single cell for movement.

Three fuzzy Inference systems are given in Table I

TABLE I. THREE FUZZY INFERENCE SYSTEMS

FIS 1 – RuleBookFis1		FIS 2 – RuleBookFis2		FIS 3 – RuleBookFis3	
Inputs	Outputs	Inputs	Outputs	Inputs	Outputs
Camouflage	Climb	Armour	Separation-Distance	Obstacle-Direction	Separation-Distance
Obstacle-Altitude	Time-Delay-Region	Obstacle-Distance	Probability-Trap	Obstacle-Distance	Probability-Trap
Region-Traffic-utility	Goal-Steer-Direction	Penetrability	Time-Delay-Obstacle	Clutter-Density	Goal-Steer-Direction
Target-Direction		Lethality		Target-Direction	

We have taken nine Meta rules depending upon which we determine which combination of fuzzy inference systems is to be called. Using the three outputs separation distance, climb, and goal steer direction from fuzzy inference systems three mental maps are constructed. Mental maps are basically 9 by 9 cellular space with each cell having its own utility value. Cells with minimum utility value are the most eligible cells.

Developing Mobile Message Security Application Using 3D Playfair Cipher Algorithm

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Abstract—The theme of this research is to provide security for the messages of an Android phone that contains alphabets, numerals and special characters. This research overrules the functioning of Application Lock and secures the messages by encrypting through 3D-Playfair Cipher(4 X 4 X 4). 3D-Playfair works on trigraph and supports all of the 26 alphabets {A to Z}, the 10 digits {0 to 9} and the 28 basic special characters. 3D-Playfair increases the security by maximizing complexity. Using this application, all the messages will be displayed in the encrypted form on the mobile screen which can be decrypted upon the verification of valid user.

Keywords—Android Application, 3D Playfair cipher, trigraph

I. INTRODUCTION

The Android operating system allows the users to develop their own applications in their interest following certain guidelines of the technology. Various Android applications have been designed for the security of various data and applications in an Android phone. Various pattern locks and application locks developed secures the complete application or the phone from accessing.

This Android Application integrates the features of a default message application and 3D Playfair Cipher encryption technique in order to enhance the security of messages. Any user is allowed to access the message application but is shown the messages encrypted using 3D Playfair rather than original messages. Once a user verifies itself to be the valid user through password, the messages can be decrypted.

II. WORKING

A. Mobile Message Security Application

The application reads the particular message from the default message inbox and then, provide input to the algorithm. The application work as a bridge between the message and the algorithm -3D playfair cipher. On clicking the icon of the application the user can see encrypted messages from various sender.

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To decrypt the messages user have to click on the name of the sender and provide a password .If the access is verified then the application will decrypt messages from that sender only.

B Algorithm:3D Playfair Cipher

The application reads the particular message from the default message inbox and then, provide input to the algorithm.

The application work as a bridge between the message and the algorithm -3D playfair cipher. On clicking the icon of the application the user can see encrypted messages from various sender. To decrypt the messages user have to click on the name of the sender and provide a password .If the access is verified then the application will decrypt messages from that sender only.

TABLE I. SEQUENCE OF LETTERS IN 3D PLAYFAIR CIPHER

FLOOR 1			
0	1	2	3
4	5	6	7
8	9	A	B
C	D	E	F

FLOOR 2			
G	H	I	J
K	L	M	N
O	P	Q	R
S	T	U	V

FLOOR 3			
W	X	Y	Z
!	"	#	$
%	&	'	(
)	*	+	,

FLOOR 4			
-	.	/	:
;	<	=	>
?	@	[	\
]	^	_	|

III. KEY MATRIX GENERATION

3D-Playfair Cipher, the keyword is stored in a 4 X 4 X 4 matrix (table). The keyword is then used as the secret key for encryption and decryption. The basic rules for storing keyword into 4 X 4 X 4 matrix are:

1. Enter the secret key (password) which is the combination of numerals, alphabets and special symbols like: thepranay14@gmail.com,sakshiagarwal.aug11@gmail.com, cipher, 8527045758 etc.
2. Find out the keyword by removing the repeated letters of the secret key. Ex: thepranay14@gmail.co, sakshiagrwl.ut@gm.com, cipher, 852704 for above keys.
3. Arrange the keyword in 4 X 4 X 4 matrix floor by floor, row- wise: left to right and then top-to-bottom.
4. Fill the rest of the spaces left in the matrix with the remaining numerals (0-9), alphabets (A-Z) and special symbols.

The keyword for the secret key HAPPYNEWYEAR2015 will be HAPYNEWR2015 and Key-Matrix will be:

TABLE II KEY MATRIX GENERATION

FLOOR 1			
H	A	P	Y
N	E	W	R
2	0	1	5
3	4	6	7

FLOOR 2			
B	9	B	C
D	F	G	I
J	K	L	M
O	Q	S	T

FLOOR 3			
U	V	X	Z
!	"	#	$
%	&	'	(
)	*	+	,

FLOOR 4			
-	.	/	:
;	<	=	>
?	@	[	\
]	^	_	|

A. Encryption

During the encryption process of a message, the message is broken down into trigraph. The filler letters X and Z are used to fill the trigraph. X if one there is space for one letter and X and Z sequentially, if for two. So that LOLLIPOP would be treated as {LOL}, {LIP}, {OPX}, and GOODGRACES would be treated as {GOO}, {DGR}, {ACE}, {SXZ}.

Replacement of the letter in the trigraph will be replaced by the letter that takes place with respect to the position of letters in trigraph in row, column, floor in circular fashion. This can be better understood by the following table :

TABLE III ESCRIPTION

Plain Text Trigraph	Plain Text Trigraph			Cipher Text Trigraph
	1st Letter	2nd Letter	3rd Letter	
1st Letter	Row	Column	Floor	1st Letter
2nd Letter	Floor	Row	Column	2nd Letter
3rd Letter	Column	Floor	Row	3rd Letter

B Decryption

Replacement of letter for decryption purpose follows the circular fashion too, just the sequence changed that is row, floor, column of the letters in the trigraph of cipher text. This can be better understood by the table below:

TABLE IV DECRYPTION

Cipher Text Trigraph	Cipher Text Trigraph			PlainText graph
	1st Letter	2nd Letter	3rd Letter	
1st Letter	Row	Floor	Column	1st Letter
2nd Letter	Column	Row	Floor	2nd Letter
3rd Letter	Floor	Column	Row	3rd Letter

Filler letters (X and Z) are removed from the trigraph. The cipher text is thus decrypted to the actual text or plaintext.

IV. ANALYSIS OF ALGORITHM

A. Encryption And Decryption

Example of encryption for with key HAPYNEWR2015 is: Plaintext: IMSUPTU
Trigraph. {IMS}, {UPT}, {UXZ}
Encryption- (According to Table II)

TABLE V ENCRYPTION OF IMS

Plain Text Trigraph	Plain Text Trigraph			Cipher Text Trigraph
	I	M	S	
I	Row	Column	Floor	I
M	Floor	Row	Column	L
S	Column	Floor	Row	T

TABLE VI ENCRYPTION OF UPT

Plain Text Trigraph	Plain Text Trigraph			Cipher Text Trigraph
	U	P	T	
U	Row	Column	Floor	B
P	Floor	Row	Column	Z
T	Column	Floor	Row	3

TABLE VII ENCRYPTION OF UXZ

Plain Text Trigraph	Plain Text Trigraph			Cipher Text Trigraph
	U	X	Z	
U	Row	Column	Floor	X
X	Floor	Row	Column	Z
Z	Column	Floor	Row	U

Cipher text: ILTBZ3XZU

Receiver decrypts the ciphertext received over the internet using the same key as used by the sender.

A. Decryption

Trigraph : {IMS}, {UPT}, {UXZ}
Plaintext : IMSUPTU

Developing 3D-Playfair Cipher Algorithm Using Structure Rotation

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Abstract—3D-Playfair cipher is a multiple letter encryption cipher. Trigraphs (combination of 3 characters) of the plaintext are treated as single unit and converted into corresponding cipher text trigraphs and vice-versa. Classical Playfair Cipher supports English alphabets with limitation that only one alphabet "i" or "j" will be considered at a time. 3D-Playfair Cipher came into focus to eliminate this limitation. In addition to that 3D-Playfair Cipher also overlooks the limitation of similar fashion encryption of diagrams and its reverse diagrams. 3D-Playfair cipher supports all 26 English alphabets {A-Z}, 10 digits {0-9} and 28 special characters including { ! " * # $ % & ' + , - . / : ; ( ) < = > ? @ [ ] \ ^ _ }. The theme of this research is to enhance the security of text files that contains alphabets, numerals and special characters. In this approach we developed a structure rotation concept on key matrix of 3D-Playfair cipher using random key to achieve the objective. Random sequences are generated through Linear Feedback Shift Register due to its simplicity and better performance.

Keywords—3D-Playfair cipher; trigraph; rotations; bitwise operations; LFSR

I. Introduction

The relationship of security and bitwise operations are very casual [2]. A bitwise operation is used to operate on one or more than one bit patterns or on any binary numerals at the level of their individual bits. Shifting the binary value of any integer in circular fashion is called rotation. Rotations are considered bitwise operations [3], because they operate on the binary representation of an integer instead of its numerical value; however, rotations do not operate on pairs of corresponding bits therefore cannot properly be called bit-wise [4]. Rotations play crucial roles in data security; it move or shift the position of bits according to the user's command [5] to the left/ right in circular fashion. It is very popular and being used in most of the cryptographic algorithms due to its easy implementation and fast response.

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Linear Feedback Shift Registers are good candidate for generating random sequences. Due to its logical circuit variation and its implementation on software and hardware are also easy [6].

A novel approach of encryption is presented in this paper, with moving structure of key matrix on each trigraph processing. A random key will be required for structure movement. So LSFR is used to generate keys for rotations of key matrix of 3D-Playfair Cipher in this research. At first plaintext trigraphs will be converted into corresponding ciphertext trigraphs based on 3D-Playfair cipher rules and then rotated key matrix will be used to process next trigraph.

II. 3D- Playfair Cipher

3D-Playfair cipher is the multiple letter encryption cipher, and encrypts a trigraph of plaintext into corresponding cipher text trigraph and vice-versa by using a 4 X 4 X 4 matrix to store twenty-six (26) alphabets, ten (20) numerals and twenty-eight (28) special symbols. These letters are arranged in the matrix by using secret key in the same manner as classical playfair cipher. A matrix is represented in below table by assuming a null key.

TABLE I. SEQUENCE OF LETTERS IN 3D PLAYFAIR CIPHER

Floor 1			
0	1	2	3
4	5	6	7
8	9	A	B
C	D	E	F

Floor 2			
G	H	I	J
K	L	M	N
O	P	Q	R
S	T	U	V

Floor 3			
W	X	Y	Z
!	"	#	$
%	&	'	(
)	*	+	,

Floor 4			
-	.	/	:
;	<	=	>
?	@	[	\
]	^	_	{

3D-Playfair cipher has 3 main parts Key Matrix generation, Encryption and Decryption. All these parts are better explained in following section [1]-

A. Key-Matrix Generation

3D-Playfair Cipher uses a 4 X 4 X 4 matrix (table) to store a keyword that becomes the key for encryption and decryption process. Storing keyword into 4 X 4 X 4 matrix is based on given rules-

1. Enter the secret (password) which may contain numerals, alphabets and special symbols like: aman2015nitj@gmail.com, cipher, 29101989, ravindra_1987_singh@nitj.ac.in etc.
2. Drop the duplicate letters of key to get the keyword. Ex: amn2015itj@g.com, ravind_1987sgh@tj.c, cipher, 29108 for above keys.
3. Arrange this keyword in 4 X 4 X 4 matrix floor by floor, row-wise: left to right and then top-to-bottom.
4. Fill all remaining spaces of the matrix with the rest of numerals (0-9), alphabets (A-Z), special symbols.

Ex: if secret is FRIENDS4EVER@NITJ_2012.CSE
Then keyword will be FRIENDS4V@TJ_201.C
And Key-Matrix is given in the table below:

TABLE II. KEY MATRIX GENERATION

Floor 1			
F	R	I	E
N	D	S	4
V	@	T	J
_	2	0	1

Floor 2			
C	.	S	
6	7	8	9
A	B	G	H
K	L	M	O

Floor 3			
P	Q	U	W
X	Y	Z	!
"	#	$	%
&	'	(	)

Floor 4			
*	+	,	-
/	:	;	<
=	>	?	[
\	]	^	{

B. Encryption

Encryption process will require trigraph (group of 3 letters). Grouping of letters are following few rules in order to produce trigraph.

1. If any two letters are the same or only one letter is left, add two filler letter X and Z after the first letter in the trigraph.
2. And if any two letter is left, add a filler X after the second letter.

So that BALLOON would be treated as {BAL}, {LOX}, {ONX}, and HELLOWORLDS would be treated as {HEL}, {LOW}, {ORL}, {DSX} and MASTI_M.TECH @NITJ.2012 would be treated as {MAS}, {TI_}, {M.T}, {ECH}, {@NI}, {TJ.}, {201}, {2XZ}.

A letter in the trigraph will be replaced by the letter that will lay on the same row of the letter and the column of the next letter and at the floor of next-to-next letter in circular fashion. This approach can be better understand by the following diagram-

TABLE III. ENCRYPTION PROCESS OF 3D PLAYFAIR CIPHER

Plain Text Trigraph	Plain Text Trigraph			Cipher Text Trigraph
	1st Letter	2nd Letter	3rd letter	
1st Letter	Row	Column	Floor	1st Letter
2nd Letter	Floor	Row	Column	2nd Letter
3rd letter	Column	Floor	Row	3rd letter

Circular fashion means 2nd letter is the next letter and 3rd letter will be the next-to-next letter for 1st letter. 3rd letter will be the next letter and 1st letter will be the next-to-next letter for 2nd letter and 1st letter will be the next letter and 2nd letter will be the next-to-next letter for 3rd letter.

C. Decryption

A letter in the trigraph will be replaced by the letter that will lay on the same row of the letter and at the floor of the next letter and the column of next-to-next letter in circular fashion. This approach can be better understand by the following diagram-

TABLE IV. DECRYPTION PROCESS OF 3D-PLAYFAIR CIPHER

Cipher Text Trigraph	Cipher Text Trigraph			Plain Text Trigraph
	1st Letter	2nd Letter	3rd letter	
1st Letter	Row	Floor	Column	1st Letter
2nd Letter	Column	Row	Floor	2nd Letter
3rd letter	Floor	Column	Row	3rd letter

Remove the filler letter from the trigraph (Dropping any extra X and Z that don't make sense in the final message) to find the actual text (plaintext).

III. Linear Feedback Shift Register (LFSR)

Linear Feedback Shift Register is the rotation based arrangement to produce a random bit and changes its state in each iteration [7]. This state is a linear function of (using XOR and/or inverse-XOR) its previous state which is responsible to generate the random sequence [8]. Here few selected bits are processed by this function and drive next state along with random bit. These selected bits are considered as "tap" [9] in other words "bit positions that affects next state is known as tap". The state Linear Feedback Shift Register at very start is considered as "seed". Seed is the initial value (L-bit) of LFSR, here L represents the no of register in this arrangement, generally called "length" [10]. Generated random sequence will be more dynamic if we frequently change the tap. Thus the scenario is illustrated in the figure as follows [8].

A Methodological Survey of Image Segmentation Using Soft Computing Techniques

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Abstract-This paper presents a state of art review of image segmentation using soft computing techniques. Some of these techniques are explained by to what ways they similar to GAs and in what ways they differ. Different soft techniques of implementing Image segmentation have been reviewed in this paper. Finally, summaries and review of research work on image segmentation using soft computing techniques has been represented.

Keywords: Image processing, Genetic algorithm, Soft Computing Techniques

I. Introduction

Separating or grouping an image into different parts can be done by the image segmentation process. There are currently many different ways of performing image segmentation, ranging from the simple thresholding method to advanced color image segmentation methods. These parts normally correspond to something that humans can easily separate and view as individual objects. Computers have no means of intelligently recognizing objects, and so many different methods have been developed in order to segment images [1][2][3][5].

II. Soft Computing Methods

With the rise of the development of heuristic methods and artificial life computing, other solving techniques similar to genetic algorithms have emerged. The way neurons are connected to the brain is a computer model, which is used by a soft computing method like neural network. Tabu search is the meta heuristic search method which uses local search techniques used for mathematical optimization. Genetic algorithms were used to evolve programs to perform certain tasks by John Koza in 1992. His method was known as "genetic programming" (GP). Genetic programming is considered to be the most famous for solving symbolic regression problems and is widely used for solving optimization problem. The working principle behind GP and GA are same but there lies a major difference between the two that GP gives solutions in terms of weighted sum of coefficients, whereas GA gives solutions represented by a number in binary or real form.

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III. Literature Review

In this paper, a hybrid genetic and variation EM algorithm for image segmentation of brain MR images is proposed. In this method, the VEM algorithm is used to estimate the GMM which is initialized by the GA. Our results show improvement on the performance of brain MR image segmentation on the incorporation of population-based optimization into the variation Bayes inference. [6]

In this paper, Amiya Halder has proposed an efficient evolutionary color image segmentation algorithm i.e. dynamic GA based clustering (GADCIS). The optimum number of clusters for color images is automatically determined by the proposed technique. The optimum number of clusters is obtained with the help of Gaussian distribution. The author concludes that there is no need to prior knowledge which is required to partition the dataset, in advance. Finally comparison of the other unsupervised clustering methods with experimental results of this paper shows that the proposed methodology gives satisfactory results when applied on natural images. [4][7]

Genetic algorithms are applied in major decision of choosing a method of segmentation, finding a fitness function for quality of image segmentation and a meaningful way to represent the chromosomes. [8]

This paper proposed a robust Algorithm for Image Segmentation System for a RGB color image, and an evolutionary approach i.e. improved Genetic algorithm, based on proposed efficient color image segmentation. [9]

S.Cagnoni presents strategies and segmentation filters for their application from data available along a few contours drawn by the end user by feature extraction. [10]

In this paper, a new multilevel thresholding method for image segmentation based on PSO is proposed by Fahd M.A. Mohsen. In this method, the thresholding problem is solved by using the principle of PSO by treating as an optimization problem and it produce new optimization based image segmentation method, PSOTH. [11]

There are interesting properties for image processing in the PCNN model of the cat visual cortex are described in this paper. This article describe that the processing of images of heterogeneous materials is described by the PCNN application, and specifically PCNN is applied to image segmentation. It is useful tool for this method. The process of image processing of granular materials is automated by the integration of smoothing, segmentation, addition of binary output. [12]

In this paper, a PSO (Particle Swarm optimization) based new image segmentation method is proposed. A new method is produced by the combination of any one of the region-based image segmentation method which is named Seeded Region Growing (SRG) and PSO algorithm. A segmentation of Image is performed by the SRG method with respect to seeds a set of points. The PSO-SRG method tries to find the best location for the seed point and finds best similarity difference between regions and their neighbor pixel. [13]

According to the similarity between gray levels Orlando J. Tobias propose an approach to threshold the histogram. Fuzzy measure is used to assessed such type of similarity. In Those conventional methods are affected by local minima, reduced in this paper. For histogram thresholding, the procedure based on minimization of a criterion function is replaced according to the similarity between gray levels. Mathematical model uses fuzzy framework .Not representing a serious restriction, real images having the required characteristic is very large. [15]

Mantas Paulinas present the survey of genetic algorithms applications is growing fast. So that complex image processing tasks can be solved by using genetic algorithms. The presenting chromosome encoding scheme, crossover, mutation scheme and fitness functions are responsible for success of optimization. [16]

Genetic algorithm has been used for solving travelling salesman problem given by Saloni Gupta. Firstly the Euclidean distances are calculated which is the distances between all cities to be visited by the salesman and for initial population randomly chosen a city. TSP is solved by integrating the knowledge from heuristic methods and genetic algorithms. Crossover and mutation methods are used to find the good solution of travelling salesman problem but it depends on which type of crossover and mutation methods are used by genetic algorithm and the way to encode the problem [17].

To review the major applications of Genetic algorithms, an attempt has been made to the domain of medical image segmentation by Ujjwal Maulik. When the images are simple, less noisy the classical image segmentation techniques are used such as information regarding texture, shape, contours, etc. Reduction of the computation time of Gas is another important consideration in medical image analysis that is time consuming nature. [19]

The modified fuzzy c-means (FCM) clustering algorithm is used on normal MRI brain image with tumor [20].

"ACISFMC" is a novel system for color image segmentation proposed by Kanchan Deshmukh. Simpson's FMMN clustering algorithm is an application used in this paper. As a tool Fuzzy entropy is used to decide number of clusters in the proposed work. Neural network is used and the main feature of this technique is no need of priori knowledge to segment a color image. In this paper, a novel segmentation technique used for color images. After segmentation, the neural network tries to remain the same color as before the object using multisigmoid.[21]

K.Selvanayaki proposes two stages, first is used for preprocessing and enhancement using tracking algorithm. The algorithm is generalized that suit for the brain MRI from any database and it has shows that PSO is better than ACO and GA algorithm for tumor detection. [22]

TABLE I. Review

Ref	TECHNIQUE	PARAMETER	FUTURE WORK
[6]	Expectation Maximization Algorithm	$\beta 0$ is empirically initialized as 0.10. The $\tau 0$ is set to be the dimension of the observed data. $m0$ and $W0$ are initialized to be	Proposed segmentation algorithm could be applied to other single/multimodality medical images, such as PET-CT images.

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Detection of unhealthy region of plant leaves using Image Processing and Genetic Algorithm

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Abstract -Agricultural productivity is that thing on which Indian Economy highly depends. This is the one of the reasons that disease detection in plants plays an important role in agriculture field, as having disease in plants are quite natural. If proper care is not taken in this area then it causes serious effects on plants and due to which respective product quality, quantity or productivity is affected. Detection of plant disease through some automatic technique is beneficial as it reduces a large work of monitoring in big farms of crops, and at very early stage itself it detects the symptoms of diseases means when they appear on plant leaves. This paper presents an algorithm for image segmentation technique used for automatic detection as well as classification of plant leaf diseases and survey on different diseases classification techniques that can be used for plant leaf disease detection. Image segmentation, which is an important aspect for disease detection in plant leaf disease, is done by using genetic algorithm.

Keywords: Image processing, Genetic algorithm, plant disease detection

I. Introduction

The existing method for plant disease detection is simply naked eye observation by experts through which identification and detection of plant diseases is done. For doing so, a large team of experts as well as continuous monitoring of experts is required, which costs very high when farms are large. At the same time, in some countries, farmers don't have proper facilities or even idea that they can contact to experts. Due to which consulting experts even cost high as well as time consuming too. In such condition the suggested technique proves to be beneficial in monitoring large fields of crops. And automatic detection of the diseases by just seeing the symptoms on the plant leaves makes it easier as well as cheaper. This also supports machine vision to provide image based automatic process control, inspection, and robot guidance [2][4][5].

Plant disease identification by visual way is more laborious task and at the same time less accurate and can be done only in limited areas. Whereas if automatic detection technique is used it will take less efforts, less time and more accurately. In plants, some general diseases are brown and yellow spots, or early and late scorch, and other are fungal, viral and bacterial diseases. Image processing is the technique which is used for measuring affected area of disease, and to determine the difference in the color of the affected area [1][2][6].

Image segmentation is the process of separating or grouping an image into different parts. There are currently many different ways of performing image segmentation, ranging from the simple thresholding method to advanced color image segmentation methods. These parts normally correspond to something that humans can easily separate and view as individual objects. Computers have no means of intelligently recognizing objects, and so many different methods have been developed in order to segment images. The segmentation process in based on various features found in the image. This might be color information, boundaries or segment of an image [11][13].

Genetic algorithms belong to the evolutionary algorithms which generate solutions for optimization problems. Algorithm begins with a set of solutions called population. Solutions from one population are chosen and then used to form a new population. This is done with the anticipation, that the new population will be enhanced than the old one. Solutions which are selected to form new solutions (offspring) are chosen according to their fitness - the more appropriate they are the more probability they have to reproduce [12][14].

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II Literature Review

Savita N. Ghaiwat et al. present survey on different classification techniques that can be used for plant leaf disease classification. For given test example, k-nearest-neighbor method is seems to be suitable as well as simplest of all algorithms for class prediction. If training data is not linearly separable then it is difficult to determine optimal parameters in SVM, which appears as one of its drawbacks [1].

In paper [2] there are mainly four steps in developed processing scheme, out of which, first one is, for the input RGB image, a color transformation structure is created, because this RGB is used for color generation and transformed or converted image of RGB, that is, HSI is used for color descriptor. In second step, by using threshold value, green pixels are masked and removed. In third, by using pre-computed threshold level, removing of green pixels and masking is done for the useful segments that are extracted first in this step, while image is segmented. And in last or fourth main step the segmentation is done.

The paper [3] presents the technique to classify and identify the different disease through which plants are affected. In Indian Economy a Machine learning based recognition system will proves to be very useful as it saves efforts, money and time too. The approach given in this for feature set extraction is the Color Co-occurrence Method. For automatic detection of diseases in leaves, neural networks are used. The approach proposed can significantly support an accurate detection of leaf, and seems to be important approach, in case of steam, and root diseases, putting fewer efforts in computation.

According to Paper [4] disease identification process include some steps out of which four main steps are as follows. first, for the input RGB image, a color transformation structure is taken, and then using a specific threshold value, the green pixels are masked and removed, which is further followed by segmentation process, and for getting useful segments the texture statistics are computed. At last, classifier is used for the features that are extracted to classify the disease. The proposed algorithm shows its efficiency with an accuracy of 94% in successful detection and classification of the examined diseases. The robustness of the proposed algorithm is proved by using experimental results of about 500 plant leaves in a database.

Anand H Kulkarni et al. presents a methodology for early and accurately plant diseases detection, using artificial neural network (ANN) and diverse image processing techniques. As the proposed approach is based on ANN classifier for classification and Gabor filter for feature extraction, it gives better results with a recognition rate of up to 91%. An ANN based classifier classifies different plant diseases and uses the combination of textures, color and features to recognize those diseases [5].

The paper [6] presents disease detection in Malus domestica through an effective method like K-mean clustering, texture and color analysis. To classify and recognize different agriculture, it uses the texture and color features these generally appear in normal and affected areas. In coming days, for classification purpose given classifiers can also be used, like K-means clustering, Bayes classifier and principal component classifier.

According to [7] histogram matching is used to identify plant disease. In plants, disease appears on leaf therefore the histogram matching is done on the basis of edge detection technique and color feature. Layers separation technique is used for the training process which includes the training of these samples which seperates the layers of RGB image into red, green, and blue layers and edge detection technique which detecting edges of the layered images. Spatial Gray-level Dependence Matrices are used for developing the color co-occurrence texture analysis method.

Paper [8] presents the Triangle threshold and simple threshold methods. These methods are used to lesion region area and segment the leaf area respectively. In final step, categorization of disease is done by calculating the quotient of leaf area and lesion area. According to the research done, the given method is fast and accurate for calculating leaf disease severity and leaf area calculation is done by using threshold segmentation.

For disease spot segmentation an algorithm is used, that is image processing techniques in plant leaf is implemented [9]. In this paper, process of disease spot detection is done by comparing the effect of HSI, CIELAB, and YCbCr color space. For Image soothing Median filter is used. In final step,

Cardiac Image Segmentation using Simulated Genetic Algorithm

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Abstract: Cardiac Image Segmentation poses many challenges arising from the large variation between different sequences of images. As we know that Segmentation of moving objects in image sequences is more difficult .In the present paper we use Simulated Genetic Algorithm for Cardiac Image Segmentation to deal with these challenges. We propose an algorithm for segmentation of medical image sequences based on Simulated Genetic Algorithm which uses K-mean clustering in the feature vector space. We use two- dimensional feature vector for clustering in the feature space. Experiments on Cardiac images have given the satisfactory results.

Keywords: Cardiac Image Segmentation; clustering; GA, Image Segmentation;

I. Introduction

One of the leading causes of death in India is heart disease and so study and implementation of cardiac medical imaging has become the topic of rigorous research. Heart disease diagnosis and treatment follow up of cardiac imaging which include echography, computerized tomography, coronary angiography and cardiac MRI. Manual segmentation of cardiac image is a long and difficult process. There has been a lot of scope to do research in automated cardiac medical segmentation methods.

II MEDICAL IMAGE SEGMENTATION

When the images are simple, less noisy the classical image segmentation techniques are used such as information regarding texture, shape, contours, etc. Genetic algorithm and genetic programming are generally used for solving the optimization problems in medical image segmentation. Reduction of the computation time of Gas is another important consideration in medical image analysis that is time consuming nature [4][12] [14]. This paper [13] proposed several methods for medical image segmentation based on artificial neural networks. The networks were categorized into feedback and feed-forward networks. The Hopfield, Cellular, and Pulse-Coupled networks have been used as feedback networks .The neural networks, Self Organizing Map (Kohenen), Multi-Layer Perceptron, and Radial Basis Function neural networks have been utilized as feed forward neural network. These are useful for function approximation and classification.

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III. GENETIC ALGORTHIM

Genetic algorithms belong to the evolutionary algorithms which generate solutions for optimization problems. Algorithm begins with a set of solutions called population. Solutions from one population are chosen and then used to form a new population. This is done with the anticipation, that the new population will be enhanced than the old one. Solutions which are selected to form new solutions (offspring) are chosen according to their fitness - the more appropriate they are the more probability they have to reproduce. Then a process of evolution is carried out on the individuals in the population. This process is carried on again and again until some criteria (for example precision of the best solution or number of populations) is satisfied.

Genetic algorithms were used to evolve programs to perform certain tasks by John Koza in 1992. His method was known as "genetic programming" (GP). Genetic programming is considered to be the most famous for solving symbolic regression problems and is widely used for solving optimization problem. The working principle behind GP and GA are same but there lies a major difference between the two that GP gives solutions in terms of weighted sum of coefficients, whereas GA gives solutions represented by a number in binary or real form.

Raj Kumar Mohanta presentsa review on Genetic Algorithm applications for image segmentation. Parameter selection problem is difficult due to several factors which are characterized by image segmentation so that genetic algorithm is used to solved the parameter selection problem .Genetic algorithm locates the global maximum in a search space. The chromosome encoding scheme and involvement of genetic operators as well as the fitness function are used for the optimization result. However the quality of image segmentation can be improved by selecting the parameters in an optimized way. [18]

IV Methodology

1) [Start] Generate random population of n chromosomes

2) [Fitness Function] Evaluate the fitness f(x) of each chromosome x in the population

3) [Generation of New population] Create a new population by using the genetic operators Selection ,Crossover and Mutation

4) [Replacement] Use new generated population for a further run of algorithm

5) [Testing] stop if the end condition is satisfied, and return the best solution in current population

6) [Loop] Go to step 2

V. Simulated Annealing

Simulated annealing is another optimization technique which is similar to evolutionary algorithms. Simulated annealing approximately works as a GA, that is there is a fitness function that defines a fitness landscape, however, rather than a population of candidates as in GAs, there is only one candidate solution. There is a concept of temprature in Simulated annealing which play important role in termination condition in the present approch if temprature is hiegher then new individuals are kept and if lower then another individuals are generated.

VI. Literature Review

Charnchai Pluempitiwiriyawej et al.presents a novel stochastic active contour scheme for automatic image segmentation, which is designed to overcome some of the problems like papillary muscles ,low contrast, , and turbulent blood flow [5].

Spatio-temporal segmentation technique is proposed in paper [6] for of medical sequences based on K-mean clustering. In paper Two- dimensional feature vector has been used for clustering in the feature space. There are three features used in this paper for segmentation. The applying features are image brightness, which reveals the structure of interest in the image, Euclidean norm of the optical flow vector and the three-dimensional optical flow vector, which consists of computed motion in all three dimensions. In the paper output results are computed by clustering method and compared with the results obtained by simple threshold segmentation method.

Hortense A. Kirisli et al. present a new automatic segmentation algorithm for segmentation of whole heart and cardiac chambers from CTA datasets. Whole heart and cardiac chambers image segmentation is particularly valuable for the extraction of ventricular and atrial functional information, such as stroke volume and ejection fraction. The prime objective of the proposed work is to improve the diagnosis of CAD by providing functional information extracted from the same CTA dataset. High accuracy and robustness were demonstrated by a quantitative and large-scale qualitative evaluation of the method [7].

Dwarikanath Mahapatra uses prior shape information in a graph cut framework to achieve image segmentation. According to paper poor edge information and large within-patient shape variation of the different parts necessitates the inclusion of prior shape information. Real patient datasets are used for experiment on different subsets that show higher segmentation accuracy in using shape information and give superior performance over other competing methods [8].

According to paper [9], segmentation of non-synthetic SPECT and other modalities 4D images are disscused bt the author. The image segmentation accuracy is calculated on SPECT image sequences for which a ground truth about the LV volume is known. This paper shows a sub-voxel accuracy in the segmentation of the LV surface and LV chamber volume which is sufficient for clinical assessment of the cardiac function.

The paper [10] is a literature review of fully and semi-automated methods used for segmentation in short axis images using a cardiac cine MRI sequence. In this paper medical background and specific segmentation difficulties associated to image segmentation problems are presented. Prior knowledge is used for this particularly complex segmentation task. C. Petitjean et al. presents an original categorization for cardiac segmentation methods, with a special emphasis on what level of external information is required and how it is used to constrain segmentation. In paper image segmentation categorization includes deformable models and pixel classification based approaches.

The paper [11] discussed the problems in cardiac image segmentation and proposed an automatic image segmentation method to initialize the metamorph models. The paper also presents a hierarchy of global and local deformations. An attempt has been made to review the major applications of GAs to the domain of medical image segmentation by Ujjwal Maulik. When the images are simple, less noisy the classical image segmentation techniques are used such as information regarding texture, shape, contours, etc and the problem can be described in some closed mathematical form that can be solved analytically. Manifold are the main issues in integrating GAs for solving the optimization problems in medical image segmentation. Reduction of the computation time of Gas is another important consideration in medical image analysis that is time consuming nature. [14]

Indah Soesanti optimized fuzzy logic method for Magnetic Resonance Imaging (MRI) brain images segmentation is presented. The modified fuzzy c-means (FCM) clustering algorithm is used in this paper. The main objective of this research paper is to apply this method on a normal MRI brain image and MRI brain images with tumor and from segmented images analyzed the area of tumor. For analyzed the normal MRI brain and MRI brain images with tumor new methods are used .The technique on normal MRI brain image and on MRI brain images with tumor are applied by author. The technique effectively segmented Magnetic Resonance Imaging (MRI)

Hash_RC6 - Variable Length Hash Algorithm using RC6

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***Abstract*— In this paper, we present a hash algorithm using RC6 that can generate hash value of variable length. Hash algorithms play major part in cryptographic security as these algorithms are used to check the integrity of the received message. It is possible to generate hash algorithm using symmetric block cipher. The main idea behind this is that if the symmetric block algorithm is secure then the generated hash function will also be secure [1]. As RC6 is secure against various linear and differential attacks algorithm presented here will also be secure against these attack. The algorithm presented here can have variable number of rounds to generate hash value. It can also have variable block size.**

Keywords— Cryptography; Symmetric Encryption; Asymmetric Encryption; Data Integrity; Authentication; Confidentiality; Non-Repudiation; Access Control; Hash; RC6.

I. INTRODUCTION

Cryptography is the ability of keeping message secure form others while sending information between participants (Confidentiality). With the Confidentiality cryptography also provide other services known as data integrity, authentication, non-repudiation, access control etc. Data Integrity is assuring that data received is same as sent by the sender. Authentication is the ability to assure that communicating party is who that it claims to be. Non-Repudiation is the prevention against the denial by entities involved in the communication. Access Control is the prevention against the unauthorized use of resources [2].

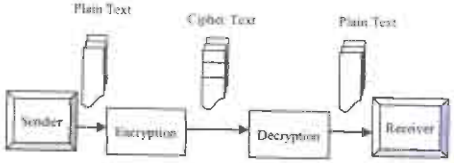

Fig. 1. Fundamental of Cryptography

II. HASH FUNCTION

A cryptographic hash function is a mathematical transformation that takes a message of arbitrary length and computes a fixed length value also known as hash value, message digest, hash code, hash sum, checksum, etc.

$$h = H(M)$$

Where H is Hash Function, M is variable length message, H is fixed size hash value. Creating hash function is accomplished by iteration. Instead of using a hash function with variable-size input, a function with fixed size input is created and is used a necessary number of times. This fixed size input function is known as compression function. It compresses an n-bit string to create a m-bit string where n is normally greater than m. This scheme is referred to as an iterated cryptographic hash function [6]. These compression function fall into two categories: a function specially designed for the hash function or a symmetric block cipher [2].

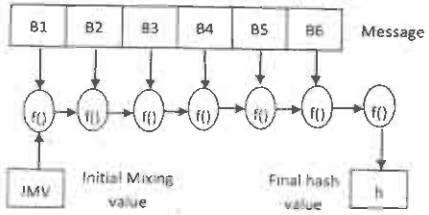

Fig. 2. Iterated Cryptographic hash Function

Characteristics of one way Hash Function:

a. Given M, it is easy to compute h.
b. Given h, it is hard to compute M such that $H(M) = h$.
c. Given M, it is hard to find another message, M', such that $H(M) = H(M')$.

The whole point of one way hash function is to provide a finger print of M that is unique. In some application one wayness is insufficient; we need an additional requirement called collision-resistance (It is hard to find two random messages, M and M', such that $H(M) = H(M')$[1]).

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Hash Function takes message and an initial value as an input and produces the hash value. The hash value is then concatenated with the message and sends to the receiver. The receiver authenticates the message by generating the hash value with the same procedure and compares it with the hash value send by the sender. If both the value matches then the received message is same as it is send by the sender otherwise message has been tampered with.

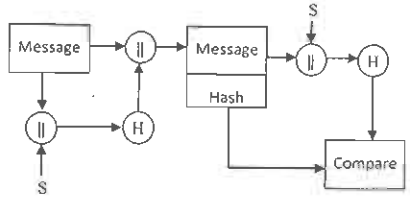

Fig. 3. Basic Hash Algorithm at sender and receiver

III. RC6

RC6 [7] is specified as RC6-w r b where w is the word size in bits, r is the number of rounds and b is the length of the encryption key in bytes. Because the AES submission was targeted by the developer of algorithm at w = 32 and r = 20, we shall use RC6 as shorthand to refer to such versions. When any other value of w or r is intended in the text, the parameter values will be specified as RC6-w r. Of particular relevance to the AES effort will be the versions of RC6 with 16-, 24-, and 32-byte keys [4].

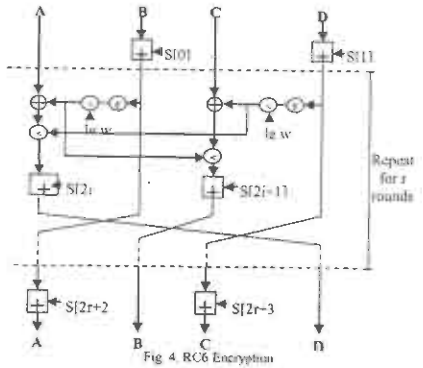

Fig. 4. RC6 Encryption

For all variants, RC6-w r b operates on units of four w-bit words using the following six basic operations

$A + B$	integer addition modulo $2w$
$A - B$	integer subtraction modulo $2w$
$A \oplus B$	bitwise exclusive-or of w-bit words
$A \times B$	integer multiplication modulo $2w$
$A \lll B$	Rotate A to the left by the amount given by the least significant $\log w$ bits of B
$A \ggg B$	Rotate A to the right, similarly
$(A, B, C, D) = (B, C, D, A)$	parallel assignment

A. Key Expansion

Use two magic constants:-
$Pw = Odd((e-2)2^w)$
$Qw = Odd((t-1)2^w)$
Where:-
$e = 2.718281828459$.....(base of natural logarithm)
$t = 1.618033988749$.....(*golden ratio* $= (1+\sqrt{5})/2$)
$Odd(x)$ is the odd integer nearest to x

INPUT
b byte key that is preloaded into c word array $L[0,1,\dots,c-1]$
r denotes the no of rounds.

OUTPUT
$(2r+4)$ w-bit round keys $S[0,1,\dots,2r+2,2r+3]$

ALGORITHM
1. $S[0] = Pw$
2. *For* $i = 1$ *to* $2r+3$ *do*
3. $S[i] = S[i-1] + Qw$
4. $X = Y = a = b = 0$
5. $Iteration = 3 * max(c, 2r+4)$
6. For $j = 1$ *to Iteration* do
7. $X = S[a] = (S[a] + X + Y) <<< 3$
8. $Y = L[b] = (L[b] + X + Y) <<< (X + Y)$
9. $i = (a+1) \bmod (2r+4)$
10. $j = (b+1) \bmod c$

B. Encryption

Four w-bit registers A, B, C, D contain the initial input plain-text as well as the output ciphertext at the end of encryption. The first byte of plaintext is placed in the least significant byte of A; the last byte of plaintext is placed into the most significant byte of D [6].

INPUT
Plaintext stored in four w-bit input registers A, B, C, D
Number r of rounds w-bit round keys $S[0], \dots, 2r+3]$

OUTPUT
Ciphertext stored in A, B, C, D

ALGORITHM
1. $B = B + S[0]$
2. $D = D + S[1]$
3. *Repeat step* 4 *to* 8 *for* $i = 1$ *to* r *do*
4. $t = (B \times (2B+1)) <<< \log w$
5. $u = (D \times (2D+1)) <<< \log w$
6. $A = ((A \oplus t) <<< u) + S[2i]$
7. $C = ((C \oplus u) <<< t) + S[2i+1]$
8. $(A, B, C, D) = (B, C, D, A)$
9. $A = A + S[2r+2]$
10. $C = C + S[2r+3]$.

Automation of WebLink Validation using a Generic & Reusable Automation Framework

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Abstract— Success of any web application depends on the smooth functionality of the application without any intervention. A web application containing broken web links can create problem and dissatisfaction among the users. Now it becomes obligatory for the organization to perform validation of the weblinks present in their application. This paper provides a generic and reusable automation framework to perform weblink validation. Selenium is used to support the feature of cross browser testing.

Keywords— Cross browser testing; webLink validation

I. INTRODUCTION

Due to the vital role in quality software production testing plays a profound role in a software organization. Nowadays many web applications contain third party weblinks. Such weblinks are often dead or broken and the customer on clicking such link redirects to an error page. This leads to dissatisfaction and interruption in customer [4]. This scenario leads to the identification and creation of such an automation tool which can validate the weblinks automatically without human intervention thereby reducing the manual effort and time.

In this work we have developed an automation framework which can perform weblink validation. The framework is generic and reusable therefore the same framework can be used to test different web applications [1]. This framework also supports cross browser testing with the help of selenium. The next section of the paper gives a brief problem conceptualization followed the architecture of the framework. The flowchart for performing this validation is also illustrated. Testing was carried out on three different web applications. Test results with the screenshots are illustrated. The paper concludes with the benefits of the framework.

II. METHODOLOGY

A. Problem Conceptualization:

Often the web applications containing the third party weblinks find redirecting to dead links. User gets interrupted. Therefore webLink validation testing is a mandate. This testing need to be carried out in periodic manner. Performing this validation manually requires lot of manual efforts and introduces redundancy. Automation of this process is required to save the testing time and eliminate redundancy [6]. Weblink validation should be done automatically and in cross browsers environment in a periodic manner to save the manual effort and testing duration. A generic framework should be designed so that the same can be used for testing different web applications.

The discussed framework uses Selenium. Selenium is a portable software testing tool for Web Application [1]. It supports cross browser testing. In this framework test scenario to validate the weblinks are broken down into set of keywords. Keywords are mapped in an excel sheet forming the business flow. This simplifies the process of creating automation scripts. Common test data is maintained in a separate excel sheet forming the common test data sheet thereby enhancing the reusability of the test data in multiple test cases. Since this framework uses selenium therefore all the weblinks in a page can be tested in different web browsers such as internet explorer, chrome, Firefox, safari and many others at the same time.

B. Process Adopted

1) Architecture

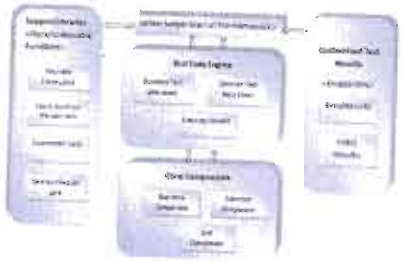

Fig 1: The architecture of the framework

The modules that make up this architecture are as follows:

- Driver Script: It is the main brain of the framework. It is the point from where the execution of the test cases start. It is also called the entry point of the framework. The initialization of the test case, initialization of the web drivers, and initialization of the reports and execution of the test cases starts from the web driver [1].
- Test Data Engine: This component comprises of the test data required to test the scenarios.
  - *Business Test Data Sheet*: The business test data sheet comprises of the test case id's along with the set of keywords forming the business flow.
  - *Common Test Data Sheet*: The common component sheet comprises of the common test data repeatedly used in an application.
  - *Lookup Sheet*: This component specifies the web pages on which the weblinks needs to be tested. During test case execution the entire lookup component corresponding to the test case id is parsed and the corresponding weblinks are tested.
- Core Components: The core components contain the logic for implementing this generic framework.
  - *Business Component*: The business component contains the logic for implementing the keywords in a business flow of a test scenario. The implementation of keywords like invoke application, verifyLink and close for webLink validation is implemented in the business component. Logic specific to a web application is implemented here.
  - *Common Component*: The common component contains the logic for reading the common test data from the data sheet and providing it to the business component. The common logic generic to all web application is implemented here.
  - *Link Component*: The link component contains the core logic of WebLink validation. After the application to be tested is invoked the lookup sheet is parsed one at a time and the weblinks in the corresponding target page is tested. The logic for validation of the weblinks is coded in this component. It contains a generic code for all the web applications.
- Support Libraries: The support libraries contain the generic reusable functions for testing the application. This component contains the logic for report generation [1].
- Customized test Results: The test results of webLink validation are generated in the form of HTML and Excel. It uses the features of Selenium for report generation [10].

2) Flowchart of the Weblink Validation

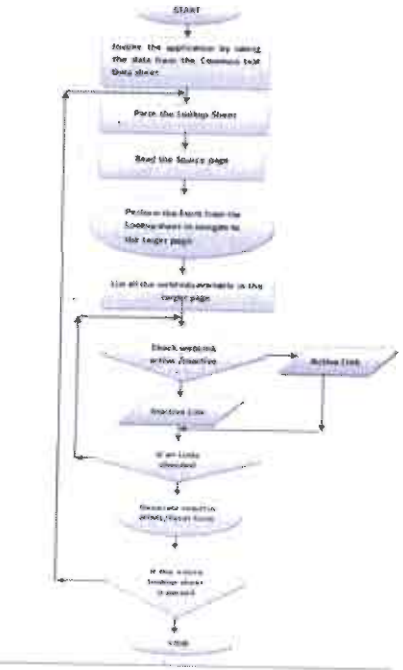

Fig 2: Flowchart of the Weblink Validation

In this we invoke the application by reading the application URL from the Common Test Data sheet. After invoking the application the Lookup sheet corresponding to the application is parsed. From the source page the target page is navigated by performing the event listed in the LookUp sheet. On the target page all the weblinks are checked one at a time. The webLinks are validated and result is generated generated showing the status (Active/Inactive) of the weblinks.The results are generated in the form of HTML/Excel.

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Cryptographic Algorithm on Multicore Processor: A Review

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Abstract— Cryptography involves different cryptographic algorithm that contributes in the security purpose of the programs. The cryptography algorithms are divided into two parts symmetric and asymmetric. There are many different challenges to implement cryptography algorithm specially throughput in terms of time execution. So, it is important that it runs with minimum encryption and decryption time and hence improvise the time efficiency. In this paper, we study and analyze the performance of different cryptographic algorithm on multicore processors and also we explore the performance in sequential and parallel implementation of cryptography algorithm on multi core processors. In this review paper we have given the summary of different research papers on cryptography and briefed about some cryptographic tools.

Keywords—cryptography; core; parallelism; RSA; DES; AES.

I. Introduction

A system that performs more than one task simultaneously, thereby rendering greater efficiency is referred to as multicore system. Unlike the dual core, a single chip contains more than two separate processors (or execution areas) in the same integrated circuit in a multi core. Cryptography is a technique that provides the most secure method to transfer sensitive information from sender to receiver [4]. It sends information in the form of cipher text which cannot be understood by anyone except the intended receiver who can decrypt the cipher text into plain text with the help of secret key. This key can be either private or public. Cryptography can be categorized into two schemes symmetric key cryptography and asymmetric key cryptography. In symmetric key cryptography same key is used for encryption and decryption, it is also known as the secret key encryption . This cryptography is an extremely secure method of transferring sensitive information. Further, it provides fast computation thereby providing excellent reading and writing performance. In second scheme different keys are used for encryption and decryption. It is also known as the public-key encryption.Various algorithms such as DES, Triple DES, AES are symmetric key cryptographic algorithms and RSA is asymmetric cryptographic algorithm. The speed and efficiency we get from a multicore processor is the result of the software algorithms used and the way in which these algorithms are implemented. A multicore machine can be a two core machine, four core machine, six core machine, eight core machine or more. However, all these cores are integrated on a single chip

The various parallel language technologies has been used as its main execution unit is thread that works perfectly on multi-core machine such as OpenMP, OpenCL, S2P, java and so on. In this paper, section II discusses the previously relate works carried out regarding the same, section III includes analysis of the various cryptography algorithms used and the tools used to implement the same. Next, section IV draws conclusion and throws light on the proposed future work.

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II. Related Research Review

In this research paper it has done comparison and analysis of GPGPU and parallel computing on multicore CPU has been done. The thread of GPU (graphics processing unit) is fine grained in the hardware management and that of CPU is the coarse grained heavy thread in the software management. To compare the performance of GPU implementation with CPU implementation of RSA algorithm the experimental settings of CPU and GPU are taken as same. GPU gave the better performance than CPU and its advantages are high performance price ratio, low power dissipation, good portability, and direct visualization. GPU is suitable for processing large scale data parallel load of high density computing but relatively simple branching logic and CPU is more suitable for processing complex logic computation. This paper explains the exponentiation for the RSA algorithm through the analysis of GPU implementation and CPU implementation and the result shows that the GPU can achieve more than 45 times speedup in comparison with multicore CPU[1]

In this research paper it has proposed on the speeding up of RSA encryption using GPU parallelization. As the development of CPU has reached limits, the GPU becomes an integral part of today's computing system. The main focus is on the heterogeneous computing to develop parallel universal Kernel operations of cryptographic component and on the application of the proposed method of the RSA encryption system. The GPU parallelization is used to enhance the performance of cryptographic systems and to make

encryption, decryption and authentication system more efficient. The Fast Fourier Transform was applied into multiplication operations and it was found that there was more than 50 folds speedup using GPU as compared to using CPU. It was found that GPU always manage to complete its operations in a given time span. The advantage of GPU computation is taken to accelerate the computing of the RSA algorithm [2].

The throughput of RC4 algorithm in multicore processors is increased using multithreading. The time taken to break, encrypt and finally merge the broken parts into one single encrypted file was taken as the measurement criteria. The input text file was broken into similar sized portions and each portion was encrypted using RC4 algorithm. All the encrypted portions were then merged together to form a single encrypted file which was then saved in a folder. The robustness of RC4 algorithm increased by using parallelism mechanism [3].

In this research paper it implements AES(Advanced Encryption Algorithm) cryptography algorithm on dual core processor by using OpenMP with the aim of reducing the execution time. The focused on using the divide and conquer strategy in parallel computation to solve the algorithm in parallel. The paper provides quantitative evaluation of both sequential and parallel implementation and safely concludes that parallel implementation of AES block cipher takes comparatively lesser execution time than the sequential implementation[4].

In this research paper it proposes an optical processor configuration for cryptographic applications. It performs a comprehensive design space exploration and case study of RSA encryption algorithm. The evaluation of every candidate processor uses direct program execution and full system simulation. The paper establishes the necessary features an optimal multicore processor must possess-a large number of hardware threads, small feature size, a large number of cores and must support dynamic frequency scaling. The paper concludes that for good performance, reliability, low power consumption and energy dissipation a correct balance should be maintained between processor specifications[5].

This research paper has performed comparison between the most commonly used algorithms in the data encryption field. The two main characteristics that identify and differentiate one encryption algorithm from another are its ability to secure the protected data against attacks and its speed and efficiency in doing so. A performance comparison between four of the most common encryption algorithms: DES, 3DES, Blowfish and AES has been drawn. The comparison has been done by running several encryption settings to process different sizes of data blocks to evaluate the algorithm's encryption/decryption speed. Simulation of algorithm has been conducted using C# language. The proposed technique results show that Blowfish has a better performance than other common encryption algorithms used. Since Blowfish does not have any known security weak points, this is considered as an excellent standard encryption algorithm. AES showed poor performance results compared to other algorithms as it requires more processing power [6].

It has proposed a parallel chaos-based encryption algorithm by taking the advantage of multicore processors. The chaotic cryptosystem is generated by the piecewise linear chaotic map (PWLCM). The proposed parallel algorithm is designed with a master/slave communication model with the Message Passing Interface (MPI). The algorithm is suitable not only for multicore processors but also for the single-processor architecture. The experimental results show that the chaos-based cryptosystem possesses good statistical properties. The parallel algorithm provides much better performance than the serial ones and would be useful to apply in encryption and decryption file with large size or multimedia[7].

Present implementation of PACMATS Cryptographic Algorithm in CBC and ICBC modes. Parallelized Adaptive Cipher with Modular Arithmetic Transposition and Substitution (PACMATS) is a Symmetric Cryptographic Algorithm designed to overcome the performance inconsistencies present in conventional cryptographic algorithms implemented in different computing systems with different processing capabilities. The performance of PACMATS in ECB, CBC and ICBC mode is analyzed by implementation in shared memory parallel computing environment and uses OpenMP, Java Threads and MPI. The performance of PACMATS in ECB mode is better when executed in parallel computing environments. The issue faced in parallelization of CBC mode encryptions is solved to some extent with two-way and four-way Interleaved CBC implementations. The algorithm is mainly designed for software implementations and to avoid functional dependencies problems in parallel computing environment. It is a scalable and adaptive cryptographic algorithm which provides better security strengths and performance efficiency in parallel computing environment. This algorithm both computational and communication intensive block cipher involving inter block operations which incurs more communication cost then the intra block operations[8].

It has worked on parallel version of Blowfish algorithm using Single Instruction Multiple Data model, named as PBlock and its implementation on a Symmetric multiprocessor machine along with the results of performance gains is introduced. The focus is on security of data over the networks to enable cloud computing applications. The security of data is ensured through the use of various types of encryption algorithms. In the present era, the use of multi core processors has enabled us to run security applications, simultaneously at both client and the server end. The encryption as well as decryption process of security algorithms can take significant benefit from parallel implementations that can run on these multi core processors. Moreover these algorithms consume greater energy on single processor systems due to the massive calculations performed by them, as there is a non-linear relationship between frequency of a core and power supply[9].

III. Analysis

The above mentioned various related research papers have made use of different cryptography algorithms in order to implement their respective proposed works. Almost all the

An Inventory Model for Deteriorating Items Having Seasonal and Stock-Dependent Demand with Allowable Shortages

S.R. Singh, Mohit Rastogi and Shilpy Tayal

Abstract This paper deals the problem of single deteriorating item, with stock-dependent and seasonal pattern demand rate. It is considered that a constant part of on-hand inventory deteriorates per unit of time. The model is solved for finite time horizon. The aim of this present paper is to give a new height to the inventory literature on stock-dependent and seasonal demand pattern. This paper can be applied in many realistic situations. Shortages are allowed and three different conditions of backlogging are discussed in this model. The purpose of this study is to optimize the overall cost of the system and to find out the optimal ordering quantity. To explain the model and its significant features a numerical illustration and sensitivity analysis with respect to different related parameters is also cited.

Keywords Inventory · Stock and seasonal pattern demand · Shortages · Backlogging

1 Introduction

Many business practices demonstrate that the existence of a larger amount of goods displayed may catch the attention of more customers than that with a smaller amount of goods. This fact implies that the demand may have a positive correlative with stock level. Under such a situation, a firm should seriously consider its pricing and ordering policy.

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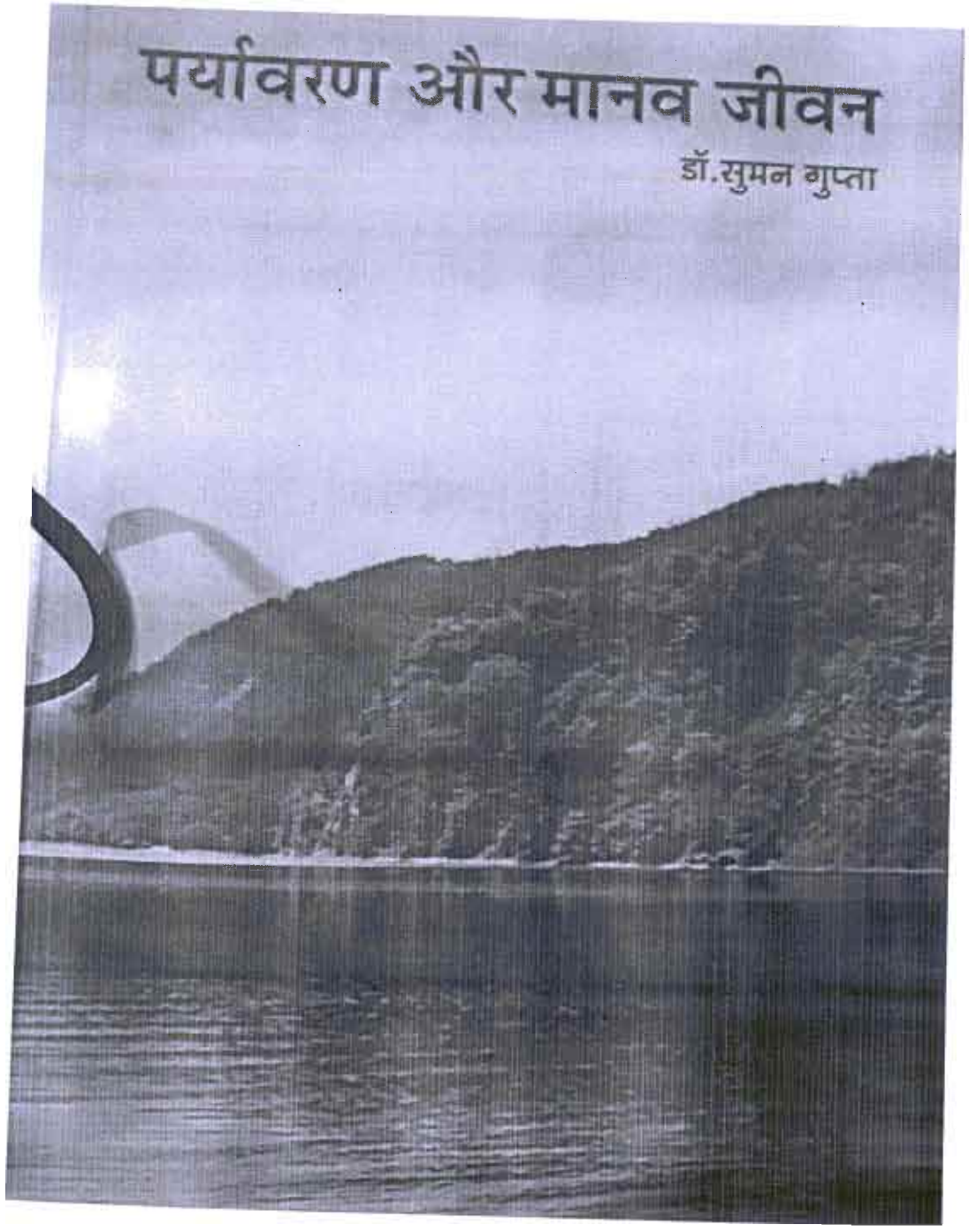
As recommended by Lau and Lau [1], in many cases a small change in the demand pattern may result in a large change in optimal inventory decisions. A manager of a company has to examine the factors that affect demand pattern, because customers purchasing behaviour may be affected by the factors such as inventory level, seasonality and so on. Singh and Diksha [2] introduced a supply chain model in a multi-echelon system with inflation-induced demand. Bhunia and Maiti [3] proposed a deteriorating inventory model with linear stock and time-dependent demand. Giri and Chaudhuri [4] introduced an inventory model with power form stock-dependent demand and nonlinear holding cost. Singh and Singh [5] presented an inventory model with stock-dependent demand under inflation in a supply chain for deteriorating items. Hsu et al. [6] presented a deteriorating inventory model with season pattern demand rate. Patel [7] developed an inventory model for deteriorating items with stock-dependent demand under and partial backlogging. Mandal and Maiti [8] focused on a production model with power form stock-dependent demand Tayal et al. [9] introduced a two echelon supply chain model with seasonal pattern and price-dependent demand for deteriorating items with effective investment in preservation technology. An algorithm for an inventory system with a power form stock-dependent demand presented by Chung [10]. Tayal et al. [11] presented an inventory model for deteriorating items with seasonal products and an option of an alternative market. Teng and Chang [12] investigated a production model with linear stock-dependent demand.

In the existing study of inventory control, the usual inventory models have been developed under the statement that during the storage period, lifetime of an item is infinite. This way that an item once in stock remains unaffected and completely usable for satisfying the future demand in an ideal condition. In actuality, this statement is not always true for some physical goods like wheat, rice or any other kind of food grain, vegetables, fruits, etc., due to their deterioration effect. Deterioration of physical goods is one of the major factors in any inventory and production system. Many researchers had studied deteriorating inventory in the last many years. Singh and Singh [13] developed a production inventory model for deteriorating products with variable demand rate.

Singh and Rastogi [14] investigated an integrated inventory model with amelioration and deterioration under shortages and inflation. Tayal et al. [15] introduced a deteriorating production inventory problem with space restriction in which the extra ordered quantity is returned to the supplier with a penalty cost. Wu et al. [16] illustrated a problem to establish the optimal replenishment policy for non-instantaneous deteriorating items with stock-dependent demand.

It has long been supposed that during the shortage period all happening demand will either totally backlogged or completely lost but in reality the happening demand during stock out is partially backlogged or partially lost. Since it is observed that some customers are willing to wait for the stock up to the next replenishment. Furthermore, the opportunity cost due to lost sales should be considered since some customers would not like to wait for backlogging during the



Cuckoo Search-Based View Selection

T.V. Vijay Kumar, Amit Kumar and Biri Arun

Abstract A data warehouse is a central store of all entities, concepts, metadata and historical information created for doing data validation, complex mining, analysis and prediction in many organizations. A data warehouse is designed primarily as a tool for answering analytical queries, which are intricate and exploratory and have higher response times when answered using a data warehouse. Many real enterprise information integration systems compute and maintain materialized views or cache results. Unlike virtual views, materialized views store data. Since all views cannot be materialized due to storage space constraints, an appropriate subset of views needs to be selected for materialization. The selection of such a subset is an NP-complete problem. Swarm intelligence algorithms have been extensively used to resolve such problems. In this paper, the cuckoo search (*CS*) algorithm has been adapted and discretized to solve the view selection problem. Based on this, a *CS*-based view selection algorithm (*CSVSA*) has been proposed. Also, experiments were performed to ascertain appropriate parameter values for which *CSVSA* is able to select reasonably good quality *Top-K*.

Keywords Data warehouse · Decision-making · Analytical queries
Materialized view selection · Swarm intelligence · Cuckoo search algorithm

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Skeleton based Human Action Recognition using Kinect

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ABSTRACT

This paper covers the aspects of action recognition using Kinect technology by human skeletal tracking. Microsoft Kinect is one of the latest advancements in Computer Vision based HCI (Human Computer Interaction). The paper is focused on how the Kinect sensor captures the 3D information of a scene and recognizes the action being performed by the human body by retrieving the depth image information and real-time skeletal tracking. The Kinect technology has revolutionized the way humans interact with the machines. It has a wide range of applications areas. The paper also covers one of the proposed approach to skeletal based action recognition using Kinect.

Keywords

Microsoft Kinect sensor, action recognition, Skeletal tracking, HMM, Pose estimation

1. INTRODUCTION

Action recognition using the Kinect technology is an advanced way of interacting with machines. The Microsoft Kinect is used for retrieving 3D information of a scene and analyzing depth map and skeletal joint information of the human body. This helps the Kinect sensor to identify the type of action being performed by the person such as standing, walking, punching, sitting, waving etc. Action recognition using Kinect has wide range of application areas such as computer science, robotics, electronics, medical and many other commercial uses. People can play games by using their own body movements. Even in medical purposes, the doctors can operate a patient from a remote location by using Kinect. There are a large number of software applications and machines which are using Kinect to interact with humans. Action recognition using Kinect has been a great advancement in computer vision based HCI (Human Computer Interaction). The Kinect sensor senses the environment and generates a depth map for it. The human body is tracked using skeletal tracking by using the mean shift algorithm. In skeletal tracking, the Kinect sensor recognizes 24 joints in the human body which represent different body parts. Using the 3D joint information, the Kinect identifies the gestures and actions being performed by the human body [5] and then the machine responds according to the action input. An approach of real-time skeletal tracking using Kinect is discussed in other sections of the paper.

2. INTRODUCTION TO KINECT

The Microsoft Kinect is one of the most recent advancements in Computer Vision. The Kinect technology has emerged with great opportunities for multimedia computing by enabling 3D scene capturing. Kinect has revolutionized the way of playing games and doing various tasks such as handling of machines and applications. Kinect sensor recognizes the actions of the human body, i.e., the key technology behind Kinect is human-body language understanding, which means that the computer first recognizes and understands what the user is doing, before responding. The Kinect sensor directly senses the third dimension(depth) of the human body and also the environment.

The Kinect technology has wide availability and low cost which extends its applications areas to computer science, electronics engineering, robotics, medical field and many more. The Kinect effect has the potential to completely transform Human-Computer Interaction(HCI).

2.1 Kinect Sensor

The Kinect hardware contains a depth sensor, a color(RGB) camera and a four-microphone array as shown in Figure 1. The depth sensor consists of the IR(Inflared) projector along with the IR camera. The IR Camera is a monochrome complementary metal oxide semiconductor(CMOS) sensor. It is based on principle of structured light. The IR projector is an IR laser which passes through a diffraction grating, turning into set of IR dots. The IR projector, IR camera and the projected IR dot pattern have a relative geometry which is known. If a dot in the image matches a dot in projector pattern, it can be reconstructed in 3D.

The Kinect sensor produces a depth map for the IR image. The depth value is encoded with gray values, therefore, the darker the pixel closer the point is to the camera. If no depth values are available (indicated by black pixels), then the points may be too far or too close to be computed. The depth values produced by Kinect may be inaccurate due to invalid calibration between the IR projector and IR camera. This error in calibration may arise due to heat, vibration or drift in the IR laser. This problem can be addressed by using various recalibration techniques.

The four array microphones are used for speech and voice recognition. Figure 2 shows some of the specifications of Microsoft Kinect Sensor.

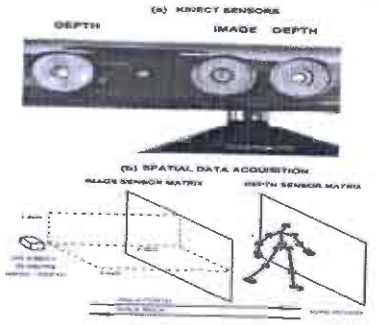

Figure 1:Kinect Sensor

SENSOR ITEM	SPECIFICATION RANGE
Viewing angle	43% vertical by 57% horizontal field of view
Mechanized tilt range(vertical)	±28%
Frame rate (depth and color stream)	30 frames per second(FPS)
Resolution, depth stream	QVGA (320*240)
Resolution, color stream	VGA (640*480)

Figure 2: Microsoft Kinect Specifications

2.2 Kinect Skeletal tracking

The Skeletal tracking is described by large number of dimensions. These dimention sets describe unique individuals, their sizes, shapes, postures, motions, hair, clothing etc.

In skeletal tracking, the human body is represented by the combination of a number of joints which represent body parts such as head, shoulders, neck and arms. All joints are represented by their 3D coordinates [1]. Here, we are treating the segmentation process of depth image as a per-pixel classification task. If we evaluate each pixel separately, it will avoid combinatorial search.

For training, realistic depth images of humans of different sizes and shapes, with variety of poses, are generated, from large databases. Also, we train a randomized decision forest classifier to avoid over fitting. Now the spatial modes of the per-pixel distribution obtained, are computed using mean sift algorithm, which results in 3D joint proposals. The optimized implementation of this algorithm runs in 5ms per frame on XBOX 360 GPU (Graphical Processing unit). Therefore, the whole pipeline of Kinect Skeletal tracking is as follows:

Step1- To perform per-pixel body part classification

Step2- To hypothesize the body joints by using mean shift algorithm to find a global centroid of local modes of density (probability mass).

Step 3- Mapping of hypothesized joints to the skeletal joints and fit a skeleton, using temporal continuity and prior knowledge.

3. HUMAN ACTION RECOGNITION

Human action recognition is gaining importance in the past few decades as it provides a wide variety of applications as in surveillance, robotics, security, patient monitoring and other systems that involves human-computer interaction.

Action recognition means the recognition of an action by using a system that t analyzes the video to acquire knowledge about the action and uses this knowledge to identify similar actions. Ryoo and Aggarwal has classified human activities into four categories- actions, gestures, interactions, and group activities.

Action recognition comprises of many actions like standing, walking, punching, sitting, waving etc. The method of action recognition is a tedious task as there can be many variations in human body movement [13]. Secondly, every individual has a different body shape, size and motion gestures and the interpretation of these actions can be different [7]. There can be other problems that can be introduced during the recognition process like variation in illumination, introduction of noise, shadow etc.

Traditional approaches were not able to eliminate these defects. With the introduction of depth camera these issues can be resolved as it can improve segmentation result by combining color, depth and motion. The depth camera is available at reasonable price and is easy to use. Also, the computer vision algorithms provide the more relevant segmentation results. With the combination of depth camera and computer vision algorithm we can direct the actions into 3D coordinate system which makes the recognition process efficient [4], [8].

A proposed approach for human action recognition is Skeletal tracking that involves Real time tracking based algorithm. The input for the method is the depth data which is collected from a Kinect sensor [3]. A skeleton tracking algorithm is used for the continuous detection of the joints (24) in human body as shown in Figure 3. For the identification of similar actions, spherical angles between joints [1] and angular velocities are measured. Then a motion energy based method is used to incorporate horizontal symmetry. At the end, HMM (Hidden Markov Model) performs the action recognition.

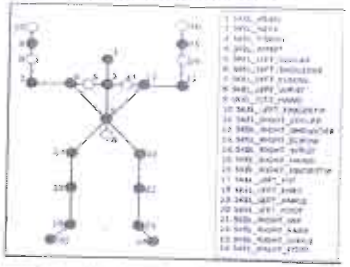

Figure 3: Joints of human body that are considered in action recognition

Gaze-based Authentication in Cloud Computing

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ABSTRACT
This paper covers the basics of cloud computing, major challenges, need for new security models, and focuses on eye-gaze based authentication technique to secure the critical information stored on cloud. The paper provides an approach for implementation of gaze technology in cloud computing. The gaze-based authentication model involves the concepts of neural networks, Image processing, gaze estimation and feature detection along with the cryptographic concepts.

Keywords
Cloud computing, IaaS, PaaS, SaaS, static, dynamic, gaze estimation, image processing, feature detection, Hough transform.

1. INTRODUCTION
Cloud Computing is a communication model which provides access to a shared pool of configurable IT resources (applications, infrastructure, data storage, servers, networks, etc.) on a network, based on on-demand service. It provides cost effective and easy access to various resources. Cloud computing allows the user to access, manipulate, configure, develop and deploy a wide spectrum of applications online. Cloud computing is platform independent i.e no additional piece of software needed to be installed. Also, cloud works on on-demand basis, which means that the user can access the resources any time [1].

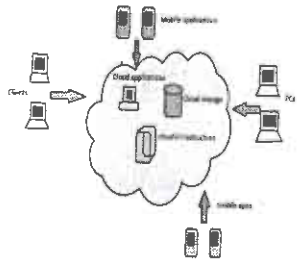

Fig 1: Cloud computing environment

2. BASIC CHARACTERSTICS OF CLOUD

2.1 On-Demand Service
Computing capabilities or resources should be provisioned automatically and the user should be able to access the cloud any time as he wants.

2.2 Broad Network Access
Since the cloud technology is completely web-based, it should be accessible from anywhere and anytime.

2.3 Resource Pooling
The services and resources (physical or virtual) provided by the Cloud Service Provider (CSP) are pooled to serve multiple tenants. This multi-tenant model allows sharing of a single physical instance of hardware, database and infrastructure by multiple consumers.

2.4 Rapid Elasticity
Scaling up and down of resources can be done quickly and flexibly making transformations quick and easy.

2.5 Measured Service
Resources which are allocated to the customer are automatically monitored, controlled and reported. This provides transparency between the consumer and the service provider.

3. CLOUD DEPLOYMENT MODELS
This section of the paper describes the basic cloud deployment models. These deployment models tell about the type of access made to the cloud. Cloud may have following access types: Public, Private, Hybrid, and Community, as shown in fig 2.

3.1 Public Cloud
Public cloud services are made available to the client by a third party service provider via internet, and are easily accessible to the general public.

3.2 Private Cloud
The Public cloud allows the cloud services to be accessible within an organization. Private cloud provides the user as well as the service provider great control over the cloud infrastructure and data storage, making it more secure.

3.3 Community Cloud
The community cloud allows the services and systems to be accessible, used and controlled by a group of organizations, having common interests or goals. It is more secure than a public cloud.

3.4 Hybrid Cloud
A Hybrid cloud is a combination of public cloud and private cloud that are interlinked. In this model, the users keep critical data and services under their control (on private cloud), and the non –critical business information and processing on public cloud.

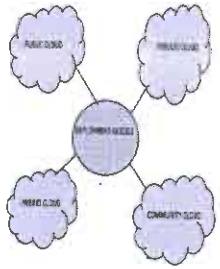

Fig 2: Deployment models of cloud computing

4. CLOUD SERVICE MODELS
This section of the paper explains various basic service models of cloud. Service models are reference models on which cloud computing is based.

Fig 3: Service models of cloud computing

Cloud can be delivered in following basic models: SaaS, PaaS, and IaaS, as shown in fig 3.

4.1 Software-as-a-Service (SaaS)
This model allows using software applications as a service to the end users. SaaS is software that is owned, controlled, managed, and delivered remotely by one or more service providers via internet, based on the pay-per use service. It provides scalability and transfers the computing load from users to providers.

4.2 Platform-as-a-Service (PaaS)
PaaS provides a runtime environment as a service for applications, development and deployment tools. The user controls the applications that run in that environment, but not the hardware or network infrastructure on which the application runs.

4.3 Infrastructure-as-a-Service (IaaS)
Iaas delivers platform virtualization outsourced service. It allows the user to access fundamental resources such as physical machines, virtual machines, virtual storage, deployed apps, operating system, firewalls, load balancers,etc, but the user can't control the cloud infrastructure.

5. CHALLENGES IN CLOUD COMPUTING

5.1 Security and privacy
Security is the biggest challenge in adopting cloud computing. When using cloud services, the data storage and management is provided by a third party, so it's risky to handover your critical information in hands of someone else.

5.2 Isolation failure
The isolation mechanism of cloud which separates data storage, memory, routing between different users may fail. This will lead to huge risk to the information stored on cloud.

5.3 Locking in
It is a condition of a user to get locked or dependent on a particular Cloud Service Provider, since it is very difficult for a user to switch from one service provider to another.

5.4 Network availability
Due to the always- on nature of cloud, the network services should be all time available to ensure 24*7 access to cloud.

6. NEED FOR NEW CLOUD SECURITY MODELS
Trusting the data on a third party (service provider) is a threat to highly critical information on cloud [2]. The commonly used cryptographic models using manual passwords to provide access to data are failing to protect the data [3]. Once the password is cracked, the information is revealed. Therefore there is a need for stronger authentication. In the present scenario, the mostly used security methods are the cryptography and biometrics. But there is a need for improved authentication since the cryptographic methods rely on passwords (generally static).Even the strongest encryption model can be bypassed if the password is compromised. Strong passwords are generally long and complex, difficult to remember. On the other hand, the multifactor authentication schemes involving use of biometrics [4] have low usability and require additional equipments, and are difficult to implement. There has to be a way out which provides both usability and security, and passwords should be made moreover "dynamic" rather than static [5].

7. EYE- GAZE AUTHENTICATION MODEL
The model overcomes the disadvantages of presently used authentication techniques. The model provides usability of passwords along with multifactor authentication in a single step, using gaze technology (eye- gaze pattern detection and estimation), employing neural networks and image processing techniques. The model uses eye gaze pattern for human-device interaction, that uses inconspicuous eye movements to calculate a person's point of gaze (POG).The model provides increased usability, scalability and high security at minimal expense. The model does not rely on high definition cameras and special lighting conditions; it works in normal conditions and uses the integrated cameras embedded in different devices.

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Metamaterial Superstrate for Performance Enhancement of Microstrip Patch Antenna Array

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Abstract— A metamaterial superstrate loaded microstrip patch antenna array has been proposed in this paper. The unloaded array resonates at 5.8 GHz with gain of 4.3 dBi and bandwidth of 425 MHz whereas, when the array is loaded with a metamaterial superstrate, composed of Multiple Split Ring Resonators (MSRR), gain and bandwidth reaches to 8 dBi and 680 MHz, respectively. The transmission line model of the composite structure has also been developed.

Keywords— Microstrip Patch Antenna Array, Metamaterial, Multiple Split Ring Resonator (MSRR), Negative Permeability

I. Introduction

Due to the novel properties, such as light weight, low profile and easy manufacturing, microstrip patch antenna possesses various applications in communication system [1, 2]. However, achievement of high gain and wide bandwidth from a single element is a cumbersome task. To overcome this problem, numerous techniques have been used by various research groups. Some of such techniques are – use of antenna array [3-4], using thick substrates [5], use of artificially engineered materials [6-9]. The use of arrays provides considerable improvement in the gain of antennas, but designing of multi stage power dividers is cumbersome task. In [4], Islam and Karmakar designed a 4 x 4 array of patch antennas for a RFID reader. The array provided a remarkable gain of 16 dBi, but the designing of 1:32 feed power dividers requires complex calculations. Any feed network providing the poor matching can result in the dip in the radiation patterns. As done by Xihui Tang *et al.*, in [5], the use of thick substrate increases the bandwidth, but increased thickness of the substrate also results in loss of surface waves.

Due to their unique properties, recently, artificially engineered materials, called metamaterial, have been used widely used to improve the performance of antennas. In [7], J. G. Joshi et al. designed a MSRR loaded dual band microstrip patch antenna to obtain the size reduction. In [8], Chirag Arora et al. loaded the conventional patch antenna with split ring resonator, as a result of which significant improvement in gain and bandwidth is obtained. In order to further improve the performance of conventional patch antenna array Chirag Arora *et al.*, in [9], replaced the conventional ground plane of the antenna with a metamaterial ground plane and observed that the proposed antenna presented better performance as compared to [8]. Further to extend their work, in this paper, authors have designed a metamaterial superstrate layer, composed of a pair is Multiple Split Ring Resonators (MSRR), which will be used as the cover for the patches of conventional patch antenna array. The proposed composite structure provided drastic improvements in bandwidth and gain, simultaneously, at almost no extra hardware cost. Presented simulation results are obtained with the method of moment based full wave IE3D electromagnetic simulator. The performance comparison of the proposed loaded antenna array and conventional unloaded antenna array show that metamaterial has a good potential to improve the performance of antennas.

This paper is systematically organised into four sections. Section II presents the geometrical details of antenna structure. In section III results and discussions are presented. Finally, the paper is concluded in section IV.

II. ANTENNA ARRAY DESIGN

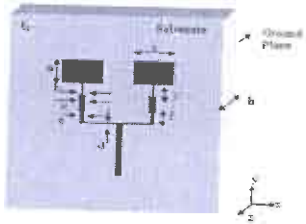

Fig. 1 Geometrical Sketch of 2-Element Conventional Microstrip Patch Antenna Array

Fig. 1 shows the geometrical structure of a two element conventional microstrip patch antenna array and fig.2 presents the conventional patch antenna array covered with the designed metamaterial superstrate. Both, conventional patch antenna array and metamaterial superstrate, are designed on FR-4

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Comparative research of various adaptive algorithms for noise cancellation in speech signals

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Abstract—In real life situations, the statistical characteristics of signal and noise are generally unknown & hence a digital filter having 'constant coefficients' is hardly of any use. In such situations adaptive filter is desirable. Adaptive filters are capable of adapting their filter coefficients as per the abnormality in characteristics of input signal and noise to achieve a noise free signal. This paper discusses the comparative analysis of various adaptive filter algorithms such as LMS (Least mean square), BLMS (Block LMS), NLMS (Normalized LMS), BNLMS (Block NLMS), VSLMS (Variable step size LMS) and BVSLMS (Block VSLMS) algorithms. As a input we have used Hindi audio speech signal and Babble noise as an interference signal.

Key words Adaptive filters, SNR, MSE, Block Length, Filter length.

I. Introduction

The design of a wiener filter requires a priori information about the variation in the characteristics of the input data to be processed. The filter is optimum only when the statistical nature of the input data match with the priori information on which the design of the filter is based. In situations where the priori information is not known completely, adaptive filters may be used. Adaptive filter means a filter that is capable of tracking the variations in the statistical characteristics of input data and capable of self-adjusting its parameters [1].

II. Adaptive Filters

Filter is said to be adaptive when it tries to adjust its parameters for meeting some requirements that depends upon the state of its surroundings. Adaptive filter has self-adjusting and tracking capabilities. It can be implemented either as IIR (infinite impulse response) filter or as an FIR (finite impulse response) filter. IIR filters being recursive becomes unstable as their pole may get shifted out of the unite circle in the Z-plane. Also IIR mean square error (a performance parameter) has many local minima points, results in the convergence of filter to one of the local minima points and not to the desired global minima point [15]. There are different types of filter structures such as Transversal filter structure, Lattice predictor, and Systolic array. Out of these, transversal filter structure is simplest and most commonly used. A simplified block diagram of linear transversal filter is shown in fig. 1[1-2].

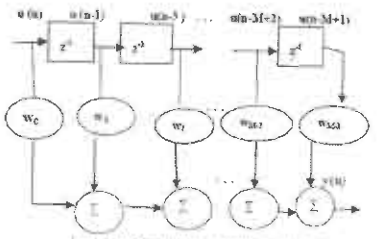

Fig.1 Block diagram of linear transversal filter

$$y(n)= w0*u(n) + \ldots + w_{m-1}*u(n-M+1) \qquad (1)$$

Structure of adaptive transversal filter shown in fig. 2 is an extension of linear transversal filter[1]. The extended part includes algorithm for adapting the weight w(n) of the linear transversal filter. The weight w(n) is updated on each iteration to reach optimum weight so that MSE is minimized. The adaptive filter intension is to equate its output y(n) to the desired output d(n). The error signal at each iteration e(n) =d(n)-y(n), is feedback into the transversal filter, where filter weights are adapted accordingly [2].

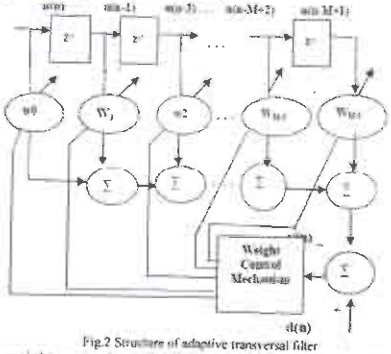

Fig.2 Structure of adaptive transversal filter

The weight control mechanism is all about adaptive filter algorithm. Different algorithms are used for weight control mechanism and the choice of one algorithm over other depends on various factors like rate of convergence, mean square error, signal to noise ratio, computational complexity etc[1,2].

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Fuzzy Logic Based Determination of Cost Overrun of Hydro Power Plant

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Abstract—The paper presents fuzzy tool for determination of cost overrun of a river type hydro power plant. The factors responsible for cost overrun have been selected from the survey conducted with the experts having experience in similar field. Hydro power plants have complicated structures lead to long running construction period, involves large amount of investment and hence are usually exposed to cost and schedule overruns risk. Cost overrun in a hydro power plant ultimately leads to increase in generation cost of electricity. Cost of electricity matters even if it is a green energy because of limited financial resources available in developing countries. The proposed cost overrun probability determination tool will help investors in making decision under uncertainty.

Keywords— Hydro power plant, fuzzy logic, cost overrun

These risk factors can have a negative effect on project. Failure to manage project risks may lead to schedule and cost overruns and sometimes lead to failure of project [1].

Risk can be defined as uncertainties or unknown factors in the project life cycle that influences the project in the planning phase as well as at the execution phase [2]. Risk assessment process involve three steps, i.e. risk identification, risk analysis and risk evaluation. There are two common techniques that are employed in risk identification i.e. experienced based risk and brainstorming based risk assessment. Risk analysis approach is divided into qualitative or quantitative approach. Generally much of the information related to risk analysis expressed in a natural language. These conceptual factors can be expressed in linguistic terms.

APPLICATION BASED REVIEW OF IMAGE IN PAINTING

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Abstract

This paper focuses on applications of Image Inpainting viz. Photo Restoration, Text Removal, Object Removal and damage recover in ancient sculptures. Various methods of image inpainting are developed till date viz. Exemplar based inpainting, Outward texture synthesis, Selective image inpainting, multi focus image fusion, block based image fusion, Patch based image inpainting. But none of the methods is universally applicable for all the inpainting issues. So this paper summarizes various methods along with application areas involved.

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Poach Tracker: An Online Plagiarism Detection Tool

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ABSTRACT
Plagiarism refers to "the act of copying material without actually conceding the original source". Plagiarism has seen a wide spread activity in the recent times. The increased in the number of materials available now in the electronic form and the easy access to the internet has increased plagiarism. Various techniques are available which help us to detect plagiarism. This paper proposes algorithm foe plagiarism detection over web using semantic networks. It also shows that a proposed method is in general capable for retrieving the source document from the web using a search engine API when sentences are being infringed. It also calculates the threshold value for different URLs.

Keywords
Plagiarism, Plagiarism Detection, Knuth MorrisPratt, Threshold Value

1. INTRODUCTION
The World Wide Web (WWW) is the biggest source of information these days. Availability of documents has increased in the WWW and the ease to access these documents has lead to a serious problem of using others work without giving credits. The ease of such access and browse web pages to get the information has made today's life more comfortable, it would be very difficult to imagine the academic research without the internet and web. Now, it is also very easy to use someone else work easily illegally or intelligently without citing credit to the original writer. This is the problem of Plagiarism.

Plagiarism is the act to use someone else's work and ideas without giving due rights to the original writer and regard the work as your own. It is not sufficient now that leaning only on exact word or phrase matching for plagiarism detection. People declare themselves as authors of the material by paraphrasing or rearranging words to give new look to their sentences.

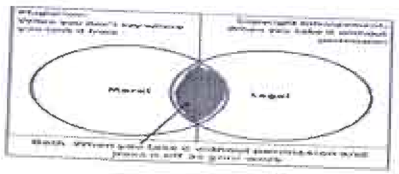

Fig. 1: Defining plagiarism

Many students make (intentionally or unintentionally) some type of cheating and plagiarism in their assignments which makes difficult for the teachers to detect plagiarism in student's assignment by hand. The detection process becomes easier, faster and more efficient if it is performed automatically. It is often hard to reveal plagiarism because many methods have been developed to detect some instances of plagiarism such as changing the structure of sentences or when replacing words slightly by synonyms or when the copied sentences are deliberately modified. A proposed method based on extracting name entities and common nouns is in general capable of retrieving the source document from the web using search engine API when sentences are being moderately plagiarized. The process of web based plagiarism detection is first of all we select the target file by pressing the browse button which we want to check for plagiarism. After selecting it will be checked on the web and different links will be provided from where it has been plagiarized and the threshold value for each of the ink will be calculated.

To provide an access to a large number of web documents there are two methods:- First method is by utilizing General purpose search engines (like Google, Yahoo, Bing) etc as they provide access services to their system. The traditional method for measuring the similarity between the document and vulnerable to fail in some complex plagiarism patterns and it is necessary to incorporate semantic based techniques for more accurate plagiarism detection. The suspected document can be considered as a sequence of queries submitted to the search engine; the result can be then compared with the input document. The main idea is to analyze the grammar of target documents and to find irregularities within the syntax of sentences, regardless of the usage of concrete words. If the suspicious sentences are found then the string matching algorithm tries to select and combine those sentences into potentially plagiarized sections.

2. LITERATURE REVIEW
First, in 2006 Maurer et al. [1] classify the plagiarism detection method in to three categories namely Stylometry, Document Comparison and Web Searching. In Stylometry analysis plagiarism is found by the author writing style and this quantification is done by some statistical method without external source known as 'intrinsic plagiarism detection[2].Every author has its own writing style, if the style of writing is changed with successive sentences then plagiarism is there in the document [3].this technique is not so popular because of no original document is available to support the fact of plagiarism [4].

In document comparison method [4], the plagiarism can be detected by either syntactically or semantically. Semantically plagiarism detection is done by finding the similar words and sentences which was modified by their synonyms [5]. Kang et al. [6] proposed the PPChecker which calculate the data copied from the original text to the query document based on the linguistic pattern namely: the exact sentence copying, word deletion, word substitution, word insertion and whole sentence change pattern. Other approach for semantic analysis was proposed by Tachaphetpiboon et al. [7] in which grammar rule was identify by the use of parsing in the text document and after that these grammar rule was compared to the structure of text. Semantic Sequence Kin (SKK) approach for semantic analysis was proposed by Bao et al. [8] which use the word position information for plagiarism detection. In syntactic plagiarism detection meaning of the word, phrase or sentence is not considered. Shiva Kumar et al. [9] proposed SCAM for plagiarism detection in the sentence which measure the global similarity but can't process the positional information of copied content.

The search engine API is the core of many web-based plagiarism detection techniques. Web based plagiarism detection tool is further categorized in to server side and client side plagiarism detection tool. There are many freely available tools in the market with paid one such as DocCop [10], Plagium [11], Turnitin [12], Safe-assignment [13], Urkund [14] are the tools of server side or based on web servie. Except these CopyCatch [15], WCopyfind [16], EVE 2[17], MOSS [18] and GPSP [19] are the tools available on web with client side functionality.

3. AVAILABLE TOOLS
To avoid the academic dishonesty there are several tools available. Some of them are discussed in this section. Doc Cop [10] is a web based plagiarism and collusion detection tool which breaks the query document in to N-gram phrases and then measure the plagiarism by conducting searching in google for each phrases [4]. It measure the similarity between the document and the web. Plagium [11] is another freely available tool. According to [4], Plagium perform better than Doc Cop. It is also based on search engine API.

Turnitin [12] is the web based commercial product from iParadigms. In which detection and processing is done remotely. Turnitin system database contain approximately 4.5 billion pages of books and journals. Safe- assignment [13] is the web based service provided by the Mydropbox, which covers 8 billion documents from ProQuest, FindArticles& other major scholastic databases [1]. Institute FürAngewandteLerntechnologien (IFALT) gives another web based service known as Docoloc. It also utilizes the searching and ranking of Google API. Urkund [14] is one more plagiarism detection technique based on web service which uses the email system for submitting and viewing the result.

CopyCatch [15] is a client based tool which is used to compare locally available database of documents. WCopyfind [16] is open source tool for detecting words or phrases of defined length within local repository of documents. EVE2 (Essay Verification Engine) [17] is an another client based tool which is based on own internet search mechanism to find the plagiarism data. Except these GPSP [18], MOSS [19] and JPlag are the other tools available on web

Reference documents
The following list contains titles and addresses of documents in ... sentences ("x Sentences") the corresponding sentences are hig... and you are directed to the first position of the corresponding ... highlighting.

2 Sentences were found in a text with the title: „Publications:
2 Sentences were found in a text with the title: „Adaptive vide
2 Sentences were found in a text with the title: „Multimedia G.
2 Sentences were found in a text with the title: „Performance
▸ In 87 further documents exactly one sentence was found. (clic

Fig. 2: An example of plagiarism report by Docoloc

Fig. 3: the Interface of EVE 2 web searching

4. IMPLEMENTATION
Most web based Plagiarism detection tools use search engine APIs. The semantic relatedness approach based on the work will be adopted in measuring the similarity between sentences by adding supports for other parts-of-speeches in particular for adjectives and adverbs

A. Document Preprocessing

Document Preprocessing involves following stages for all query documents-

Tokens which are non-essential such as numbers parenthesis and punctuations are excluded and the sentences whose length is less than three are not considered automatically.

Stop words are also omitted.

All functional words such as conjunction, preposition, articles, auxiliary verbs, pronouns and cardinal words are also not considered.

Web document Retrieval

The procedure of retrieving the source document from the web includes:- First of all selecting the target file from the browse option and then search it through Google API. Each source documents URL will be provide and recorded and the objective is to determine the top URL from where most of the content has been retrieved.

It is based on the following matrix.-

The number of URLs returned from all queries.

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Process parameters optimization for enhanced microhardness of AA 6061/ SiC surface composites fabricated via Friction Stir Processing (FSP)

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Abstract

In this research work, Taguchi's experimental design is adopted for achieving maximum micro-hardness values for AA6061/SiC surface composites fabricated using friction stir processing. This was achieved by optimizing friction stir processing parameters. Three process parameters namely tool rotational speed, tool traverse speed and tool tilt angle with three levels each were chosen to maximize microhardness values. Nine experiments were performed strictly as per Taguchi L_9 orthogonal array. After single pass friction stir processing, microhardness of all the samples were tested on Vickers digital microhardness tester. The obtained results were analyzed with the help of signal to noise (S/N) ratio. The effect of all three parameters on microhardness values was studied. The analysis of signal to noise (S/N) ratio showed that maximum micro hardness was achieved when tool rotational speed, traverse speed and tilt angle were selected as 1400 rpm, 50 mm/min and 2.5° respectively.

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Keywords: Friction Stir Processing; Microhardness; Taguchi Orthogonal Array, process parameters.

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1. Introduction

It is well known that aluminium alloys are realistic candidates for various structural applications in marine, automobile and aerospace industries due to their high strength to weight ratio, low weight density and high corrosion resistance [1]. But for several purposes these are not sufficiently stiff and strong and their reinforcement becomes necessary. The reinforced aluminium metal matrix composites exhibit high specific modulus, improved mechanical and tribological characteristics [1-3]. But the addition of hard phase reinforcement makes them brittle [4]. Also, the useful life of components often depends on their surface properties such as wear resistance and hardness. So, in most of cases surface composites are prepared which combines a tough metallic matrix with a hard ceramic reinforcement. However, the dispersion of reinforcement particles on metal surface and the control of its dispersal are more difficult to attain by conventional surface modification techniques [5, 6].

FSP is a newly developed solid state processing technique which is simply an alteration of friction stir welding process which was invented at The Welding Institute (TWI) in 1991. In its basic operation, a non consumable rotating tool with a specially designed pin and shoulder is plunged in to the monolithic plate and traversed in the defined direction to cover up the desired area of interest. Friction between tool and workpiece results in localized heating that softens and plasticizes the workpiece material. During this process, material undergoes intense plastic deformation which results in significant grain refinement. Though, FSP is basically advanced as a grain refinement technique for microstructural and surface properties improvement and removing various defects in cast products, yet it has emerged as an attractive process/route for fabricating the surface metal matrix composites [7].

Mishra et al. [7] done maiden work on surface composite fabrication using Al 5083 alloy as base material and SiC as reinforcement. In this work, a maximum microhardness of 173 Hv was achieved using 27 vol% of SiC particles which is almost double of the microhardness of base metal (85 Hv). After this work, lot of work on surface composite fabrication is reported. Initially FSP was used to modify aluminium alloys but with the passage of time FSP gains shining role in modification of other alloys like magnesium alloys [8], copper alloys [9], titanium alloys [10] and even steel [11].

Tool rotational speed and tool traverse speed are identified as the most influential process parameter of FSP which play a significant role in uniform distribution of reinforcement particles, grain refinement and heat generation during the composite fabrication process via FSP [12]. However, tilt angle of tool also affects the dispersion of reinforcement particles.

Aluminium alloy 6061-T6 has wide applications in aerospace, automobile, marine sectors. In this study, the surface composites of SiC reinforced Al 6061 alloys are produced using FSP by evaluating the effect of three process parameters namely tool rotational speed, traverse speed and tilt angle on microhardness of fabricated surface composites. Taguchi technique and MiniTab software is used for experiment design and interpretation of experimental data.

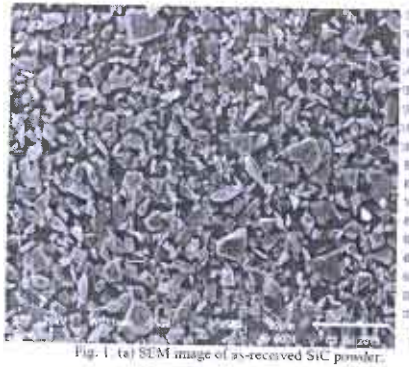

Fig. 1. (a) SEM image of as-received SiC powder; (b) XRD image of as-received SiC powder.

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Virtual Design, Modelling and Analysis of Functionally graded materials by Fused Deposition Modeling

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Abstract

Functionally graded material answers the need of material incompatibility in the area of additive manufacturing. In this work virtual design, modelling and analysis of functionally graded material (FGM) is achieved. Based upon the relationship of material properties with process parameters of fused deposition modelling (FDM) process, tailor made properties are assigned to components in different regions. FGM is proposed and is subjected to transverse loading conditions. This is accomplished by actual CAD modelling and analysis using ANSYS 14. Encouraging results in direction of FGM fabrication are obtained at the end of this research. It is observed that the proposed FGM exhibits around 51 % reduction in deformation for transverse loading conditions as compared to the component obtained at default Modeller settings. This work can very easily be extended in the direction of each mechanical property to customize materials for specific applications.

Selection and Peer-review under responsibility of International conference on materials research and applications-2016.

Keywords: Functionally graded materials; Virtual fabrication; Fused Deposition Modelling; Density; Modulus of Elasticity

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1. Introduction

Functionally Graded Materials (FGM) are a special class of engineered materials where the properties can be locally controlled in customized manner to suit specific customer requirements [1, 2]. Fabrication of FGMs provides the most plausible answer to the problem of input material inconsistency in additive manufacturing (AM). Additive manufacturing is one of the most innovative pioneering technologies which address lots of design and manufacturing time issues. A lot of research is currently under progress to address the issue of fabrication and analysis of FGMs using various additive manufacturing techniques [3-7]. Various commercial AM techniques are available today having their own distinctive features. Fused Deposition Modelling (FDM) process is a popular AM technique having established prototyping strengths and has been utilized in the present work.

2. Methodology

This research utilized FDM Maxum Modeller powered by Insight software. The FDM build parameters utilized for rendering graded properties in the current work include contour width, raster width, air gap and raster angle. Five different densities and hence composition are imparted within the given length of the structural component in the proposed FGM to counteract the deformation in most effective manner. Different levels of process parameters are imparted to different sections of the given component based upon the previous research [8]. The calculations involved in the work are:

Density Calculations:

Mass of input model material= $\rho_1 . V_1$

Where ρ_1 is the initial density of ABS P400 (wire form) = 1050 kg/m^3[9]

V_1 is the volume of model material used (from actual observation insight software)

Now suppose ρ_2 is the density of the component when this ABS P400 occupies the shape as specified by component geometry and V_2 is the component volume, then according to the law of conservation of mass (since the entire wire length extruded is used to fill component geometry and assuming that there is no wastage of model material), $\rho_1 . V_1 = \rho_2 . V_2$. This can be used to find the different densities with the changing process parameters.

Modulus of Elasticity Calculations: From the knowledge and application of basic laws of mechanics, we know that the maximum deformation in a simply supported beam which is subjected to transverse loading is given by,

$$\Delta L = \frac{4 . P . L^3}{E . m^2} . g^2$$

Where P is the external applied transverse load= 1000 N; L is the length= 125 mm; ρ is the density of material(calculated from density calculations above); m is the mass which is 8.4 x 10^{-2} kg (default conditions)

ΔL is the deformation corresponding to load P and is equal to 0.0079 m (from ANSYS modelling), E is modulus of elasticity.

Based upon the above FGM with varying properties at five levels is proposed. Details of models are given in Table 1 and Table 2. Figure 1 shows the ANSYS model of the proposed FGM

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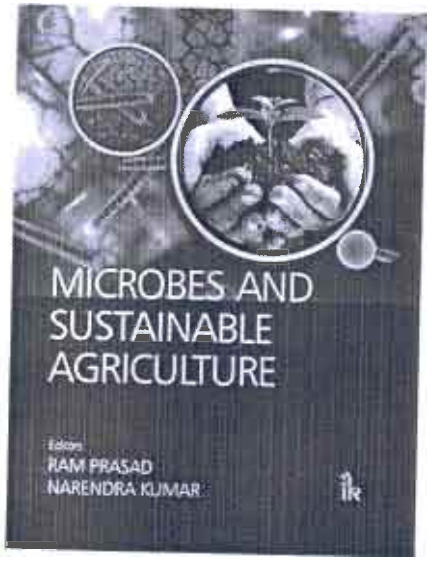

Microbes and Sustainable Agriculture

Author : Ram Prasad (https://www.ikbooks.com/author-details/ramprasad/942) & Narendra. KUMAR (https://www.ikbooks.com/author-details/narendrakumar/1055)

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Visible Light Communication "An Advanced Optical Wireless Communication Technology" Used in Li-Fi

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Abstract

Advent of information technology have enable the development of communication vertically and horizoutally , the modern research has made the Visible Light Communication (VLC) technology, one of the advanced optical wireless communication technologies, which is green and clean in nature. Visible Light Communication, uses visible region (375nm-780nm) and is used as a more secure medium for data transmission.it achieves high data rates as compared to conventional wireless technologies like Wi-Fi, Bluetooth, Wi-max etc. the conventional technologies uses radio waves for communication. To overcome the shortage of bandwidth we can use light to transfer the data which is known as "DATA THROUGH ILLUMINATION". LED light bulb that varies in intensity is used and it cannot be followed by the naked eye. It is possible to encode various data in the light by varying the light at which the LEDs flicker on and off to give different strings of 1s and 0s.While using mixtures of red, green and blue LEDs to alter the light frequency encoding a different data channel. If we can't see the light then we cannot access the data easily hence the security would be snapped.

Keywords

Visible Light Communication (VLC), LED, Wi-Fi, Li-Fi, Multiplexing, Illumination, RBG

I. Introduction

Visible Light Communication (VLC) is based on white Light Emitting Diodes (LEDs) and are used for realizing ubiquitous wireless networks, because LEDs would be used for both illumination [1] and wireless transmission simultaneously. There are two common approaches to produce white light illumination by using LEDs. One involves blue colored LEDs with wide-band phosphors that produce the form white light. The alternative option is by means of red, green and blue (RGB) LEDs. The RGB solution is more used than phosphorous-based white LED because it improves the data rate, as in the latter case, the slow response of the phosphors can limit the modulation bandwidth whereas the power efficiency get reduced if it is combined with blue filter in order to reject the phosphorescent components [4]. Moreover the RGB LED scan be used for wavelength division multiplexing (WDM) which will increases the overall transmission capacity of network. However, to implement high speed wireless connectivity, the limited modulation bandwidth of the commercial LEDs (10-20 MHz) requires spectrally efficient modulation techniques, for .g. Orthogonal Frequency Division Multiplexing (OFDM) or Discrete Multi-Tone (DMT) [5].

II. Literature Survey

Development of the information communication Technology had made a very significant researches from traditional way of sending messages from smokes, birds, pigeons to the1st generations to the 5th generation.

Sending messages from one place to other place to sending a bulk data of audio, Video and doing processing simultaneously. VLC is a communication medium for data, which uses visible light ranges between 400 THz (780 nm) and 800 THz (375 nm) as a optical carrier for data transmission and illumination. It uses fast pulses of light to transmit information wirelessly. The main components of this communication system are:

1) a high brightness white LED, Which used as a communication source and 2) a silicon photodiode which act as a good responder to visible wavelength region serving as the receiving element. LED can be switched on and off several times to produce digital strings of 1s and 0s as a data. Data can be encoded in the light to produce a new stream of data by varying the flickering rate of the LED bulb. It can work, by modulating the LED light and the data signal, the LED illumination act as a communication source .This paper uses the concept of the cost effective clean and green technology of the communication. It will simplify the essence of communication requirement of life at one end and also used to save the energy at another end. It will help in boosting our economy, as our power requirement will be at the saving end.

A. Research Methodology Used

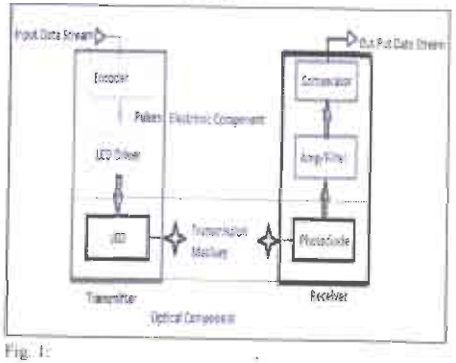

Fig. 1:

Hardware will be designed using Software and Implemented on Hardware.

The Block diagrams shown above have the two main sections.

- **Software section.** It is basically the software section of the system, shown the circuit diagram shown below.
- **Hardware Section.**

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Prototyping of Implementation:

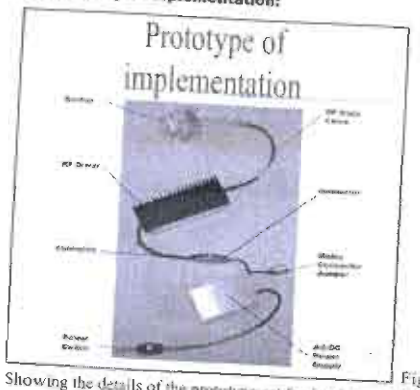

Fig 2: Showing the details of the prototype set for implementation

Details about the circuit of prototype have been shown in the picture showing

1. Emitter
2. RF driver
3. Radio frequency coaxial cable
4. Molex connect jumper
5. Connectors
6. Power supply
7. AC/DC power supply.

B. Comparison Between VLC & Wi-Fi

Comparsion is based on the various PARAMETER of VLC V/S Wi-Fi. The increasing growth of LEDs (Light Emitting Diodes) for lighting provides the opportunity to incorporate VLC technology into a LED environments. VLC is particularly suitable for many popular internet applications which requires "content consumption" such as video and audio downloads, live streaming, etc. These applications requires a heavy downlink bandwidth, but require minimal uplink capacity. In this way, the majority of the internet traffic is offloaded from existing RF channels, thus also extending cellular and Wi-Fi capacities. Some people claims that they are hypersensitive to radio frequencies and are looking for an alternative. Li-Fi is a good solution to overcome this problem. Instead it is a boon to the modern communication Engineering.

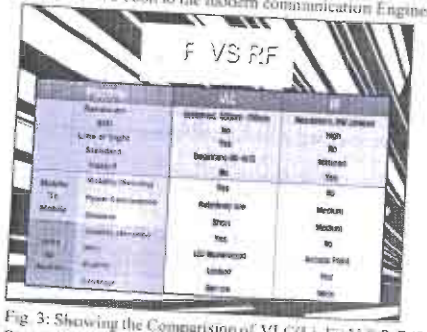

Fig 3: Showing the Comparision of VLC(Li_Fi) V/S R.F (Radio Frequency

C. Results

Data can be transmitted through light easily. If this technology is practically used then every bulb can be made to transmit wireless data and we will ultimately proceeding to greener, cleaner and safer future. This can also solves the major issues like shortage of radio-frequency bandwidth and can be realized in aircrafts or hospitals applications. Hence by using this technology the data transmission rate can be increased where the air waves are clogged due to increase in consumption of wireless internet.

D. Applications of VLC. (LI-FI)

Li-Fi, have a wide range of applications and advantages , over the existing Technology of data communications, beside the energy efficient communication system, it has a trendies superiority of all other data communication system. The speed and vide spectrum availability on the VLC is one of the important characteristics. Important advantages and applications may be summaries as under.

1. Real time Medical Observations

For a long time, medical technology has lagged behind the rest of the wireless world. Operation Theatres do not allow Wi-Fi over radiation concerns, and there is also a lack of dedicated spectrum. In hospitals, interference from cell phones and computers can block signals of monitoring equipment. Li-Fi can used to solve both the problems: lights are not only allowed in operating rooms, but tend to be the most glaring fixtures in the room. And, as Harald Haas mention in his TED Talk, Li-Fi has 10,000 times the spectrum of Wi-Fi, hence we can, dedicate the red light to medical data.

2. Airlines

Airline Wi-Fi. United is planning on speeds as high as 9.8 Mbps per plane. Li-Fi could easily introduce that sort of speed to each seat's reading light.

3. Smarter Power Plants

Wi-Fi and many other radiation types are bad for sensitive areas. But power plants need a fast, inter-connected data systems to monitor things such as demand, grid integrity and core temperature (in nuclear plants). The savings of proper monitoring at a single power plant can add up to hundreds or thousands of dollars. Li-Fi offers safe, abundant connectivity for all the sensitive locations. Not only it would save money, but the draw on a power plant's own reserves could be lessened if they haven't yet converted to LED lighting.

4. Undersea Awesomeness

Remotely Operated underwater Vehicles, toys of treasure seekers and James Cameron, all are operated with large cables that supply power as well as used to receive signals from their pilots above. ROVs work great, except when the tether isn't long enough to explore an area, or when it gets stuck on something.

If their wires are replaced with light — say from a submerged, high-powered lamp — then they would be much freer to explore. They could also use their headlamps to communicate with each other, processing data autonomously and referring findings periodically back to the surface.

5. It Could Keep You Informed and Save Lives

If there's an earthquake in New York. Or a hurricane. Take your pick — it's a wacky city. The average New Yorker may not know what the protocols are for those kinds of disasters. Until they

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A High-Speed Image Fusion Method Using Hardware and Software Co-Simulation

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Abstract. The process of adding significant information of two source images obtained from various sources into one image is called image fusion. Large volumes of data informations are obtained from various remote sensors. These informations are useful for image diagnosis through image fusion. Thus image fusion is the promising area of research. Many methods of image fusion have been suggested by the previous authors to produce a fused image having higher spatial resolution, but due to large amounts of data calculations, it is a time-consuming process. Therefore, a reconfigurable hardware system having high speed such as Field-programmable Gate Array (FPGA) is used for solving complex algorithm with reduced computation time to achieve parallel operation with high-speed characteristics. This paper describe the design and implementation of improved speed discrete wavelet transform based multisensor image fusion process with its implementation on hardware. MATLAB 2016a Simulink tools are used to integrate the Xilinx System generator with averaging method for image fusion. Algorithm design has been synthesized in Xilinx ISE 14.1and the same is implemented on ML 605 Virtex-6 FPGA kit. From the result, it is observed that the design consumes a total power of 4.36 W and operates at a maximum frequency of 851. 06 MHz.

Keywords: DWT · Image fusion · Xilinx System Generator (XSG) · Field Programmable Gate Array (FPGA)

1 Introduction

The process of adding important pictorial information of two source images obtained from various sources into one image is called image fusion. The source images may be taken from various satellite sensors, obtained at different times, or having different spatial and spectral characteristics. The prime objective of this method is to preserve the most relevant features of each source image. Image fusion process required large amount of data computation, and sometimes it is needed to store a large volume of data and process it with less computation time. This task required to perform complex algorithms with significant amount of computation [2, 4, 5]. A hardware/software

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co-design are the right choice to solve complex algorithms with less computing time using FPGAs. Designing a system and use of appropriate algorithm will reduce the computation time and provide an efficient solution to this problem. Given this, a reconfigurable system and software co-simulation method are proposed [6].

Recently, FPGAs has emerged as a useful reconfigurable programming device which is highly popular as compare to available other programmable devices like Programmable Array Logic (PAL) and Complex Programmable Logic Device

An Analysis of Misclassification of Spam and Non-Spam e-mails Using Data Mining Techniques

Shrutika Saini[1] and Avdhesh Gupta[2]

Abstract

This research is to classify and channel the vast measure of information. The principle motivation behind this exploration is to lessen the error rate of the information and to enhance the accuracy. In the past methods of arrangement there might be some miss classification. In any case, in this examination the issue of misclassification is lessened. The work is exhibited by this research is a few alterations in the classification system. Thusly, it's a decent undertaking answer for filtering. This will streamline the framework execution and make a few upgrades on the past calculation. This will give the better results from the past one.

Keywords: *Classification of Data, Filtering Email, Naive Based Classifiers, Decision Tree*

INTRODUCTION

With the proliferation of electronic mail usage as a means for personal and business communication, the volume of unwanted messages that are received is growing as well. Due to its low cost for the senders and ease of deployment, several people and companies use it to quickly distribute unsolicited bulk messages, also called spam, to a large number of recipients. The reasons for sending spam vary and may include marketing of products and services (e.g. drugs, software, and health insurance), spreading bits of gossip and other deceitful notices, (for example, profit quick), and disseminating hostile substance, (for example, grown-up material and obscene pictures). In addition, spam gives a medium to phishing assaults and circulating hurtful substance, for example, infections, Trojan stallions, worms and other malware. Spam has turned into a noteworthy risk for business clients, system managers and even conventional clients. So now the question is how good are our weapons in the spam wars? [1]

Because of the disturbing increment of the spam volume and its genuine effect, giving watchfully spam warriors has as of late pulled in significant consideration. Notwithstanding controls and enactments, a few specialized arrangements including business and open-source items have been proposed and sent to ease this issue. Installing anti-spam filters at the network gateway is among the most commonly used mechanism to block or quarantine

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Encryption And Embedding in all Multimedia Files

Suha Khan, Tanvi bakshi[1] and Avdhesh Gupta[1]

Abstract

Data transferred over a network suffers from various attacks which can lead to the disclosure of important and secret information. Sometimes, there can be spam messages also which may have some threat posing information. So, to prevent our data from all such attacks and to provide a better security, in this paper, we proposed a technique of encrypting and then embedding the data in multimedia files such as audio, video, text and images. The major advantage of this software is that it includes all types of carrier files to hide the data of any format depending on our need using both Cryptography and Steganography giving double security to the information.

INTRODUCTION

Due to the vast growth of technology, it is important and very much needed to make data out of the reach of unauthorised persons. Various advanced cryptanalytic techniques have been evolved which takes no time to decipher the secure information. So, it is important to develop a software that can provide and ensure all the three basic securities - Confidentiality, Integrity and

Availability. The main reason to develop such a system is to provide a double security to all the different types of files irrespective of their formats.

This paper proposes that all multimedia files can carry hidden information among them without any disturbance and loss of their data. Two things must be ensured while encrypting and hiding the data into carrier files, i.e.

- The embedded data which is first encrypted must be hidden in such a way that it remains undetectable by the human eyes. There should be no sign of disturbance in the carrier file due to hiding of the data.
- The file must be properly recovered at the receiver's end, de-embedding all the hidden information into it. [3]

Encryption along with embedding requires a lot of technique and can only be decrypted with a large no of brute force attacks. Normal cryptanalytic methods fail to decipher the hidden data. The application of De-embedding, Decryption should be a reverse process at the other end and should be translated only when the receiver of the data applies the proper reversal key.

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Robust Approach of Compressing Images and Analysis of Parameter PSNR, CR with Gamma Effect

Shivangi Gupta[1] and Avdhesh Gupta[2]

Abstract

Compressing an image is significantly different than compressing raw binary data. If we used general or outdated technique to compression images then result would be not optimal as it should be. This is because images have definitely statistical properties which can be triggered or exploited by encoders which are implemented or design for them. In image we have to give up some fine details for the sake of saving a little more bandwidth or storage space. So we can say that lossy compression technology. In this dissertation compression of digital images are done with the help of DCT. Several encoding technique have also been used together with DCT to improve the performance of compression. A computational analysis of picture quality is also made with respect to compression ratio and PSNR.

Keyword: *ADPCM, Pixel, Quantization, AC Coefficient, Region Growing, Compressed, Coordinates, Staggering*

INTRODUCTION

An image may be defined as a two-dimensional function, for example let f(x, y) is a function and it depend on two variable so f is dependent on independent variable x and y, where x and y are plane coordinates. We know when we take an image which is function of x and y then with help of x and y we can calculate the intensity level of image or can say pixel. As we know intensity value lies between 0 to 255. At every point intensity level would be different it depend upon which type of image we fetched. When x, y and the amplitude values of f are all finite, different quantities, we can call the image a digital or binary form. Digital image processing allows the use of complicated algorithms for image processing, and hence, can offer both more sophisticated performance at simple tasks and the implementation of different approach which would be impossible by analog

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Multi-Response Optimization of Fused Deposition Modelling Process Parameters of ABS Using Response Surface Methodology (RSM)-Based Desirability Analysis

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Abstract

The basic efforts of this investigation are focused on the development of an optimal layout plan with minimal build time, model material volume, support volume and thus production cost for a Fortus 250mc modeler. ABS plastic is used as a raw material and cylindrical primitives with pre specified STL dimensions are taken as the component. This study focuses on multi response optimization of layout plan for different FDM parameters as well as spatial orientations. Experiments are conducted using full factorial central composite design. Response surface methodology based desirability analysis was employed for optimization of FDM process parameters namely, contour width, raster width, air gap, raster angle, slice height and orientation based on multiple performance characteristics including build time, model material volume and support material volume. Mathematical models were developed and tested for accuracy using DesignExpert software for RSM application. The results thus obtained are further processed using Desirability approach for multi objective optimization in order to achieve overall layout optimization for quantitative characteristics.

Selection and peer-review under responsibility of Conference Committee Members of 5th International Conference of Materials Processing and Characterization (ICMPC 2016).

Keywords: FDM process parameters; Layout Optimization; Response surface Methodology; Desirability Approach

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Selection and peer-review under responsibility of Conference Committee Members of 5th International Conference of Materials Processing and Characterization (ICMPC 2016)

1. Introduction

Fused Deposition Modelling is an extensively used LM technique which produces high strength robust prototypes. It offers a variety of Modeller choices ranging from legacy modellers like FDM Maxum and FDM Titan to present day commercial Mojo, uPrint SE, uPrint SE plus, Fortus 250mc, Fortus 360mc, Fortus 400mc and Fortus 900 mc modelers [1,2]. The choice of raw materials is also wide including ABS plusP430, ABSi, ABS-ESD7, ABS-M30, ABS-M30i, PC-ABS, PC-ISO, PC, Nylon 12, ULTEM-9085, PPSF PPSU [1]. Support material is either soluble or Bass. Model material is available in a number of colors including ivory, black, etc.[3-5]. Additionally, a good range of elongation strength, heat deflection, flexural stress, impact strength and other unique material properties are available for FDM model materials. FDM prototypes have a wide range of applications including form and fit models, biomedical applications, jewellery etc.[3-7].

In FDM process, optimal process performance can be achieved based on right parameter selection and in this work process parameters are taken from previous research and desired response [8]. Conventional experimental design techniques including RSM and Taguchi methods are normally used for single response optimization of process parameters. However, these are not very effective for multi response optimization. Frequently employed multi- response optimization techniques include desirability technique, grey relational analysis, fuzzy logic, etc. Evolutionary techniques like ant colony optimization, swarm optimization, etc. are also employed for process optimization by various researchers [9-11].

2. Experimental Procedure

In this work a two way approach is used. The experiment is designed using RSM and multi-objective optimization is achieved using GRA. These are discussed in the subsequent sections

2.1 RSM Based Experimentation

Experiment is designed by RSM using trial version of Design Expert 9 software. The arrangement to conduct the experiments uses a face-centered Central Composite Design with three responses and six variables, having a total of 86 runs in three blocks [12, 13].

Experiments were conducted to determine the effect of process parameters i.e., Contour width, orientation, raster angle, raster width, slice height and air gap on build time, model material volume and support volume of the ABS work piece on a FDM Fortus 250mc Modeler. The primitive is oriented about x-axis keeping z height minimum as this orientation is found to result in minimum possible build time [14, 15]. Apart from process parameters listed in Table 1, all other FDM parameters are kept constant throughout experimentation. A cylindrical Primitive of STL size X= 20, Y= 69.999, Z=20 mm is used. The different factors and their levels are depicted in Table 1. The CAD drawing for conical primitive was made using Solidworks software and then it was converted into .stl format. This .stl was inputted to Insight 9.1 and the different experimental runs and corresponding responses are tabulated in Table 2.The responses are noted from FDM control center by modelling the conical primitive at variable values of process parameters. The experiments are designed and analyzed using RSM on Design Expert 9 software [16].

Table 1 Input variables used in the experiments and their levels

S No.	Parameters	Level 1	Level 2	Level 3
1	Slice height(mm)	0.1778	0.254	0.3302
2	Contour width(mm)	0.4	0.48	0.56
3	Air gap(mm)	-0.1	0.4	0.9
4	Raster width(mm)	0.4	0.48	0.56
5	Raster angle(degrees)	0	15	30
6	Orientation(degrees)	0	15	30

IT and Banking

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IMS Engineering College Ghaziabad

ABSTRACT

Information Technology or IT has enabled us to see a different world altogether. In the last three decades of its development, IT has changed the landscape of many areas. From creation of information systems websites of companies to interactive web portals, from sending and receiving email messages to booking flights online, from connecting the primary health center in a remote area with a big size city hospital to social networking, IT has helped us to do things differently and in a much better way.

It is because of IT that we hear phrases like 'work from home' and 'virtual offices' etc where people can connect with each others from their home locations and submit their tasks online without having to build an office or hire rented office space. IT has saved so much of lost and other valuable resources across industries.

1. Introduction

One of the many areas that have been tremendously influenced by IT is banking. From the 'pen and paper' based banking practiced three decades ago, we see that banking has transformed itself in a huge way through the application of Information and Communication Technology or ICT. Digitalization in banks started when the bulky registers on the desks of the bank clerks got replaced with standalone computers that enabled book keeping, however, since the internet was not developed by then, information exchange was not possible.

The next wave came with the invention of 'www' by Tim Berners Lee. Those standalone computers started interchanging information and banks started setting up LAN (Local Area Network). After sometime, IT giants like Infosys came up with path breaking products such as the 'finacle' which enabled the centralization of customer's data and also enabled the customer to do 'anywhere banking'. After this, the customer was no more bound to do commercial banking transaction in his own city only but could also transact during travel. We witnessed another wave of IT in banking when ATM machines were installed, ATMs were a big step in delivering banking services to customers and we feel the difference till this day.

Thanks to IT, even this much was not enough. ATMs were followed by card based system of payments through increasing use of credit and debit cards, digital signatures to make the transactions more secure etc. IT enabled banks to develop interactive web based transaction system or what we popularly call 'e-banking'. A customer could log on to the bank website and then log into his account and make payments, receive money while sitting at his home or office or travelling anytime of the day. This reduced the need to visit ATMs.

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Encyclopedia of Animal Cognition and Behavior

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| Editors: Jennifer Vonk, Todd Shackelford

Crossover

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Synonyms

Chromosomal recombination (http://link.springer.com/search?facet-eisbn=&facet-content-type=ReferenceWorkEntry&query=Chromosomal%20recombination); Nondisjunction of chromosomes (http://link.springer.com/search?facet-eisbn=&facet-content-type=ReferenceWorkEntry&query=Nondisjunction%20of%20chromosomes)

Definition

Crossing over is exchange of genetic material between homologous chromosomes during meiosis stage.

Crossing Over

Crossing over involves exchange of genetic material between homologous chromosomes (having same genes at the same loci, but possibly different alleles). The exchange of chromosome occurs during meiosis and can be visualized as chiasma that interlocks homologous chromosomes. This is visible in form of physical overlapping between chromosomes and works opposite to the polarizing forces of the meiotic spindle (protein structures that divide the genetic material in a cell) as shown in Fig. 1. Crossing over prevents premature segregation of homologous chromosomes during first meiotic cycle (Page and Hawley 2003). Problem or interruptions in crossing over may lead to abnormalities like gene linkage, nondisjunction of chromosomes, aneuploidy, etc. (Hassold et al. 2009). Low rates of crossover and abnormal...

Keywords

Crossing Over Stress-causing Agents Achiasmatic Chromosomes Geometric Encoding Correct Chromosome Segregation

These keywords were added by machine and not by the authors. This process is experimental and the keywords may be updated as the learning algorithm improves.

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Heterogametic

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Synonyms

Heterozygous chromosomes (http://link.springer.com/search?facet-eisbn=&facet-content-type=ReferenceWorkEntry&query=Heterozygous%20chromosomes)

Definition

Heterogametic means nonuniform distribution of sex-chromosomes in an organism.

Heterogametic

Heterogametic describes presence of different types of sex chromosomes in an organism. Heterozygosity is mostly associated with sex chromosomes than autosomes and plays a key role in sex-determination among organisms. For example, in case of human beings, XY chromosomes define a male sex while XX chromosome represents a female sex. Sex chromosomes are present as single copy in an organism and complement the gene product quantity through dosage compensation or the meiotic silencing (Forsdyke 2000; Johnson and Lachance 2012). Sex chromosomes show strong impact of evolutionary processes (mutation, selection, genetic drift, and meiotic drive) and play an important role in natural phenomenons like hybrid incompatibility and speciation. Besides animals and birds, heterogametic chromosomes are occasionally observed in plants also (Johnson and Lachance 2012)....

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Gene Map

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Synonyms

Genome mapping (http://link.springer.com/search?facet-eisbn=&facet-content-type=ReferenceWorkEntry&query=Genome%20mapping), Linkage maps (http://link.springer.com/search?facet-eisbn=&facet-content-type=ReferenceWorkEntry&query=Linkage%20maps)

Definition

Gene mapping is allocating chromosomal location coordinates to a gene.

Gene Map

Gene mapping is allocating chromosomal location coordinates to a gene. Mapping a gene helps to prepare a roadmap of genome and identify milestones in form of genetic markers. The genetic map of an organism gives an overview of gene arrangement in their chromosomes (refer Fig. 1). The gene maps are composed of markers which might be genes controlling visible phenotypic traits (classical markers) or molecular markers whose phenotype is revealed by using modern molecular biology techniques (e.g., DNA markers). In case of animals, gene mapping is used for all aspects of genome analysis and their improvement for benefit of human beings. Mapping of genes in farm animals, companion animals, laboratory animals, aquatic animals, insects, and primates, including humans provides comprehensive data which is used to elucidate origin, evolution, phylogenetic relationship;. .

Keywords

Random Amplification Of Polymorphic DNA (RAPD) Radiation Hybrid Mapping Klungland Enhanced Search Capabilities Simple Sequence Repeat
These keywords were added by machine and not by the authors. This process is experimental and the keywords may be updated as the learning algorithm improves.

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RESEARCH-ARTICLE

River Pollution Detection Using Google Maps

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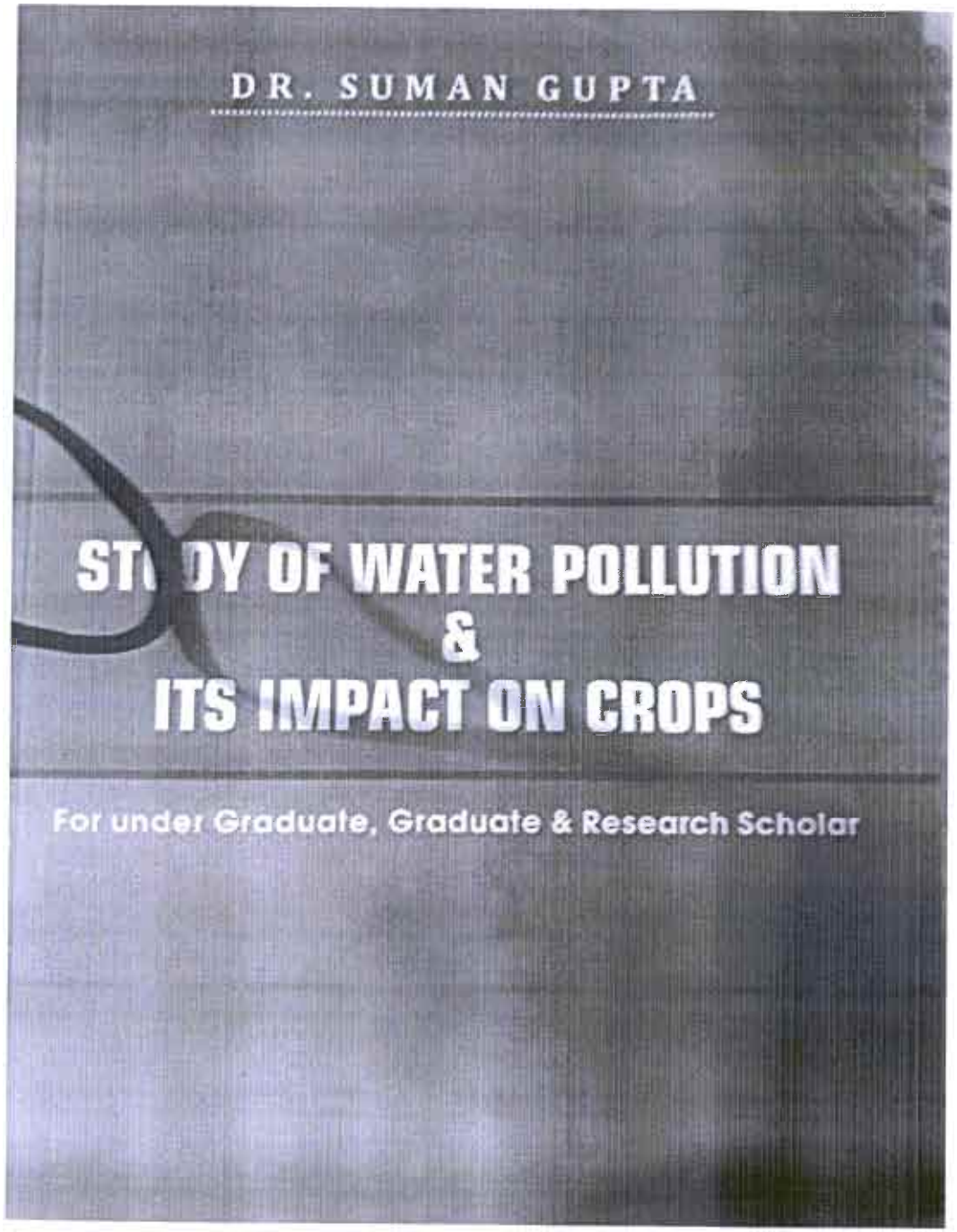
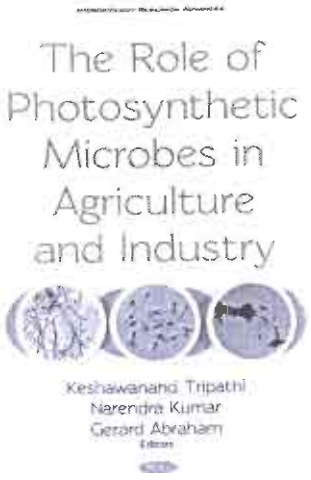
ABSTRACT

River pollution is a major problem in India in the present time. Google Maps provide us satellite view and terrain view of earth in India for most of the places. But we can't get exact insights of pollution affected areas.

The paper is about how we can distinguish and highlight the pollution affected areas on the banks of rivers, what remedies can be taken to check the pollution on that spot, and to help people to know better about the severe river pollution. Google Maps has a lot of information and one can crawl the Google Maps to have very useful results. Our basic idea is to make a tool which may be helpful in identifying the causes and more polluted areas of the river and to give the correct remedies and suggestions to control the river-pollution of corresponding areas.

The paper focuses on the problems that we face and can face in the near future like dangerous diseases, etc. This paper presents a detailed methodology of identifying the cities on the river banks along with their status of pollution as severe or moderate.





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The photosynthetic microbes including microalgae and cyanobacteria are the most widespread photosynthetic organisms on Earth. These organisms thrive successfully in a wide range of ecological habitats, ranging from marine and freshwater to terrestrial environments. The short generation time and capability to fix the atmospheric N2 and cosmopolitan distribution make these organisms unique.

Photosynthetic microbes such as cyanobacteria are used as biofertilizer for rice paddy and their application improves soil physico-chemical characteristics and the mineral nutrient status of the soil. However, in recent times they have been exploited for the production of several fine chemicals and biofuel. Due to their simple cellular organization, the bare minimum requirement of nutrients and ease of cultivation, recently the microalgae have been exploited and accompanied by the capacity to produce bio-energy, especially bio-diesel.

Use of photosynthetic microbes in wastewater treatment has also generated considerable interest in the scientific community and industry at large.

Bioremediation using photosynthetic microbes is an emerging area of research and the organisms accumulate or degrade several environmental contaminants and heavy metals. Because of the antagonistic properties, they are also a potential source of various bioactive compounds. In brief, the potential of photosynthetic microbes could be harnessed for economic viability and sustainability of agro-ecosystems. This book attempts to highlight the potential and prospects of the photosynthetic microbes for the welfare of mankind in view of the anticipated population explosion and global climate change.

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Prediction of Secondary Structure of Proteins Using Sliding Window and Backpropagation Algorithm

Applications of Artificial Intelligence Techniques in Engineering pp 533-541 | Cite as

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Abstract

Prediction of protein secondary structure plays a vital role in structural biology. Computational methodology is the initial step in bioinformatics to predict the 3-D secondary structure from a primary sequence and structure homology. This problem lies in the category of NP problem, and thus its time and space complexity is very high. In this paper, in a model for secondary structure prediction of proteins using sliding window and MADALINE, a multilayer feedforward network is proposed. The algorithm starts with encoding of amino acid sequence, which after passing through window is given as input to the neural network. The resultant data is in numeric format and translated back to actual secondary structure. It is observed from the results that the proposed technique provides better prediction with an accuracy more than 75%.

Keywords

Primary protein sequence MADALINE learning Backpropagation Error minimization Sliding window

References

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A Comparative Study of Recently Proposed Key Management Schemes in Wireless Sensor Network

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Abstract— Key management is the active research area in security of Wireless Sensor Network (WSN). There are many key management scheme proposed based on usability and benefits depending upon the type of WSN application. The paper presents the comparison and analysis of various recent development in key management schemes with a list of major issues and open research challenges. The survey contains the major aspects of existing key management scheme and provided comparison table 4 which helps in selection of appropriate protocol according to their WSN application. This paper surveys key management development using comparing and literature review of schemes proposed for the last few years to explore how various key distribution schemes help to improve security in WSN.

Index Terms— *Wireless sensor network, Key Distribution, Pair-wise, Group key*

I. INTRODUCTION

A WSN consists of tiny devices known as wireless sensor nodes; these nodes cooperate with each other in order to collect the information from the sensing field. These tiny sensor nodes consist of some modules which are as follows: sensing module (for monitoring the environment), processing module (for performing data processing), communication module (for transmitting data between sensor nodes) and power supply (for energy). A WSN is resource constraint network. The network consists of sensor nodes which are low cost, low processing power, has limited energy, limited storage capacity and a base station. These sensor nodes are arranged in large quantity in the unpleasant environment from where they collect detailed data about the surrounding environment and obtained information then transferred to the distant base station. Figure 1 represents structure of WSN.

A WSN shows some specific characteristics such as dense deployment of nodes, dynamic topology of network, low duty cycle, limited battery power, multi-hop communication, sensor nodes may be homogeneous or heterogeneous, self-configurable sensor nodes, sensor nodes can either be stationary or mobile and redundant data obtained from the sensor nodes.

When sensors are distributed in a hostile environment, then there is a danger of different malicious attacks due to its broadcast nature. For example, an adversary can analyse the traffic pattern and take

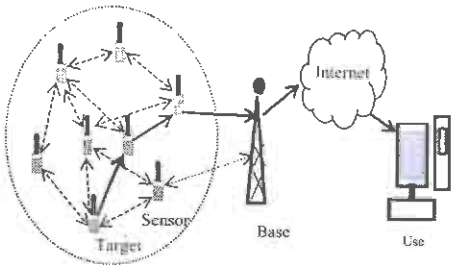

Fig. 1 Wireless Sensor Network

The following content of the paper is organized as in Sections 2 the background of key management discussed, the section 3 explained related work of classical method in this domain. Section 4 describe the recent development in key management, the conclusion and future opportunities in section 5.

II. BACKGROUND

A. Types of Threat in WSN

Some threats are also classifying on the basis of presence in different layer of OSI Model as following in Figure 2.

- *Tampering*: The node is physically access by an attacker. The aim of attacker to recover keys and other cryptographic material used for Encryption/Decryption.
- *Black hole*: In Black hole attack, a node falsifies the route of network and attract all the packets and routing information towards itself.
- *Selective forwarding*: This type of attack consists, a malicious node behaves like a router and drops some packet and may deny to forward that packet or messages.
- *Eavesdropping*: This refers that any unauthorised user or malicious node observe the traffic of communication.

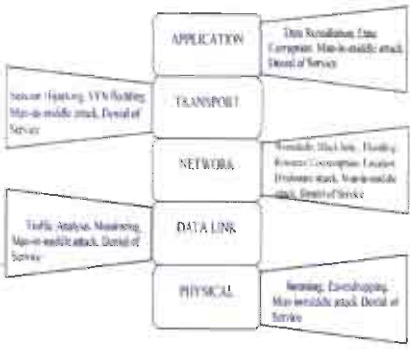

Fig. 2 Security Attacks on different layer

- *Sybil attack*: In this attack the adversary node is a malevolent device, having multiple identities of other node in an illegitimate.
- *HELLO flood attack*: The adversary node is sending flood of "HELLO" packet and block the communication and transmit / receive packet between nodes in the network.
- *Jamming*: The jamming can block the signal either temporary, intermittent or permanent.
- *Blackmail attack*: If the adversary node affects to other node by blackmail attack, then it could affect the communication of network.
- *Exhaustion*: It is also exhausts the victim energy by unnecessarily data transfer.
- *Wormhole attack*: Attackers strategically placed malicious node at different ends of a network. They can create a tunnel and receive messages.
- *Identity replication attack*: In this attack the attacker can make copy of existing node and placed to different part of network.

B. Security Solutions Constraints

- *Lightweight*: Due to limitation of energy in sensors the solutions must be utilize less amount of energy by minimization of computation without affecting the security services.
- *Scalability*: WSN security solutions must support bigger network and it must be flexible and work properly when substantial increases in size.
- *Reactive*: WSN is static and dynamic both. Nodes (trustworthy and malicious) may updated either adding or removing from the network then the security paradigms manages these changes and detect compromises and vulnerabilities.
- *Fault-Tolerant*: As we know that wireless mediums unreliable. Nodes may have compromised without warning. So the solution for security is design by having these issue in mind.

C. Authentication

Authentication is a feature of security where it is guaranteed that the message transmitted from authenticated source. There are mainly four types of authentication technique: One-way authentication, Two-way or mutual authentication, Three-way authentication, Implicit authentication.

D. Key Management in WSN

WSN Security Needs Data Confidentiality, Authentication, Data Integrity, Availability, Robustness, Access Control, and key management schemes. The solutions of security in WSN include scalable, strong, light weight and efficient and effective key management and key distribution mechanisms and authentication. The WSN uses single shared key which is insecure because the attacker can easily acquire the secret key. So the WSN can establish the environment to distribute the key by using following schemes:

To provide safe communication, the data should be encrypted with the help of secret key and authenticated. Key management and distribution schemes for a secure application in such network must provide scalability, authenticity, integrity confidentiality and flexibility. The single key which is shared for communication in WSN is not secure as the adversary can easily detect the key. Therefore, sensor networks use different key management methods to secure the communication.

III. RELATED WORK

Many research has been done on key distribution in sensor networks. Key revocation are the current trends in research on key distribution. The following are some overview and analysis of the current key management and distribution schemes.

Eschenauer et al. [6] presented very first key distribution method for WSN. They proposed three phases of key pre distribution mechanism. Key pre-distribution, shared-key discovery and path-key establishment. In their method, a node having fixed number of keys called key ring are opted randomly without replacement from large number of keys called key pool. A key ring has each key node. The key identifiers from a key ring and sensor identifiers which is related to that key must be stored in controller node which are trusted.

Du et al. [7] proposes pairwise matrix in pre distribution scheme for key management. It uses dynamic key generation and selects k keys randomly from a large pool of keys to make a key ring. If any node wants to communicate, then pair of node's key which are common in ring allow communication. Leap et al. [8] proposes a key management scheme which is based on hybrid structure. The generation of key is mostly static. This scheme uses a pre distributed key which can derive four keys. First the individual key which is used to communicate with base station. And it is also unique for each sensor node. Second is the group key which is used by base station to communicate with all sensor nodes. Third is the cluster key which is used for collaboration within a cluster. Fourth is pairwise key used for secure communication between neighbouring nodes.

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A Robust Trust Model for Wireless Sensor Networks

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Abstract— Wireless Sensor Networks (WSNs) are vulnerable to various security attacks due to its broadcast nature. Trust management is one of the effective methods to defend against threats posed to WSN. The trust management system helps to mitigate many insider attacks and malicious behaviour of nodes. In this paper, we proposed a robust trust model that prevents various attacks viz; bad mouthing, self-promoting and collusion attacks. It uses the time lapses function based on forgetting curve to calculate direct trust and reputation function for indirect trust. Our proposed trust model is scalable. When the trust value is above the threshold value, then we consider a communication link as active and node is trusted, otherwise we remove the communication link and mark the node as malicious. The simulation results indicate the effectiveness of proposed method and maximizes the defence against the internal attacks.

Keywords—WSNs, trust management, direct trust, indirect trust, time decay function.

I INTRODUCTION

A WSN consists of multiple detection devices called sensor nodes, each of which is small, lightweight and portable. Every sensor node is equipped with a transducer, microcomputer, transceiver and power source. The transducer generates electrical signals based on sensed physical effects and phenomena. The microcontroller processes and stores the sensor data. The transceiver receives commands from a central computer and transmits data to that computer [1][2]. The power for each sensor node is derived from a battery. WSN can be usually divided into two categories: distributed sensor networks and hierarchical sensor networks [3]. A distributed sensor network is composed of sensor nodes and sink node. On the contrary, a hierarchical sensor network has at least one immediate layer with header nodes. It is thus composed of sensor nodes, header nodes viz; forwarding nodes and sink node. The header nodes and the sink node are different from the sensor nodes in energy, memory and computational capability.

The applications of WSNs are widely used in industry automation, agriculture fields, healthcare applications, military applications, robotics etc. Most of the path finding challenges is faced by WSN in terms of security, node deployment, energy consumption, communication range, fault tolerance, quality of service, etc. The security of WSNs is getting more attention because economic loss and privacy issue. [4] [5].

A WSN shows some specific characteristics such as dense deployment of nodes, dynamic topology of network, low duty cycle, limited battery power, multi-hop communication. In WSN, sensor nodes may be homogeneous or heterogeneous, and self-configurable also sensor nodes can either be stationary or mobile. When sensors are distributed in a hostile environment, then there is a threat of different malicious attacks due to its broadcast nature. For example, an adversary can analyse the traffic pattern and take stupid action against the network. There are various types of threats present in WSN. The resource efficiency and dependability of a trust system should undoubtedly be the most fundamental requirements for any WSN including clustered WSNs. However, existing trusts systems developed for clustered WSNs are incapable of satisfying these requirements because of their high overhead and low dependability.

A Trust

Many definitions of trust are proposed by the authors. Trust is defined as the level of belief that is developed by past interaction and behaviour between source and destination node. Trust has made impact on future route selection and communication [6][7].

- *Direct Trust*

  The direct trust establishes between source node and neighbor nodes. The direct communication between nodes helps to evaluate the direct trust. It has more impact than indirect and recommendation based trust.

- *Indirect Trust*

  When the source node cannot directly connect to target node and observes the behaviour of target node through other nodes. This is the combinations of feedback and recommendations of other nodes.

- *Recommended Trust*

  Recommendation is the part of indirect trust where the neighbours of target node are given feedback about that node. It is based on the trust record of direct neighbors about the target node on the basis of their experiences with target node.

Based on the behaviour of the adversary node, some security attacks can be defined as follows [8][9]:

- *Black hole*: In Black hole attack, a node falsifies the route of network and attracts all the packets and routing information towards itself.

- *Selective forwarding*: This type of attack consists of a malicious node which behaves like a router and drops some packet and may deny to forward that packet or messages.

- *Bad Mouthing attack*: In this type of attack, the malicious node gives the wrong information about the neighbor node.

- *DoS attacks*: In Denial of Service (DoS) attack the malicious node injects bad information to mislead the network. Here, the bad node provides the wrong reputation and feedback about other nodes.

- *Sybil attack:* Here the malicious node has many Ids and behaves as like many nodes.

- *Collusion attack:* In this type of attack more than one malicious node give false information and feedback about good node.

The rest of the paper is organised as follows: Section 2 gives the literature survey about previously proposed trust models in WSN. Our proposed scheme has explained in section 3. Section 4 explained the simulation of proposed model and conclusion is presented in Section 5.

II RELATED WORK

The research into building trusts either direct or indirect is based on eigen values, entropy, packets delivery, recommendation, and may other parameters [9].

Ganeriwal *et al.* [10] proposed a trust model based on reputation for high integrity sensor networks. This model includes five parts: direct trust based on reputation, indirect trust evaluation, synthesis of reputation, conversion and behaviour of node trust. In their model, they had used Beta distribution and Bayesian formula to update and calculate the trust.

Gheorghe *et al.* [11] proposed an intrusion detection approach based on adaptive trust management protocol. This protocol includes three phases: Learning phase, exchanging phase and Updating phase. In Learning phase, experiences are developed. In exchanging phase, the nodes have shared their experiences with each other. In update phase, reputation has been updated based on experiences.

Jiang *et al.* proposed an Efficient Distributed Trust model (EDTM) [12] for WSNs. EDTM uses number of packets for trust calculation. The direct trust and recommendation-based trust is calculated using number of packets transferred between nodes. This is the efficient mechanism to calculate the trust in distributive environment of WSN.

In some models [13-15], the number of packets transferred between nodes has been used to calculate the trust. This method establishes secure route between source node to sink node. It helps to find the secure neighbor node. In this method, the recent transmission of packets has more weight than older transmissions.

Li *et al.* [16] proposed Lightweight Dependable Trust System (LDTS) for WSNs. They had applied this approach in hierarchical sensor networks. This method establishes the trust relationship between Cluster head node and Normal sensor node, Cluster head to another Cluster head and Cluster head to Sink node. This method uses simple mathematical calculation to make this model lightweight.

Tan *et al.* [17] has proposed Iterative and Dynamic Trust model (IDTrust) based on three layered distributed trust communication architecture. In this iterative model, a global trust has been presented with the help of direct and indirect trust. This iterative and dynamic trust model improves the efficiency of the P2P networks. Hongjun et al. [18] [20] proposed a trust model based on entropy. Here the trust is shown as an entropy. When a node performs some action, then entropy is changed. This entropy has been mathematically modeled and the quantitative evaluation of the trust is done in WSN.

III PROPOSED MODEL

There are two types of node in WSN: source node and target node. The main focus of this paper is to develop a secure model which should also be energy efficient and robust. This paper uses direct trust, recommendation-based trust, time lapses function and threshold to mitigate the malicious nodes and thereby securing the WSN.

The trust is combination of direct trust and recommendation-based trust (indirect trust). In this model, following assumptions are made.

- The recent conversation has more weight than past conversation.
- The value of weight is negligible if the conversation is too old.
- Direct trust has more weight than recommendation-based trust.

The curve of forgetting is discovered by Hermann Ebbinghaus. The decay function has features that the aging will decline at some extent. The forgetting function reflects the timeliness and evaluation. At start, the timeliness lapses fast but after a period of time, it will slow.

A Direct Trust

The direct trust is the trust from source node to target node based on its previous communication experiences. The satisfaction 'S' is a comprehensive evaluation about the target node which is based on energy, robustness, delivery speed, reliability etc. We divided the satisfaction at five levels as follows [19]:

TABLE I. SATISFACTION LEVEL

Trust value	Meaning
0	Distrust
0.25	Untrust
0.5	Low trust
0.75	Trust
1	High trust

The mapping function S(x) is

$$ST(x) = \begin{cases} a_1, & if\ x = High\ Trust, \quad a_1 = 1 \\ a_2, & if\ x = Trust, \quad 0.75 \le a_2 < a_1 \\ a_3, & if\ x = Low\ Trust, \quad 0.5 \le a_3 < 0.75 \\ a_4, & if\ x = Distrust, \quad 0.25 \le a_4 < 0.5 \\ a_5, & if\ x = Distrust, \quad 0 \le a_5 < 0.25 \end{cases}$$

Here we use time decay function to calculate trust about target node and it depends on time factor. The recent conversation has more effect in direct trust.

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Improvement in Spectral Efficiency Using Higher Order QAM

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Abstract- This paper represents improvement of the BER in the Binary coding, the Gray coding, Pulse shaping in raised cosine filter and Error correction using convolution codes operations, with implementation of higher order QAM on communication system. Improvement of BER represents the enhancement in the spectral efficiency because they are proportionally related. Perhaps based on error is also increasing as order of QAM is enhancing but with the compensation of these errors, higher order QAM can be implemented for the purpose of improvement of spectral efficiency.

Keywords: QAM, BER, Spectral efficiency

I INTRODUCTION

CSMAC (The commerce spectrum management advisory committee) states, "Unfortunately, it is not possible to establish a uniform metric for spectrum efficiency usage that encompasses the wide range of services and uses for which spectrum is needed" [1]. FCC TAC (Federal communication commission Technological advisory council) had uses six categories for application of different efficiency metrics and these categories are (2) Satellite broadcast systems, (3) point to point satellite systems, (3) terrestrial broadcast systems, (5) terrestrial personal communication systems, (6) terrestrial point to point systems and (7) terrestrial hybrid system [1].

From few years, traffic on optical network are increasing due to high demand of telecommunication services i.e. video on demand, full high definition-video transmission, cloud and grid computing etc. To achieve higher data rate (up to100 Gbps), designing of multichannel transmitter, digital coherent receivers, advanced modulation formats from 16 QAM to 1024 QAM and hybrid modulations, are required. Due to optical signal to noise ratio (OSNR), higher order modulations do not allow long reach transmission [4]. Development of various modulation techniques can provide high data rate, upgraded system capacity, more coverage, bandwidth flexible operations, improved spectral efficiency, short round trip time, small dormancy, cheap operation cost, multi antenna provision, smooth amalgamation with internet and existing generation of communication systems [2]. High data rates, better spectral efficiency and power reduction can be achieved with the help of ortogonality property in communication system [3]. This paper uses Qudrature amplitude modulation (QAM) because QAM have two orthogonal pulse amplitude modulation (PAM) so that spectral efficiency going to be almost double [3]. This paper is going to propose, method of improvement in spectral efficiency with improving bit error rate. One more thing can be noted, BER for a wire line communication is $Q\sqrt{SNR}$ and BER for wireless communication is approximately equal to $\frac{1}{2SNR}$, where $Q(x) = \frac{1}{\sqrt{2\pi}}\int_x^\infty e^{-\frac{x^2}{2}}dx$ and SNR is Signal to Noise ratio

These mathematical relations are showing that BER for wire line is less than wireless communication because of fading [2].

II. IMPROVEMENT TECHNIQUES IN BIT ERROR RATE

Noise, interference, distortion and bit synchronization errors can alter the data stream used in digital communication channel. Number of altered bit in communication channel due to the noise, interference, distortion and bit synchronization errors, is known as bit error. Rate of this bit error is bit error rate (BER), represent in percentage.

BER of M-QAM (Rectangular QAM) can be calculated by

$$BER = 1 - (1 - P_e)^2 \quad (1)$$

Where

$$P_e = \frac{4}{k}\left(1 - \frac{1}{\sqrt{M}}\right)Q\left(\sqrt{\frac{3k}{M-1}\frac{E_b}{N_0}}\right) \quad (2)$$

$$k = \log_2 M \quad (3)$$

As order of QAM increases bandwidth and power efficiency also improves (TABLE I).

TABLE I. Bandwidth and Energy per bit to noise power spectral density ratio for M-QAM.

M	4	16	64	256	1024	4096
B_T	1	2	3	4	5	6
E_b/N_0 for BER=10^{-6}	10.5	15	18.5	24	28	33.5

IFFT is useful for improvement in BER performance. OFDM has high peak to average power ratio (PAPER). This is the disadvantage of OFDM technique, for high data rate. If input data of IFFT block is coded in the way that output results in lesser peaks. PAPER will reduce small but BER performance will improve [5]. BER performance can be improved for the band edge subcarriers of LTE system. For

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Reduction of ISI by Beamforming Transmission in IEEE802.11ac

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Abstract: Device to Device (D2D) communication is very demanding technology for today's communication system due to heavy traffic of data and voice. So there must be improvement in spectral efficiency and system capacity. Higher order modulation technique in wireless communication system can increase the system capacity but the major problem is Inter Symbol Interference (ISI). This paper is going to reduce effect of ISI by transmission of beamforming in IEEE802.11ac. Result will show improved SNR while beamformed transmission is performed instead of spatial expansion transmission. There is increment in the received power so this technique also provides more reliable demodulation for higher order modulation and coding schemes, used for the transmission.

Keywords: IEEE802.11ac, Beamforming transmission, spatial expansion transmission, ISI, Qudrature amplitude modulation (QAM)

I INTRODUCTION

Multiple Input Multiple Output (MIMO) and higher order modulation techniques can increase the capacity of wireless communication system. MIMO system with Beamforming can send frame to spatially diverse location by using first standardized version of 802.11. Enterprise access point has to use more memory, power and antennas so beamforming in the downlink direction from the access point (AP) to the client is a mature area for uniqueness in the 802.11 ac standard.

IEEE802.11ac provides high throughput wireless local area network (WLAN) on the 5GHz band [4] [5]. Very high throughput WALN IEEE 802.11ac uses MIMO-OFDM technology and provides up to 69 Gbps speed [10]. MIMO decoder is very significant and necessary part of the WLAN 802.11ac. MIMO decoder may be linear or non-linear. Zero forcing (ZF) technique and Minimum mean square error (MMSE) methods are linear. These methods are simple but have low performance. Maximum likelihood detection (MLD) technique is non-linear. This technique measures probability of the received signal at all symbol. WLAN 802.11 also uses K-Best technique along with Trellis and Sphere detection methods for optimum performance. Beamforming transmission can improve IEEE802.11ac link performance while channel state information is available at the transmitter. Transmitter and receiver are known as beamformer and beamformee respectively for IEEE802.11ac link. Beamforming transmission in the IEEE802.11ac can reduce ISI which is generated by higher order modulation technique.

As order of QAM is increased, the spectral efficiency (SE) also improves in various fading conditions but based on error also improves due to ISI [11] [12] [13]. Beamforming transmission can overcome the problem of ISI. This paper works for 64 QAM (Qudrature Amplitude Modulation) on transmission with spatial expansion and transmission with beamforming.

II. TRANSMISSION WITH SPATIAL EXPANSSION AND BEAMFORMING

IEEE802.ac is 5GHz based very high throughput WLAN. It provides better performance along with high transmission rate, due to accurate channel estimation. Channel State Information (CSI) is very essential part of the IEEE802.11ac WLAN. CSI can be obtained by training sequences. This paper is going to present the transmission with spatial expansion and beamforming transmission in IEEE802.11ac WLAN. Both of them use 64-QAM for modulation and demodulation.

A. Basic Working Model

Wi-Fi frame has a physical layer header followed by a payload but a null data packet (NDP) frame includes preamble instead of payload. NDP frame may be used in wireless network to convey information between access point (AP) and wireless station. So beamformer of this model uses NDP to create sounding in channel towards beamformee and this generated sounding is necessary to obtain CSI [1]. Note that CSI is useful to create feedback matrix on beamformee side. This matrix is feedback to the beamformer in a compressed format and it is useful for preparing the steering matrix. The process is shown in figure 1.

MIMO technology is the key technology for the IEEE802.11ac broadband wireless LAN standard. Basics of beamforming transmission can be understood with the help of block diagram shown in fig. 1 where beamformer sends the energy to beamformee by using steering matrix. Steering matrix is a mathematical description of, how antenna array uses each and individual elements to select a spatial path for the transmission. Next is measurement of channel state information which is again useful for

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Comparative Performance of the Various Control Techniques to Mitigate the Power Quality Events Using UPQC

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I Introduction

The power qualities [1] in AC distribution system are voltage flickering, voltage fluctuation, unbalanced voltage, voltage sag/swell, current harmonics, and reactive power, and when PQ comprise with harmonics is called multiple power quality (MPQ) [2]. The PQ and MPQ are the common existing problems in AC distribution network. This problem ascended because of highly necessitated electronics based device, like computer, mobile, laptop, power electronics oven, washing machine, etc. Electronics or power electronics devices generate pollution in the AC distribution network. The multiple mitigation devices are available to enhance PQ and MPQ. Rather the passive elements like capacitor and inductor are grouped to mitigate the PQ and MPQ, as the passive elements have limitation. Therefore, active filters are ready to enhance the PQ of AC networks. The most popular active power filter is unified power quality conditioners (UPQC) which is the combination of dynamic voltage restorer (DVR) and the D-STATCOM. It enhances unified power quality condition of the AC distribution network, so it is named as UPQC. The DVR is series part of the UPQC, whereas D-STATCOM is shunt part of the UPQC. The DVR is used to enhance the voltage profile of AC distribution network and D-STATCOM enhances the current profile of the network. The DVR, D_STATCOM, and UPQC are insulated gate bipolar transistor (IGBT)-based converter, which requires gate drive circuit for proper operation of the converter-based active filters like DVR, D-STATCOM, and UPQC. The UPQC is universal choice to enhance the PQ and MPQ in low-level three-phase AC voltage circuit or three-phase four-wire circuits. The UPQC is categorized on the basis of sharing of active and reactive power through series converter/DVR of the UPQC. The active and reactive power sharing depends on the angle of voltage injection with the utility (AC mains) current. If the voltage injection is in series with utility currents, to improve the voltage profile [3], it means UPQC shares active power as it is

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SVM Tuned NARX Method for Wind speed & power Prediction in Electricity Generation

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***Abstract*—Due to continuous depleting of conventional energy reserves as well as global warming issues has diverted world attention towards non conventional energy sources. Out of different non conventional energy sources wind can be consider the cleanest source with minimum possible pollution or harmful emissions and has the potential to decrease the relying on conventional energy sources .Wind energy can play a major role to meet our energy demands, however, it faces various problems such as intermittent nature, instability in frequency. To reduce such issues the idea of futuristic wind speed trends and weather conditions are required. This paper suggests a method for wind speed, power forecasting using NARX and Support Vector Machine (SVM). This hybrid technique can select most suitable data segment from available data. These data segments are used for the training and validation of SVM model. The historical data used is from Kolkata region wind energy farm.**

***Keywords*—Wind power forecasting, Artificial Neural Network, NARX, SVM, Size optimization, Mean Absolute Percentage Error.**

I. Introduction

The people of world today faces two, significant problem, first to enhance energy generation to meet the required demand and secondly to minimize the global warming effect due to energy generation and utilization by conventional sources. To reduce these significant problems we have to increase the contribution of non conventional energy sources in electricity generation such as wind power. As wind is highly unpredictable and its reliability for energy generation is not up to mark [1], [2]. So, forecasting of wind speed with minimum possible error will help in the improvement of reliable power generation, risk minimization and highly economical operation. Wind power generation is proportional to the cube of wind speed so any error in speed prediction will lead error in power generation. For reliable power generation accurate wind speed prediction is essential. For accuracy point of view the estimation of future value of wind speed with certainty is very difficult [3]. Currently various techniques are used for the prediction of wind speed and power such as Physical method, Numerical weather Prediction, artificial intelligence method, ARMA model, Persistence method, Statistical method, hybrid approach etc. Physical method is generally good for long term forecasting which involved physical based equations for the conversion of data from certain period of time to forecasted value [4]. Statistical method is pattern based technique and more effective for short term forecasting as it involve curve fitting for prediction [5]. Artificial intelligence (AI) method is also used for wind speed forecasting, the beauty of AI technique is that future time series data can be predicted without knowledge of any prior defined mathematical model. With the occurrence similar patterns probability of error can be minimized and simultaneously and accuracy significantly decreases with increase in time horizon [6]. In Numerical weather prediction (NWP) model, parameters selections are very crucial steps. and involve geographical area, special resolution, temporal resolution, time horizon and accuracy of computational time [7]. This work mainly suggests the implementation of SVM and NARX for prediction of speed & power of wind available from historical wind data of Indian wind energy farms.

II. Artificial Neural Network Approach

In early days artificial neural network (ANN) was mainly used for the conventional load and price forecasting in power market. Now days it is widely used in wind power forecasting. Due to non linear nature of wind speed many researchers used ANN for wind speed and power forecasting as ANN is a great tool and easily understands the complication and non-linear bonding between the data without any prior assumption [8]. Its structure is composed basic element in parallel and work on the basis of biological nervous systems. To perform a particular function ANN can be trained by changing weights of its different connections. After receiving the input neuron it gives the output through the activation function compared from its output and depending on conditions weights are modified to meet the best output. Artificial neural networks can extract the dependency of the variable in training process by showing a non linear complex relationship [9]. For non linear function approximation, time series based estimation of climate variables in separate time horizon ANN gives better result as compare to traditional methods [10]-[11].

For wind speed and power prediction Artificial Neural Network is a considerably accurate technique. Feed forward and error back-propagation algorithm based model used by Lapedes for the wind speed prediction gives the satisfactory result [12]. On the other hand Song also proposed an ANN based model to estimate one-step ahead wind speed and power prediction and it provide good result as compare to Lapedes when wind data variation rate is very low [13]. Figure 1 and figure 2 shows the Feed forward- back propagation (FFBP) and Radial basis neural network structure.

Basic elements for the activation pattern or input vector can be supply by input layer source nodes that involve the input signal for the hidden layer neurons and output of hidden layer will work as input to output layer of the network.

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Effects of Welding Parameters in Friction Stir Welding of Stainless Steel and Aluminum

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Abstract Joining of dissimilar materials (DMs) is the growing demand of various industries to attain distinct features of individual material. In this regard, friction stir welding (FSW) has emerged as a unique joining method to weld DMs among various joining techniques. FSW is a solid-state welding process used to join similar and dissimilar materials (DMs). In this study, DMs AA7475-T761 aluminum alloy (AA) and AISI 304 stainless steel (SS) are joined using FSW. These DMs are widely lap welded in industries such as space shuttles and aerospace. Friction stir welded (FSWed) half-lap joints are obtained and analyzed under three different tool rotation speeds: 450, 560, and 710 rpm. The joint quality is analyzed by tensile strength and microstructure. The improper heat generation at different tool rotation speeds affected joint quality considerably. The defects such as tunneling and void were observed which resulted in poor efficiency of joints. The joint efficiency was obtained maximum 62.83% of the base material (BM) AA 7475 at rotational speed 560 rpm with 6.89% elongation.

Keywords Friction stir welding · AA7475 · AISI 304 · Microstructure · Tensile strength

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1 Introduction

Recently, the manufacturing industries are using DMs to produce the products of lightweight with high strength and high corrosion resistance, etc. Moreover, another criterion is to derive the best combination of mechanical properties of DMs to improvise the functioning of product with cost reduction. In this context, several industries have adopted DMs for manufacturing of the large number of products for the sectors such as aerospace, automotive, and shipbuilding [1, 2]. AA is a low-temperature material (LTM) and finds a wide application in aerospace, railcars, automobile, and shipbuilding sectors, etc., being enriched with features such as low absorbing energy, anti-corrosive, good forming, and high strength-to-weight ratio [3]. SS is a high-temperature material (HTM) and finds extensive applications in outer panels, engine parts, fuel tanks, and exhaust parts of various industries [4]. The extensive applications and several features of both AA and SS put emphasis to join these DMs using an appropriate technology. A new green technology, friction stir welding (FSW), was invented by "The Welding Institute" (TWI), UK in 1991 [5]. FSW was initially employed on LTM, but its inherited features have developed and matured this process to weld HTM as well as DMs [6, 7]. FSW is a solid-state welding process, due to which it overcomes the various quality issues associated with fusion welding processes such as occurrence of solidification cracks, distortion, porosity, and significant change in microstructure. To perform the FSW, both BMs are firmly clamped in a competent fixture. A non-consumable tool (with rotary motion) with the suitable profile is plunged into the faying surfaces of the fixed plates. The frictional force generated between tool shoulder and plates produces the significant amount of heat causing softening of materials. Tool pin stirs this soften materials for mixing of DMs [8]. During traversing of the tool, tool pin executes severe plastic deformation between the faying surfaces (along the joint line) to produce good quality of weld in solid-state condition as shown in Fig. 1 [9].

Limited literatures are observed on the joining of DMs using FSW. Inertia friction welding on 6061-T6 AA and AISI 1018 steel was conducted by Taban et al. [10] for different welding parameters. They obtained tensile strength in the range

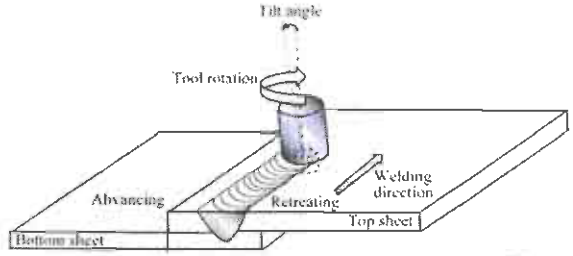

Fig. 1 Schematic diagram of friction stir welding

Optimization of FSW Process Parameters During Joining of Al to Cu Using Taguchi-Based GA

Nidhi Sharma, Pankul Goel, M. A. Wahid, Zahid. A. Khan and Arshad Noor Siddiquee

Abstract Friction stir welding (FSW) is a new and effective solid-state joining process and getting evolved to join the dissimilar materials such as aluminum (Al) and copper (Cu). FSW tool design, geometry, and FSW process parameters possess a considerable impact on the material movement and stirring during joining and govern the microstructure and mechanical properties of the joints. In the present study, the effect of the combination of different process parameters, i.e., shoulder diameter (*A*), welding speed (*B*), and rotational speed (*C*) on the ultimate tensile strength (UTS) during joining of Al-6101, and pure copper has been studied. The joining is performed using the cylindrical tool pin, and the Taguchi's L_9 standard orthogonal array for three process parameters each at three levels are chosen to perform the experimentation. The optimal combination of the FSW parameters yielding maximum UTS is determined using the ANOM (Analysis of Mean), and the significance of each parameter on the UTS is ascertained through ANOVA (Analysis of Variance) It is observed that the UTS of the FSWed joints varied significantly within the selected process parameter range. Further, the observed results were verified by applying genetic algorithm (GA) using the MATLAB software.

Keywords Aluminum · Copper · Friction stir welding · Genetic algorithm · Optimization · Taguchi

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1 Introduction

Friction stir welding (FSW) process is able to effectively join various similar and dissimilar materials in the solid state [1–3]. However, dissimilar joining is a very difficult and challenging task owing to the vast difference in the properties of the materials required to be joined. Conventionally, the fusion welding processes are used to join the nonferrous similar or dissimilar materials. During FSW, the materials required to join has to sustain the melting and solidification phenomenon at the joint location; therefore, the joint properties differ considerably from the base materials. Also the fusion welding process creates a large number of welding defects such as porosity, cavity, slag inclusion, etc. [3]. The formation of intermetallic compounds (IMCs) is also higher during joining of dissimilar materials using fusion welding process due to higher affinity of the materials at higher temperatures [4, 5]. FSW occurs in solid state and joining occurs without the base material's melting; therefore, the joints are usually free from the various defects which occur in fusion welding [6]. FSW is also a green process due to the absence of harmful radiation and gases. FSW has been effectively used by many researchers to dissimilar joining of materials such as Al to Cu and observed the elimination of the inherent limitations of fusion joining processes [7–10]. The main element required to join the materials using FSW is the FSW tool, which is divided into two segments, shoulder and pin. Tool shoulder and pin usually consist of different profiles, shapes, and sizes, and their selection is on the basis of base materials properties required to join the materials. To perform the FSW, a rotating and traversing FSW is first FSW plunged inside the butting surfaces and further allowed to traverse along the weld direction. The movement of the FSW tool inside the butting surface creates a large frictional heat, sufficient enough to join the materials in solid state [1, 11]. The materials movement and stirring also occur by the rotating action of the pin and forms the mixed material zone and welding occurs without the use of any additional filler material. This technique has been successfully used by many researchers to join Al alloys and copper. Copper is a highly conductive material; therefore, it is widely used material as the conducting element in the electrical industries. The conducting component made by using copper is generally heavier and costly due to the higher density and cost of the copper. Some Al grades are reasonably conductive and cheaper which may be used partial replace the copper so the lighter, economical, and competitive conducting element can be formed [12, 13]. The available literature on FSW of Al to Cu suggests that the FSW joint quality depends upon the various FSW process parameters, i.e., rotational speed, travel speed, pin offset, shoulder diameter, tilt angle, base plates positioning and placement [14, 15]. The literature pertaining to the FSW of the electrical grade Al with Cu is not sufficiently available [16, 17]. Keeping this in view, the present study is aimed to successfully join electrical grade Al-6101 with pure Cu using FSW and to explore the influence of different FSW process parameters on UTS of the fabricated joints. FSW is performed using three FSW process parameters each at three levels using a cylindrical tool pin profile. The experimentation is performed according to Taguchi's L_9 orthogonal array, and the data for UTS and μH of the fabricated

Temperature and Traverse Force Analysis During Underwater Friction Stir Welding

Mohd Atif Wahid, Nidhi Sharma, Pankul Goel, Zahid A. Khan and Arshad N. Siddiquee

Abstract Friction stir welding (FSW) is an auspicious clean welding method to join marine grade aluminum alloys (AAs). Underwater Friction Stir Welding (UFSW), can extend the marine application of the FSW due to its superior mechanical properties over its contemporary FSW. In FSW/UFSW the weld thermal cycles and tool forces exhibit a noteworthy effect on the weld properties. Force and temperature measurement during UFSW process play a pivotal role in understanding the process, prediction of tool life, microstructure and mechanical properties of the welded joints. As such an attempt has been made in this study to investigate the effect of welding speed (50–80 mm/min) on temperature distribution and traverse force during UFSW of AA 6082-T6. The results revealed that increase in welding speed caused high traverse force and low peak temperature. Furthermore, the increase in temperature was observed as the tool approaches the thermocouple near the weld center. After that, the temperature reduces due to a decrease in the thermal gradient. The maximum peak temperature of 137 °C was observed at the retreating side (RS) in heat affected zone (HAZ) at a low welding speed of 50 mm/min due to high heat input and slow cooling rate. Additionally, the maximum traverse force of 103 kgf was attained at a high welding speed of 80 mm/min due to high material flow stresses resulting from high strain rate and low temperature.

Keywords Friction stir welding (FSW) · Underwater friction stir welding (UFSW) · Temperature · Traverse force · Welding speed

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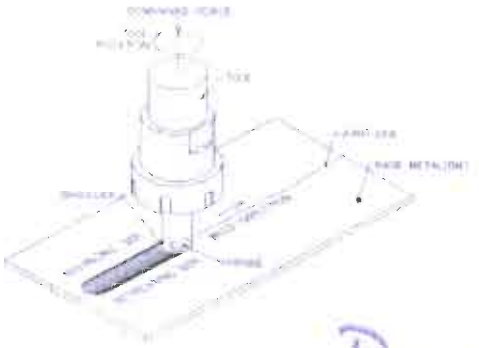
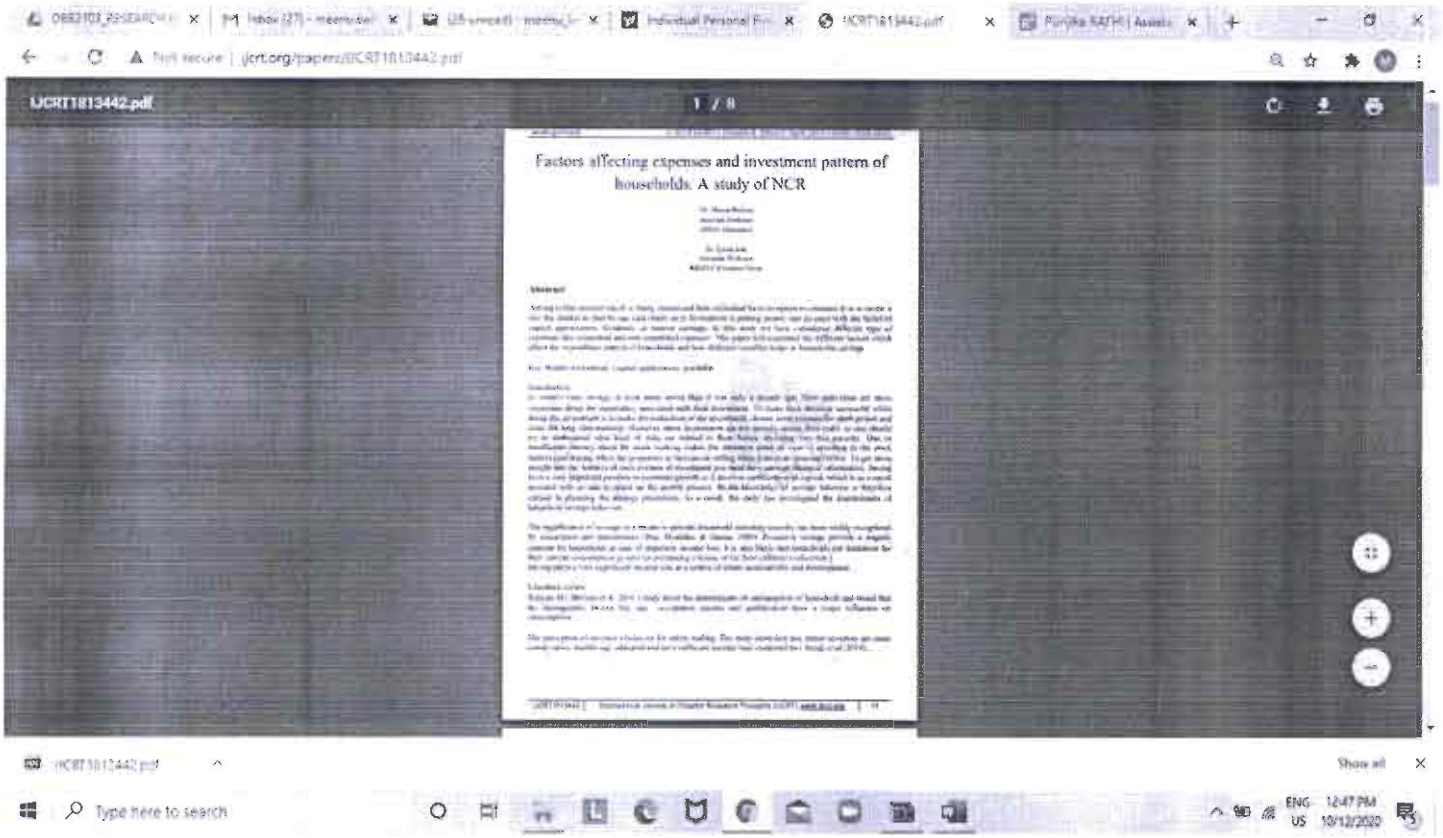
1 Introduction

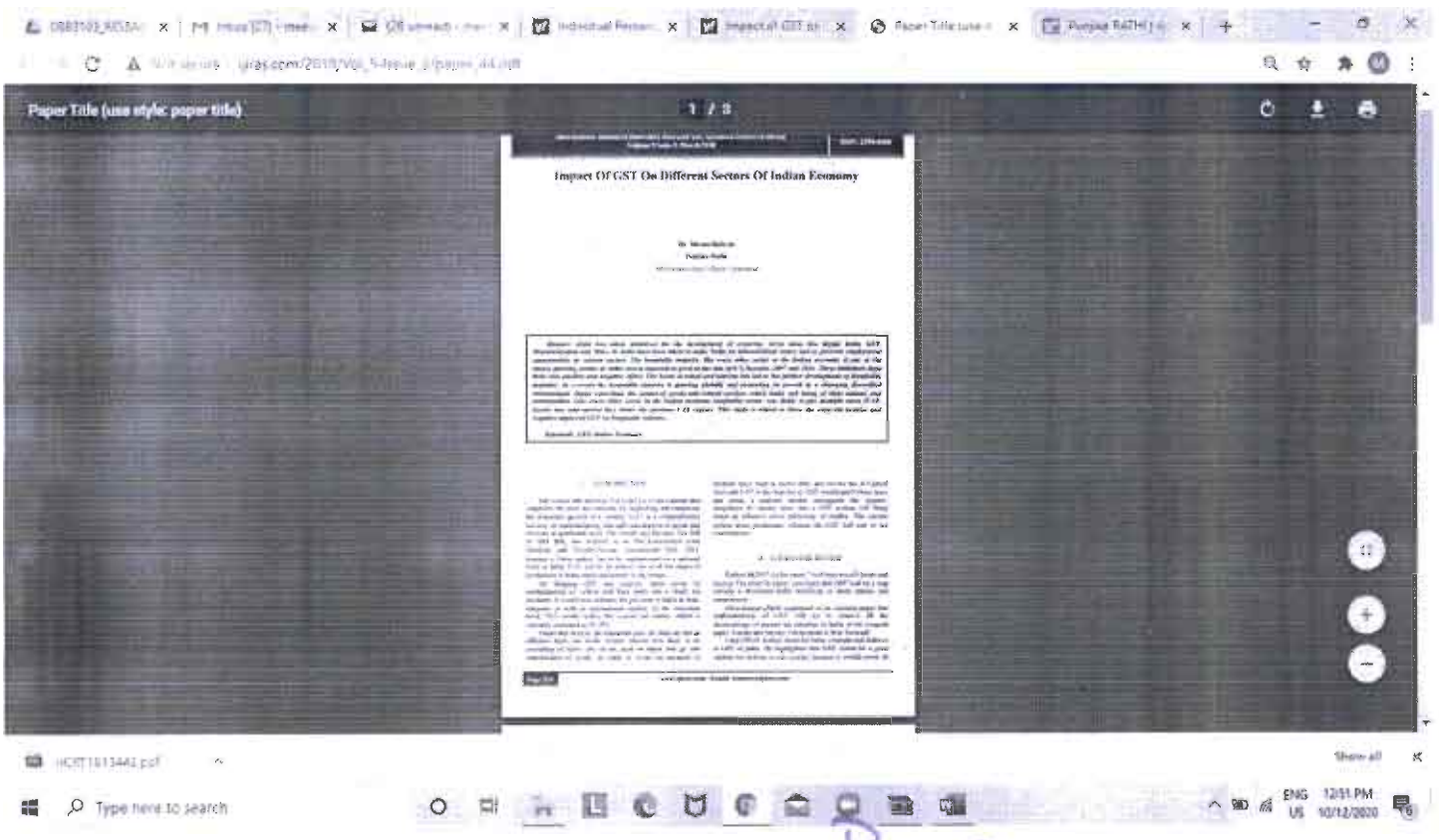
A number of welding techniques have been developed in the past few years; still, welding of AAs seems to be challenging due to its high thermal conductivity and relatively low melting temperature [1, 2]. A recent joining technique, FSW has extended the application of AAs in different sectors, i.e., aerospace, automobile, and marine. FSW is a non-fusion joining technique developed by The Welding Institute (TWI) in 1991 [3]. This process does not cause melting of the material. Thus, undesirable fusion welding (FW) defects like solidification cracking, hydrogen embrittlement, etc. occurring due to the microstructural changes do not exist in FSW resulting in improved mechanical properties as compared to FW. In FSW, a specifically profiled tool with a shoulder and pin are inserted into the abutting faces of the base material (BM) and navigated along the joint line. The frictional heat generated amid the tool and the BM causes material softening leading to plastic deformation. Also, the material is transported from one side of the pin to the other side due to rotational and traverse movement of the tool. Intrinsically due to frictional heating and plastic deformation solid-state joining takes place [4–6] as shown in Fig. 1.

The FSW process is affected to a great extent by the heat generation and flow. Although the heat produced in FSW is less in comparison to FW, still it is sufficient enough to reduce the mechanical efficiency of the joints due to the dissolution and coarsening of the precipitates in heat treatable AAs. FSW regions most affected by this phenomenon are the HAZ and thermo–mechanically affected zone (TMAZ). So, the control of thermal cycles during FSW becomes necessary and this high heat generated can be overcome using different coolant, for instance, water, liquid nitrogen, etc. [7, 8]. In UFSW, water as a coolant is used to stabilize the temperature existing in the joints (see Fig. 2). Due to excellent absorption and transmission characteristic of water the heat is transferred readily from the HAZ and TMAZ

Fig. 1 Schematic representation of FSW







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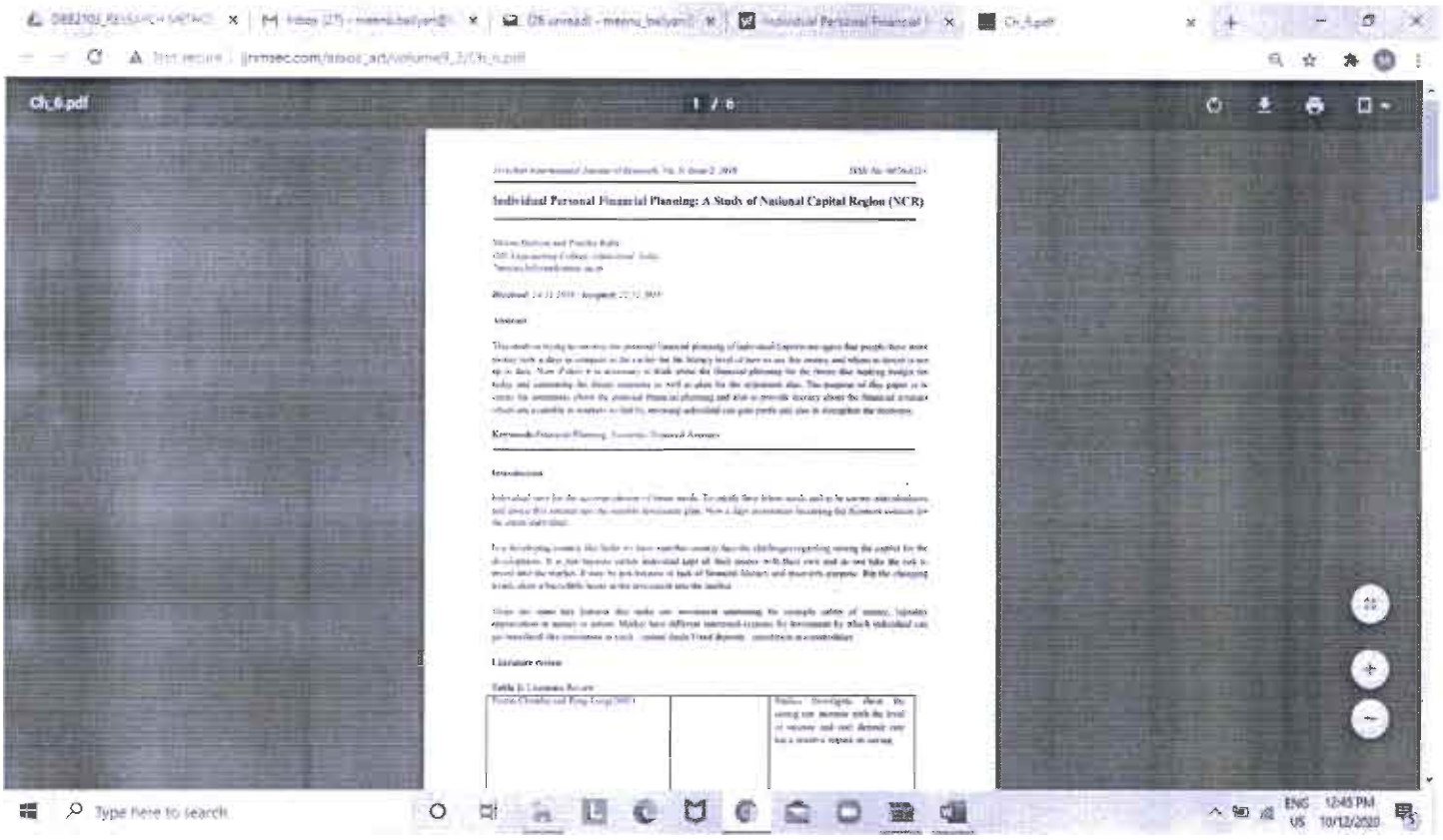

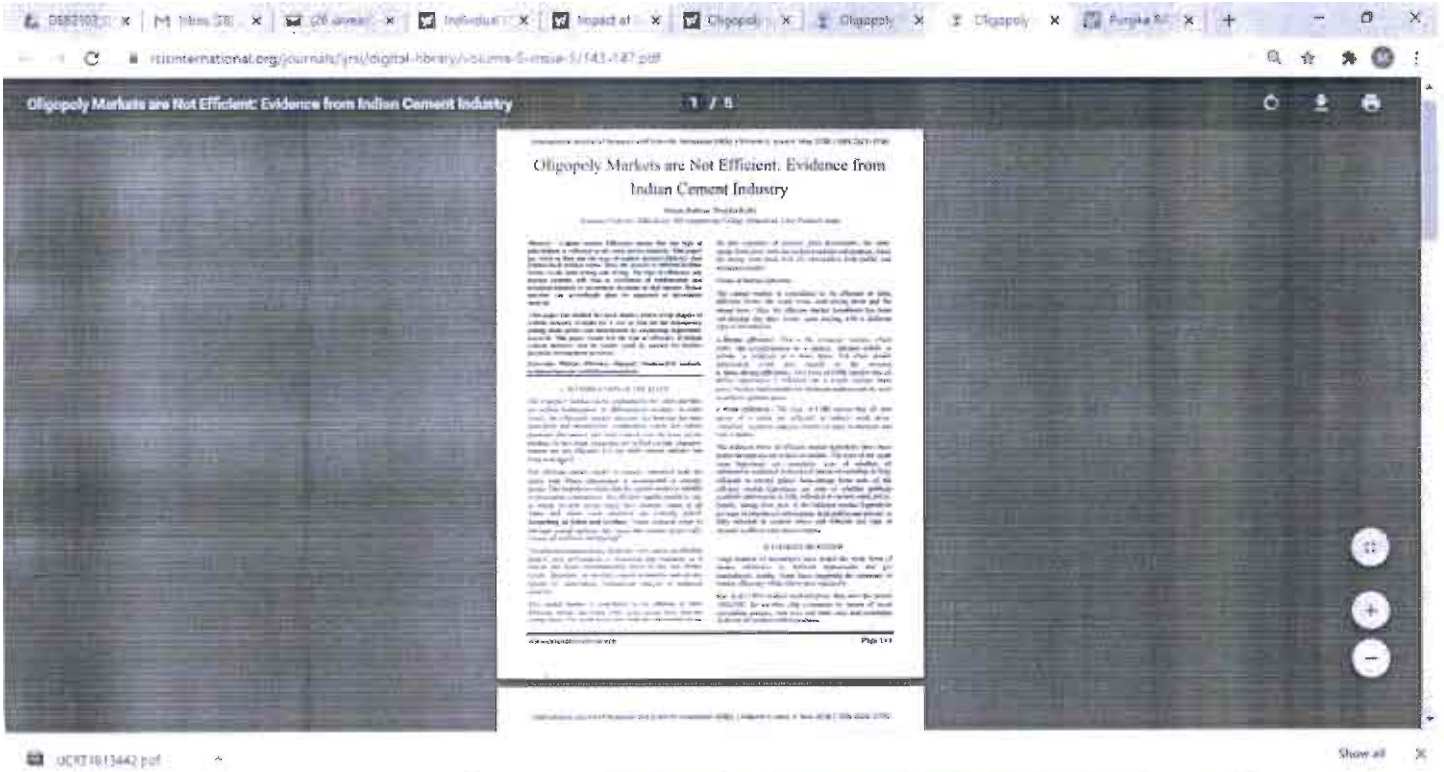

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Promotion Through Facebook: Impact of Features on Consumer Engagement

Ashish Awasthi
Assistant Professor
IMS Engineering College Ghaziabad

ABSTRACT

Impact of social media in society has been ever increasing. Facebook was one of the earliest platforms developed for the purpose of online social interactions. It replaced 'Orkut' developed by Google. In its nascent stage, social media was limited to searching old friends and interacting with them. With the passage of time, marketers came to understand the power of social media in marketing of products and services. Digital marketing as a discipline of study and practice also grew almost simultaneously.

The current paper talks promotion through Facebook, which is one of the most popular social media platforms in the modern world. Facebook is being increasingly used for marketing and promotion of products and services and a major share of Facebook's revenue is generated through this activity. Today, every small, medium or large company owns a Facebook page or is interested in starting with it as soon as possible, the reason being – cost effectiveness, wider reach, ease of managementetc.

In spite of all the above facts, engaging potential consumers on a Facebook page is not easy. Although the features available to all the marketers are common, the difference lies in how the features are used so that maximum attention from viewers is obtained. The current paper discusses about the approaches of marketers towards the available features and its impact on the level of consumer engagement on Facebook, it talks about how marketers use these features to engage consumers and the effectiveness of their methods.

The study has been done through a survey of Facebook users (potential, current customers). Survey instrument used is questionnaire which was circulated among 200 consumers and around 150 complete responses were received.

1. Introduction

Engaging consumers and extracting more out of them has been the aim of marketers ever since. Every marketer dreams about setting up an army of loyal consumers whom he can bank upon. It is very well known that a satisfied consumer is the biggest advertisement for the company. In traditional marketing era, consumer engagement was done using various methods such as:

- Discounts
- Giving outfreebies

Current Development and Future Prospects of Aptamer Based Protein Targeting

Aptamers pp 123-131 | Cite as

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- Hoime Banerjee (1)

1. Dr. A.P.J. Abdul Kalam Technical University, , Lucknow, India

Chapter
First Online: 12 November 2019

Abstract

Certain form of aptamers have ability to bind proteins including surface proteins. These aptamers are capable of binding active region of the proteins, helping treatment of many diseases. Their stability and high binding affinity equivalent to the antibodies makes them a strong candidate for the protein targeting for the purpose of diagnosis, new drug discovery and therapy. They can be used for targeting of protein of wide range of organism like viruses, bacteria or cells from any other organism. Protein targeting by aptamers also have potential in proteomics where studies of large number of proteins becomes an absolute necessity. With the increase in understanding of aptamers and protein interaction new therapeutic strategies will evolve and benefit the mankind.

Keywords

Protein targeting Therapy Diagnostics SELEX DNA aptamers RNA aptamers

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Encyclopedia of Animal Cognition and Behavior

Living Edition
| Editors: Jennifer Vonk, Todd Shackelford

Biomass

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Synonyms

Biological material derived from living or recently living organisms

Total mass of living matter

Definition

Biomass is the renewable organic material obtained from agricultural product, animal, and municipal wastes and can be used as a source of fuel or energy.

Biomass is an organic matter produced directly or indirectly by living organisms and probably the largest energy source after the sun. The biomass in plant matter is produced by the process of photosynthesis in which carbon dioxide and water from the environment are converted into carbohydrates (sugars, starches, cellulose and lignin) by using energy from sunlight. Lignocellulosic biomass have been recognized as a potential sustainable source of mixed sugars for fermentation to biofuels and other biological products of industrial importance. Several technologies have been developed during the past that allow this conversion process to occur, and the clear objective now is to make this process cost-competitive in...

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Detection of Gas Leakage and Automatic Alert System using Arduino

Juhi Chaudhary[1] and Anurag Mishra[2]

Abstract—LPG is a significant and effective fuel, for the most part utilized as a part of private spots for cooking. LPG for the most part filled in cylinder which is solid and can't be harmed effortlessly. In any case, breaks may happen from gas cylinder, controller and gas pipe tube when these are definitely not in a decent condition and may cause a mishap. Mischances may prompt medical problems like suffocation and potentially cause an impact on the start of any fire or electric supply. One of the important preventive methods to stop mischance related with the gas spillage is to introduce gas leakage detector at vulnerable places. The main focus of this paper is to present such an outline that can consequently identify and remove gas spillage in defenseless premises. The gas spill sensor is such a gadget which distinguishes the gas spills at beginning levels and cautions the individuals of the same. This paper fundamentally manages the advancement of a straightforward gas spill locator at the underlying stage and after that changing this basic gadget into a most progressive gas identifier framework later on. Gas sensors have been specifically utilized which has high affectability for propane (C_3H_8) and butane (C_4H_{10}). Gas leakage system consists of GSM (Worldwide System for versatile communication) module, which sends SMS as soon as gas leakage is detected.

Keywords: *Arduino Uno, MQ-6 Gas Sensor, LCD, LPG, Stepper Motor Driver, Buzzer, GSM modem*

I. Introduction

There are generally over 80% LPG customers in the country in which generally 35% of the gas related accidents occur because of gas leakage. So the real concern is spillage of LPG. Various guidelines are also executed for the gas spillage identification system. The current model gives an alert framework which is basically required to distinguish a Gas leakage in the house and commercial premises.

Pro portional message is passed on by the methods for a LCD screen and a signal and with the assistance of the GSM module it is skilled to communicate messages to the partners about the LPG spill and quickly kill fundamental supply of LPG. With the utilization of MQ Sensor we can likewise recognize liquor, which is an extra component.

The Gas Leak identifier gadget can discover application at private homes as well as it is relevant to inns, eateries and even in businesses where LPG gas is utilized for a few or alternate purposes.

II. Methodology Used

A. GSM Module

Global System for Mobile/ GPRS (General Packet Radio Service) TTL modems SIM900A (general) quad–band GSM/ GPRS device, works on frequencies which is used to communicate over the mobile network. It is very compact in size and can be easily to use as plug in GSM Modem.

The Modem is designed with 3V3 and 5V DC TTL interfacing circuitry and can operate in the range of 5.2V–12V. This allows the users to directly interface with 5V microcontrollers (Arduino, 8051 microprocessors, etc.).

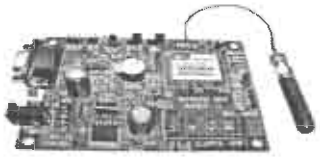

Figure 1: GSM module

The significant mischance identified with the utilization of LPG occurs because of the spillage of the gas which is hazardous. Gas holes can happen from the gas barrels which are utilized as a part of all the family unit of India. The other probability of gas spillage is from the gas pipeline as the old pipelines regularly get consumed and subsequently may burst, offering path to the leakage of the gas. On the off chance that LPG releases, the odds of flame perils are at its crest as LPG is a combustible gas. LPG Gas spills have been expanded from 0.72% of all kitchen accidents to 10.74% of all the kitchen mishaps.

A PC program to run online to distinguish the spillage areas has been begun and it works as the programmed administrator of the pipelines in remote regions. Basic Gas spill Detector is a straightforward gadget which is utilized to recognize the spillage of gas and if the gas spill happens.

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B. Arduino Uno R3

Arduino Uno R3 is used as a controller in this proposed system. Arduino is a well-equipped Open-Source Prototype Platform which is based on easy-to-use hardware and software.

It is very easy to program. Arduino boards are able to read inputs–light sensor, and can read any changes in physical environment with the help of suitable sensors, and activating another module (motor, publishing anything, any electrical part) online or offline.

The Arduino software is convenient for beginners because of its easy interface. It will disentangle the process of creating a control environment by providing the standard and flexible board. This can be programmed and connected to the system without any requirement of PCB design. This software is inexpensive, cross–platform, simple programming environment, Open source extensible software and extensible hardware. It is flexible enough for advanced users. It works on platforms like Mac, Windows and Linux any other type of operating system. It is principal tool to learn new things and base of automation.

Figure 2: Arduino uno board

C. Solenoidal Valve

Figure 3: Solenoidal valve

This is very safe equipment to control the flow of any hazardous gas or flammable oil and gas. It reduces the possibility of catching fire due to any spark which can occurs in old rotatory valve through any motor or any moveable part.

D. MQ–6 Sensors

MQ–6 Sensor is the fundamental part of this device. It senses the presence of the LPG gas any other flammable gases. Detection speed of this sensor is very fast. it has a very long life. It provides high sensitivity not only to LPG but also to isobutane and propane. It has sensitivity to alcohol and smoke. The basic height of the sensor is 23 ± 5% and it has a width of 20 ± 5% mm (as per given in the specification of sensor by the manufacturer. The detector can detect the gas concentrations anywhere from 200 p.m. to 10000 p.m. If a gas is observed then the sensor feeds the output as high and when no gas is discovered then it makes a low turnout. The basic working of the sensor can be keyed out as when the gas interacts with the detector, it gets ionized into its ingredients tin di oxide and it is occupied by the sensing component. This absorption changes the potential difference and a current thus flows through the connecting leads and this current is termed as heating current. The value of sensing gas is in analog single so resistance changes as the current flows through the filament of Tio oxide and produce the analogue signal.

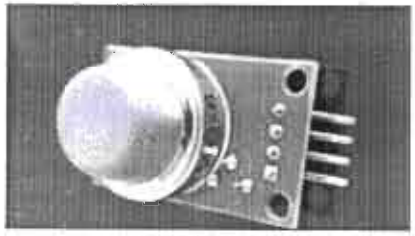

Figure 4: Arduino uno board

E. Future Scope

The present gas spillage recognition framework can be additionally improved. For modern purposes, versatile robot can be produced for recognizing numerous gas fixations. Expansion of load cell can likewise be utilized as weight sensor which identifies the measure of gas in the chamber and furthermore recognizes high weight gas in barrel pipe, showing the alarm messages by means of SMS and LCD Displays.

III. Result

This model has been tried by using a small measure of LPG gas close to the sensor. MQ–6 gas sensor distinguishes the LPG gas and thereafter a signal will be send to the Microcontroller. After that Microcontroller send an active signal to other remotely associated device. Therefore buzzer sounds and a message is shown on 16x2 LCD screen. At the same time gas supply is turned off

Hit or Flop Let's See: A Concise Survey

Anurag Mishra[1] and Abhay Kumar Agarwal[2]

Abstract—As human race, we are evolved as much as a continuous developing making easy going life. In between we have tendency to break a bit and get entertained. Movies are the best source of entertainment. Since the advent of motion pictures that are movies are not only for entertainment, but also employment for many. As of today around the world, this business that is not only mainstream but also profitable if movie does great at box office. But it's a matter of concern of every movie maker that film would do good or not. In this paper authors have tried out to discuss various schemes which can predict the Box office collections of the movies.

Keywords. Movies, Collection, Prediction, Before Release

I. Introduction

In the evolution journey we are confident that human have always played games as a main source of their entertainment. It was part of their daily routine because it was not only giving them mental rest and support but also habit of winning and losing every day. Then the concept of theatre came, where some people gathers before an audience to enact according to a script. This journey evolved when we came to know how to record images and later on motion pictures. When motion pictures came into existence these theatre acts started shooting and making available it for public to watch on media, which is being called movies these days. When movies got popularity around the world it attracted the attention of capitalists in

Figure 1: Open theatre of ancient time

(Source: https://www.theaterseatstore.com)

this domain. As of now we can see almost every business is directly or indirectly connected to the entertainment industry. In fig.1 we can see ancient open theatre that is called empi-theatre now. When movie industry became the main source of investment for many investors, then it became[1] a great concern how a movie performs at box office. To predict it literally impossible for anyone, how great success a movie can achieve. But Science can do favor for us in this case, as we have data of past many results which includes various factors. Therefore in this paper some of the well-known schemes are being discussed and compared.

II. Discussion

I have taken four schemes which are of almost same period of years. I am going to elaborate every scheme in detail here, and how they are trying to predict the future of film.

1. Early Prediction of Movie Box Office Success Based on Wikipedia Activity Big Data[1].
2. Prediction of Movies Box Office Performance Using Social Media[2]
3. Prediction of Movie Success using Sentiment Analysis of Tweets[3]
4. Box Office Prediction for Feature Films[4]

III. Based on Wikipedia Activity Big Data

Every day and night every moment each of us generating data on Social sites to access information about collective states of the minds in human societies. We are so eager to know the prediction of the society's reaction to a new product in the sense of popularity and adoption rate. However, bridging the gap between "real time monitoring" and "early predicting" remains an enormous challenge. Authors in this build a minimalistic predictive model for the financial success of movies based on collective activity data of online users. They have demonstrated that the popularity of a movie can be guessed much before its release by identifying and analyzing the activity layers of editors and viewers of the corresponding entry to the moving-picture show in Wikipedia, the well-known on-line reference work.

In this study authors have taken into account a sample of 312 movies, which were released in the United States in 2010.

The complete knowledgeset together with the monetary data yet as Wikipedia activity records is accessible via Dataset S1. To obtain this dataset, first the list of 2010 movies distributed in the U. S. is acquired from Box Office Mojo (http://boxofficemojo.com) along with their accompanying financial data (535 movies). Financial knowledge contains the gap weekend box workplace revenue and therefore the variety of theaters screening the moving-picture show.

IV. Prediction of Movies Box Office using Social Media

In this study, authors have applied data mining tools to calculate some innovative patterns for generate interesting patterns for predicting box office performance of movies using data collected from multiple social media and internet sources together with Twitter, YouTube and the IMDb movie database. The prediction relies on call factors derived from a historical moving-picture show info, followers count from Twitter, and sentiment analysis of YouTube viewers' comments. We label the prediction in 3 categories, Hit, Neutral and Flop, using Weka's K-Means clustering tool. Interesting patterns for prediction square measure generated by Weka's J48 Since our prediction is for movies nevertheless to be free in summer 2013, the performance of the final results will be validated by a follow-up study.

V. Prediction of Movie Success using Sentiment Analysis of Tweets

Social media content contains made data concerning people's preferences. An example is that folks typically share their thoughts concerning movies exploitation Twitter. We did knowledge analysis ontweets concerning moving-picture shows to predict many aspects of the movie quality. The main results we have a tendency to gift square measure whether or not a moving-picture show would achieve success at the box workplace. In this work, we try to predict the movie popularity from sentiment analysis of Twitter data talking about movies. We analysis each the tweets in 2009 and up to date tweets in 2012. We manually label tweets to create a training set, and train a classifier to classify the tweets into: positive, negative, neutral, and irrelevant. We further develop a metric to capture the relationship between sentiment analysis and the box office results of movies. Finally we have a tendency to predict the Box workplace results by classifying the moving-picture show as 3 categories: Hit, Flop, and Average. Our project conjointly includes investigation on connected topics just like the relationship between tweet sent time and tweet variety.

VI. Box Office Prediction for Feature Films

Feature films are a multibillion-dollar industry. Given the sheer variety of films made yet because the level of scrutiny to that they're exposed, it may be possible to predict the success of an unreleased film based on publicly available data. A large quantity of information representing feature films, maintained by the Internet Movie Database (IMDb), was extracted and prepared for use in training several machine learning algorithms. The goal of this project is to build a system that can closely predict average user rating and degree of profitability of a given movie by learning from historical movie data. Since there's a powerful correlation between a film's budget and therefore the gross USA earnings, predicting raw gross earnings isn't notably indicative of a film's success. Instead, we transform the gross earnings of a film to a multiple of its budget, which is a much more meaningful indicator of a film's success.

VII. Conclusion

As and when this business would grow rapidly, prediction would be more and more crucial. But predictions are always meant for denying the predictions. No prediction model can always be accurate, but it would be better if we can always have a prediction before actual result, actually we can be prepared for the results or maybe we can be more and more ready with the implementation. Many future scope within this area and we hope many researchers including us would be doing predictions in the area of Movies.

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Prediction of Secondary Structure of Proteins Using Sliding Window and Backpropagation Algorithm

Applications of Artificial Intelligence Techniques in Engineering pp 533-541 | Cite as

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Abstract

Prediction of protein secondary structure plays a vital role in structural biology. Computational methodology is the initial step in bioinformatics to predict the 3-D secondary structure from a primary sequence and structure homology. This problem lies in the category of NP problem, and thus its time and space complexity is very high. In this paper, to a model for secondary structure prediction of proteins using sliding window and MADALINE, a multilayer feedforward network is proposed. The algorithm starts with encoding of amino acid sequence, which after passing through window is given as input to the neural network. The resultant data is in numeric format and translated back to actual secondary structure. It is observed from the results that the proposed technique provides better prediction with an accuracy more than 75%.

Keywords

Primary protein sequence MADALINE learning Backpropagation Error information Sliding window

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International Conference
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Recent Advances in Non Conventional Energy Resources using Solar based Technologies
25th & 27th July, 2019

ACCEPTED PAPERS

SOLAR POWER: AN ALTERNATE PERSPECTIVE FOR ELECTRICITY GENERATION IN THE PRESENT AND FUTURE

Rajeev Kumar Chauhan, Snigdha Chaturvedi,
Sulekha Saxena, Atul Kumar Kushwaha and Mayank Agarwal
IMS Engineering College Ghaziabad

In the ancient world the only power source available was solar energy. There was no fossil fuel, mineral oil and coal available for utilization. Renewable energy sources especially solar have very good potential in India and the world as well. The small (KW) at the micro grid/local grid level and the large (MW) Plants at the national/state grid level can produce the electricity. If the mineral oil and coal were not found as a fuel the solar/ renewable technology would have developed with its utmost potential. But this is the starting of the renewable technologies. The future is only for the renewable technologies where a lot of scope seems to be there with the points of the good business, good environment, good technologies, good research and developments, overall good livelihood. At present we see the adverse effects of the polluted environment as a result of the removal of the breeds of birds, animals, flies-mostly butterflies etc. Removal of the EM Waves from the environment is essential to save the Ecological System on the earth. This could be achieved by sustainable and economic technological development for optimum utilization of the natural resources. Innovations in low Voltage Electricity Generation and proper channelization of the mini grid/micro grid/local grid interactive power system concept are desirable for the future aspects. Optimum utilization of Renewable Resources like the hybrid solar photovoltaic, biomass/biomass gas, biogas and wind Power Plants doesn't mean to be far away. Limited utilization of the high frequency related equipments and development of the low frequency utilization technologies is essentially required for the medical fitness of the humanity and to save the life expectancy for today. Emphasis in this paper is to achieve the highest growth and development in the solar technological innovations and suggestions. Commercial and deployment activities for the solar projects implementation may be the areas for developing EPC Solar-NET Metering/Gross Metering Rooftops/Ground Mounted for better business solutions. The government should take keen interest and initiatives to collect and provide funds for these projects. A transparent fit in tariff (FIT) should grow to build up the mass scale solar business

Keywords: Renewable energy, Solar, Integrated, Power cuts, Government.

1. Introduction

Despite the general economic crisis, India's energy demand is growing and continuously rising with the global warming and the disastrous consequences. Only the solution to this problem is to focus on renewable energy especially on Solar as only solar energy/Power can keep India shining [1]. India is the nation of villages and towns where the integrated approach to empower the people of the community is essential. Electricity is required to improve the healthcare, water & agriculture, education and enterprises facilities in the villages, towns and cities in the country. Lighting system in the villages as well as in the towns is very poor. People community especially in the villages and small towns of India are living in energy poverty.

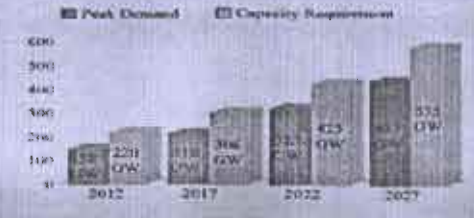

Figure 1 Projected Power scenario in India

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ICMPC-2019

Effect of Copper Addition and Artificial Ageing on Mechanical Behaviour of Al-6061 Alloy

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Abstract

The work has been done for comparative study of mechanical behavior of age hardened and non-heat treated Al6061-Copper alloy. Four compositions of Al6061 with varying percentage of copper 2.9 %, 3.8 %, 4.5 % and 5.3 % has been die casted. Strontium and titanium have been added for grain refinement. For Each composition two samples have been casted out of which one subjected to age hardening and other kept non heat treated. It has been found that tensile strength decreased from 2.9 wt% to 5.3 wt% copper for heat treated specimens. Maximum strength has been found for age hardened sample with 2.9 % of copper, which was 340 MPa with 3.1% elongation. This high value of strength of age hardened sample with 2.9 wt% has been found due to formation of precipitate of Al_2Cu over grain boundaries hindering the movement of dislocation.

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Keywords: Copper; Aluminum; Characterization; Artificial ageing

1. Introduction

It has been observed that Al-6061, alloys are widely used to manufacture panel for automotive body because of better strength and formability [1]. Copper is used as an alloying element to improve the kinetics of precipitation [2, 3] & has been observed to be effective to improve mechanical properties of alloys [4-10].The heat treatment process is used for obtaining good combination of mechanical properties in terms of strength and ductility due to precipitation hardening. The required mechanical properties are achieved by T6 heat treatment.T6 heat treatment consists of three steps [11, 12].

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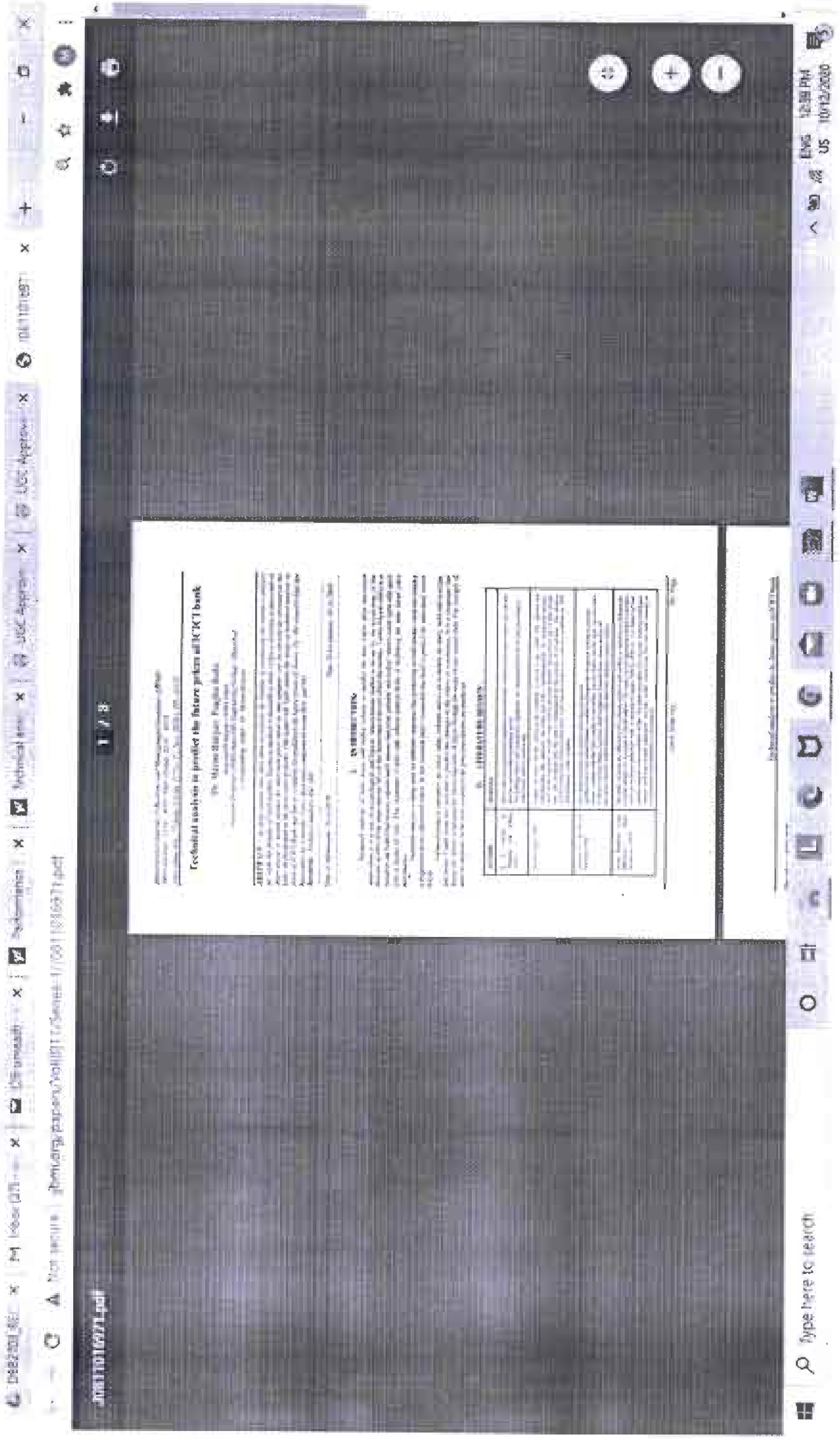

Springer Link

Encyclopedia of Animal Cognition and Behavior

Living Edition
| Editors. Jennifer Vonk, Todd Shackelford

Waist-Hip Ratio

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Synonyms

Waist to hip ratio [illegible]

Definition

It is the ratio of perimeter of waist to the hip.

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Waist-Hip Ratio

Fat is one of the most important constituent of diet. However, fat deposition in the body could be harmful to health among all the people irrespective of age, sex, and ethnicity. Fat tends to deposit in abdomen and hip than any other place in the body, for both male and females. Waist-hip ratio is a significant health parameter, and it relates with serious health problems. Waist-hip ratio describes distribution of harmful fat around abdominal region (visceral fat). Overweight and obesity are often found to be related to major human disorders responsible for several deaths worldwide like diabetes, hypertension, heart diseases, and several other disorders (Emery et al. 1993)

Nowadays, doctors consider waist-hip ratio along with body mass index (BMI) for determining fat distribution. Some consider it as better parameter than BMI (as it fails to predict body fat distribution), which...

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Encyclopedia of Animal Cognition and Behavior

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Environmental Influences

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Synonyms

Environmental effect

Definition

External factors that affect humans or any other life form

Before the nineteenth century, the effects of the environment on an organism were not well studied. Wilhelm Johannsen, a Danish botanist, first found differences in observable physical properties of genetically identical bean plants. He coined genetic content as "genotype" and observable properties as "phenotype." He concluded from his experiments that these variations in phenotypes are caused by environmental factors (or environmental influences. Johannsen 1911).

Genotype is not the sole factor that decides the phenotype of any organism; there are several environmental influences which possibly modify them. Researchers are particularly interested in studying effects of environmental influences on development, growth, and health over long periods of time, as well as in humans and other animal species. Understanding of this unpredictable interplay between environment and genetics may...

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Acclimatization

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Synonyms

Acclimation (http://link.springer.com/search?facet-eisbn=978-3-319-47829-6&facet-content-type=ReferenceWorkEntry&query=Acclimation); Acclimatization (http://link.springer.com/search?facet-eisbn=978-3-319-47829-6&facet-content-type=ReferenceWorkEntry&query=Acclimatization); Adaptation (http://link.springer.com/search?facet-eisbn=978-3-319-47829-6&facet-content-type=ReferenceWorkEntry&query=Adaptation); Conditioning (http://link.springer.com/search?facet-eisbn=978-3-319-47829-6&facet-content-type=ReferenceWorkEntry&query=Conditioning); Habituation (http://link.springer.com/search?facet-eisbn=978-3-319-47829-6&facet-content-type=ReferenceWorkEntry&query=Habituation)

Definition

Acclimatization is the process of physiological adaptation by animals or plants due to changes in climatic or environmental conditions.

The process of adjustment of cells or organisms to new environmental conditions including temperature, humidity, photoperiod, and other climatic conditions is called Acclimatization. In order to sustain themselves, during this process, organisms tend to adjust their morphological and biochemical properties in response to new environmental conditions. Depending on the natural characteristics and types of adaptation, the time taken for Acclimatization shows a lot of variation in different organisms ranging from hours to months in some to over a lifetime in others.

Acclimatization is a well-coordinated phenotypic response against environmental stresses that gradually diminishes or lessens relatively upon removal of stressors. Acclimatization occurs in two different ...

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Influence of Friction Stir Welding Parameters on Mechanical Properties of dissimilar AA 7475 to AISI 304

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Abstract. Joining of dissimilar materials is difficult and challenging. Trend towards replacement of high density material (HDM) by low density material (LDM) is gaining importance in automotive industries. In the present work, friction stir welding (FSW) of high strength dissimilar materials i.e. aluminium alloy AA7475-T761 and stainless steel AISI 304 was conducted. The mechanical properties and microstructure of butt joint were investigated on using Taguchi L_8 orthogonal array (OA). Different combinations of FSW parameters were used to obtain the maximum value of UTS. It was observed that most dominating parameter affecting UTS is tool rotational speed, contributing 42.19%, followed by traverse speed with 38.96% and shoulder diameter with 12.60%. The maximum UTS was observed 75.22% of base material AA 7475 (452MPa) under the optimum combination of parameters; tool rotational speed at 450 rpm, traverse speed 63 mm/min and shoulder diameter 14 mm. The microstructure of the resulted efficient joint shows appreciable variation in grain sizes in different zones and the micro hardness was found maximum in SZ on the retreating side.

Keywords: Aluminum, Friction Stir Welding (FSW), Mechanical Properties, Microstructure, Microhardness, Steel

1. Introduction

Recent days various transportation industries are focusing and adopting the low density material (LDM) by replacing high density material (HDM) without compromising or degrading the safety and service issues [1-2]. The LDMs are suitable as they offer low inertia and lead to fuel economy. Among LDMs, aluminium alloy (AA) finds extensive application in aerospace and transportation industries. In addition, AA offers numerous features such as good forming ability, anti-corrosive and low absorbing energy, etc. Apart LDMs, stainless steel (SS) one of HDMs, finds substantial applications in exhaust parts and fuel tanks of automotive industries [3]. In order to decline inertia and enhancing of mechanical properties, AA and SS were joined by using a green technology FSW. In 1991, FSW was established as well as patented by "The Welding Institute" (TWI), UK [4]. It is a solid-state welding process due to which it avoids number of quality issues such as distortion, porosity, alteration of

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Effect of Ni-20 mg treatment and machining parameters on surface quality of Al (1–4) Fe-IV-1Si alloys

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ABSTRACT

In this study, the machinability of Al-alloys regarding surface quality of machined specimen was investigated. Subsequently, the impact of Ni-20Mg treatment and machining parameters was analysed on machining characteristics in terms of surface quality of Al-(1-4) Fe-1Si-1V cast alloys. It is observed that Surface roughness (SR) increases with increasing amount of iron (Fe) from 1% to 4% by weight in all the machining parameters. It is also observed that in modified Al-Fe-Si-V alloys, SR increases for all cutting conditions when Fe content is increased from 1% to 2%. At 3% Fe, there is mixed mode of SR height at different cutting conditions, while surface quality significantly improves with modified Al alloys at 4% Fe during all the machining parameters. Therefore, machinability significantly relies on the compositional changes of alloys and modification treatment.

Selection and peer-review under responsibility of the scientific committee of the 10th International Conference of Materials Processing and Characterization.

1. Introduction

Modification of the internal structure through alloy addition, process selection, or subsequent heat treatment can lead to readily machinable Al component parts. It has been also observed that the internal structure of the alloys were affected dramatically the machinability [1]. When tool life increases or hardness of work-piece material decreases, the machinability of the work-piece increases, lower production cost and high productivity are possible [2]. SR is one of the imperative parameters which influence the machinability as well as service life of the component.

Literature study shows that there is a relation between the microstructure of the alloys and their machined SR i.e. related to the magnitude of the variation of the cutting force after machining (milling, turning). From the literature survey it was also evaluated that cutting force and the surface quality increases if the size of the soft matrix grains produced increases [3]. Experimental studies reveals that the surface quality is a function of cutting parameters, composition and alloy conditions [4,5]. It is also noticed that addition of some modifiers like Beryllium and cadmium improves the machinability [6,7]. The object of such modification is to convert the morphology of the precipitate particles into globular or similar compact forms and also to refine the particle size and ensure more uniform distribution. The wide applications of Al-Fe-V-Si alloy systems have drawn considerable attention among researchers being light weight material and employable in high temperature usage [8]. An investigation reported that these alloys are largely affected by the formation of intermetallic phases due to the dispersion of Fe content in Al matrix [9,10]. They concluded that high percentage of Fe dispersion also leads to the formation of needle and angular shaped intermetallic compounds which results in poor mechanical properties. Using different modifiers, Al-8.3Fe-0.8V-0.9Si alloy was build up through conventional casting route [11,12]. They concluded that modifier Ni-Mg renders best results in all mechanical properties but did not report on machinability of Al-Fe-V-Si alloys. Therefore, it is important to evaluate the machining behavior of these alloys with comparison among their different compositions. Subsequently, there is also a need to investigate the influence of various parameters like feed rate, depth of cut and cutting speed on machinability behaviour and their surface quality during milling of aluminium alloys.

Thus wide application and importance of Al-Fe-V-Si alloys motivated us to investigate the machinability of high iron containing aluminum alloys in terms of surface quality of machined samples. In the current investigation an attempt has been made to

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carry out the refinement and modifications of micro-constituents of Al-(1–4) Fe-1V-1Si alloys with Ni-20 Mg. The aim of this research is to analyse the effect of cutting variables on the machining behaviour in the form of surface quality and the secondary objective is to optimize the machining process [13].

2. Experimental procedure

The compositions of different alloys and different modification treatments are given in the Table 1.

2.1 Estimation of surface roughness

To survey the SR of the specimen, the arithmetic Mean, Ra and Maximum peak-to-valley height, Rz were utilized for examination. The work piece surface qualities were estimated with the assistance of compact SR analyzer (make: Mitutoyo, Japan; model number SJ-400). SR of the machined surface was estimated after each test. SR of each sample was studied under different conditions and graphs were plotted for all conditions. The average of three values was taken for each sample.

3. Result and discussion

All this section, the experimental analysis of machinability of Al-alloys in terms of SR of machined alloys surfaces are reported and discussed. In order to detect the average SR (Ra) and Maximum peak-to-valley height (Rz) value, experiments were carried out by changing the cutting speed (Vc), the feed speed (f) and the depth of cut (ap). The objective of the present work is, therefore, to study the influence of different parameters, e.g., cutting speed, feed rate and depth of cut on machinability properties, viz., surface finish, the process of amid milling processing of Al-(1–4) Fe-1Si-1V alloys. Further, Al-(1–4)Fe-1Si-1V alloys were modified with 1% Ni-20 Mg master alloy and then SR were compared with unmodified alloys to see the effect of Ni-20 Mg on machinability characteristics.

3.1. Surface roughness

In the present examination, Ra and Rz parameters were utilized for the SR analysis. The impact of machining parameters, for example, depth of cut, cutting speed and feed rate by and large on average centre line height (Ra) and most extreme crest-to-valley height (Rz) for unmodified and modified Al-(1–4) Fe-1Si-1V alloys is appeared from Figs. 5–8. From the depth of cut versus surface finish graph, it can be observed that the SR height increases on addition of iron from 1% to 4% for unmodified alloys [8] but for modified alloys, it is observed that the SR height decreases towards higher percentage of iron except for Al-3Fe-1Si-1V alloy. It means, machinability improves as a result of treatment with 1% Ni-20 Mg, towards higher percentages of iron. It was observed that in unmodified alloys, the structure was form blocky Al_3Fe precipitates which is brittle intermetallic phases and deteriorate the mechanical properties of the alloys. Out of these intermetallic phases saw in aluminium alloy it is commonly expected that plate-type shapes are the most unsafe to mechanical properties (e.g., elongation). Changing the state of intermetallic stages from plate type to other reduced form enhance the properties and structure of Al alloys. Magnesium addition as Ni-20 Mg master alloy to the Al-Fe-V-Si alloy composition changed the morphology of both essential and eutectic stages. With the modification treatment both primary phases and eutectic are finer than corresponding unmodified alloys. The strong dissolvability of Ni in Al is low, so Ni strongly segregates before developing interface to the melt and influence the development morphology of the precipitates. Ni and Mg both enter into the lattice of the essential stages and change its morphology. This might be because of understanding that Mg limits the nucleation and development of Al_3Fe-type precipitates. Optical microstructures of the unmodified and 1% of Ni-20 Mg adjusted Al-(1–4) Fe-1V-1Si alloys are appeared in Figs. 1–4 separately. From the representation of the figure it is shown that with addition of Ni-20 Mg master alloys, the blocky Al_3Fe precipitates refined into cuboidal or rectangular or globular type precipitates of unmodified alloys that are much smaller in size. The object of such modification is to convert the morphology of the precipitate particles into compact forms and also to refine the particle size and ensure more uniform distribution. The metallographic observations were done to see the morphological changes in the phases and its impact on the surface quality.

3.2. Effect of Ni-20 Mg master alloy on surface roughness of Al-(1–4) Fe-1V-1Si alloy for different parameters

Figs. 5–8, show the influence of 1% Ni-20 Mg master alloy on SR characteristics i.e., Ra and Rz during milling of Al-(1–4)Fe-1Si-1V alloys. From the graph (Figs. 5 to 7) it is clear that for all alloy compositions (1–3% Fe), Ra and Rz values at different cutting conditions (i.e. depth of cut, cutting speed, feed rate) are higher for modified alloys as compared with un-modified alloys. This might be because of the increase in hardness because of change with by 1% Ni-20 Mg master alloy. In addition globular particles, which are basically nickel aluminised containing other elements (like Fe, V, Si, Mg) were also formed. In contrast, at different cutting speeds, the surface quality improves for modified Al-3Fe-1Si-1V alloy as compared with unmodified alloy (Fig. 7).

Similarly, it is also clear from the Fig. 8 that SR height decreases on modification with 1% Ni-20 Mg master alloy for Al-4Fe-1Si-1V alloy at different conditions.

From the above investigation, it can be briefly summarized that when Al-Fe-Si-V alloys are treated with 1% Ni-20 Mg master alloy, SR increases for 1 and 2% Fe for all cutting conditions. In case of Al-3Fe-1Si-1V alloy, there is mixed mode of SR height at different cutting conditions, whereas machinability improves on modification for Al-4Fe-1Si-1V alloy at all cutting conditions. This may be due

Table 1
Alloys designation compositions of the alloys prepared.

Alloy Designation	Chemical composition (wt.%)				Treatment condition (wt%)
	Fe	V	Si	Al	
BE11	1	1	1	Balance	Unmodified
BE11M	1	1	1	Balance	Treated with 1.0% of Ni-20 Mg
BE12	2	1	1	Balance	Unmodified
BE12M	2	1	1	Balance	Treated with 1.0% of Ni-20 Mg
BE13	3	1	1	Balance	Unmodified
BE13M	3	1	1	Balance	Treated with 1.0% of Ni-20 Mg
BE14	4	1	1	Balance	Unmodified
BE14M	4	1	1	Balance	Treated with 1.0% of Ni-20 Mg

Chapter 48
Kinematic Analysis of Steering Mechanism: A Review

Mubina Shekh, O. P. Umrao and Dharmendra Singh

Abstract Mostly, two-wheel steering (2 WS) systems are used to control the vehicle. But many researchers are working in this area, for a narrow space how a car can take turn or back without any failure occurs. There are different types of drives in a vehicle such as front-wheel, rear-wheel or all-wheel drive (2 and 4 WS). But for the reason of safety, four-wheel steering (4 WS) vehicles termed as Quadra Steering System are being used. In this paper, the features of different models of car steering system used have some drawbacks like failing at high speed, slipping of the tracks, higher turning radius. To overcome these drawbacks, a suitable and appropriate steering system has been proposed and it has been presented here.

Keywords Kinematic analysis · Two-wheel steering (2 WS) · Four-wheel steering (4 WS) · Turning radius

48.1 Introduction

Many time endeavours have been devoted to develop a reliable and safe steering design for the driver, which is easy to operate at busy and narrow road to take a back and U turn. Many researchers are working on wheel drive mechanism of vehicle from many years, so numerous designs are proposed for reducing turning radius by researchers. Arvind et al. [1] said less body lean during fast lane changes and turns; theoretical methods were also found in different literatures. Nityananth said in his paper that steering arrangement is to turn the front wheels using a hand-operated steering wheel, which is positioned in front of the driver [2]. Chaudhary, in his paper, has done the kinematic analysis of the four-wheel steering system. These data are

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Chapter 10
Supportive Culture: A Transformational Strategy

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Abstract The volatile, uncertain and challenging global business environment has resulted in organizations adopting innovative strategies to enhance their performance and sustain their competitive advantage. Organizations are trying to develop and sustain a culture which is flexible and can provide them with a strong foundation. This chapter tries to examine the relationship between supportive culture and job satisfaction mediated by stress and career advancement by using the data collected from women employees of call centres located in Delhi and NCR. Multiple regression is used both for analyzing the data and testing the hypotheses. The findings indicate the significance of supportive culture in enhancing the satisfaction of women employees in call centres in India.

Keywords Call centres · Career advancement · Culture · Job satisfaction · Stress · Women

10.1 Introduction

The presence of an agile environment has forced organizations to design, develop and adopt flexible management systems to have sustainable solutions. These flexible management systems comprise of various types of flexibilities related to organizations, operations, people, information, marketing, etc. (Sushil 2016) and nowadays form a part of the overall culture of any organization.

The culture of an organization is widely known to have a strong impact on the success of organizations. It is considered as a vital parameter of achieving competitive advantage which is sustainable (Schein 1990; Zheng et al. 2010). The effectiveness of strategies and systems implemented in the organizations are explained by the

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Predictive Model for Analyzing PM 2.5 Level Of Air

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Abstract

It is often noticed that we tend to ignore or accept the harmful effects due to the acute levels of air pollution. This works aims at predicting the PM2.5 level of air in Delhi NCR region. Data mining & learning algorithms have proven to be useful techniques for predicting the various aspects of the air quality [1]. In this work we have worked on three learning models namely LSTM, Auto-regression and SVR to understand which of the models will be more suitable for prediction of PM2.5 level of air. We have performed pollutant forecasting on the data available at CPCB website from 01-jan-2016 upto 16-mar-2019. Our proposed model can predict the concentration of PM 2.5 level of air quality index by applying the three learning models on past data of air quality index dataset of Delhi NCR region. Motivation behind this work lies in the fact that alarming levels of PM2.5 has become a very serious problem particularly in Delhi NCR region. In the proposed work we have predicted the value of PM2.5 by using all other pollutants including Nitrogen Oxide, Sulphur Dioxide, Benzene, Ozone, Toluene, Carbon Monoxide. Our area of study is Anand Vihar of Delhi which is one of the pollution driven areas of Delhi. Our experimentation shows that Support Vector Regression model provides better prediction results in comparison to LSTM & auto-regression based learning.

1. Introduction

Today air pollution has now become a very alarming concern particularly in Delhi NCR region of India. There are a number of factors responsible for the poor quality of air which can be categorized as natural factors and man-made factors.

Natural factors of air pollution include volcanic activity, dust, sea-salt, forest fires, lightening, soil outgassing etc. Anthropogenic sources include emission from industries, vehicular emissions, waste disposal landfills, open burning etc [2]. This work is primarily an experimentation work where we wanted to understand & compare the effectiveness of some well known learning algorithms so that algorithm can be further applied at extensive level by researchers. The contribution of this work lies in the experimental results obtained according to which SVR can be taken as one of the potential learning algorithms for training & predicting of air contaminants.

Table 1 – The major pollutants in the Delhi Air are.

Pollutants	Emission sources	Health Effect
Sulfur dioxide (SO_2)	Burning of metal smelting, petroleum refining, fossil fuels etc	Heart and lung disorders Respiratory problems, visual impairment
Nitrogen dioxide (NO_2)	Burning of fossil fuels, factories and high temperature	increased susceptibility to respiratory infections Pulmonary disorders
Particulate matter (PM)	Vehicular emissions, industrial Combustion processes, commercial and residential combustion, construction industries	heart stroke, bone problems, Respiratory problems, liver fibrosis, lung/liver cancer
Carbon monoxide (CO)	evolution from IC engines, Burning of carbonaceous fuels	Cardiovascular problems Higher risks in fetuses, pregnant women, and elderly people
Ozone (O_3)	Hydrocarbons reacting with sunlight results in O_3 formation	asthma, bronchitis, Respiratory problems etc
Lead (Pb)	automobile exhausts, lead-acid batteries, industrial effluents, Metal processing plants, waste incineration etc	it is absorbed rapidly in blood stream and has serious effects on central nervous, Anemia, liver, fat soft tissues and bones,

1.1. Trends of Air Quality in Delhi NCR

During recent years quality for the three major pollutants including SO_2, NO_2, and PM is analysed to understand the trend of pollution in Delhi NCR. Based on annual average concentration of pollutants, air quality trend has been observed by Delhi pollution control board for the years 2009 – 2015 along with the comparison with existing national ambient air quality standards (NAAQS), 2009. It can be seen that among the three pollutants viz. NO_2, SO_2 and PM_{10}, the concentration of NO_2 and PM_{10} are beyond the prescribed standard limits. The problem of particulate matter (PM_{10}) is more serious. Since 2009, approximately 200-300% rise has been observed in PM_{10} concentration compared to the standards [2].

1.2. AQI

Air quality index (AQI) is the method to monitor air quality in real time basis. The AQI is based on human exposure and possible health effects. Pollutants which are considered for AQI calculation are PM10, PM2.5, SO2, NH3, NO2, O3, CO and Pb. AQI is determined by taking the online readings from various air quality monitoring stations.

Pl. Note: Values above 500 are considered beyond the AQI.

Table 2 – Air Quality Index Table

Air Quality Index (AQI) Values	Levels of Health Concern
0 to 50	Air quality is considered satisfactory, and air pollution poses little or no risk
51 to 100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people
101 to 150	Although general public is not likely to be affected at this AQI range, people with lung disease, older adults and children are at a greater risk from exposure to ozone, whereas persons with heart and lung disease, older adults and children are at greater risk from the presence of particles in the air
151 to 200	Everyone may begin to experience some adverse health effects, and members of the sensitive groups may experience more serious effects
201 to 300	This would trigger a health alert signifying that everyone may experience more serious health effects

Evaluating the Impact of Sampling-Based Nonlinear Manifold Detection Model on Software Defect Prediction Problem

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Abstract

Accurate prediction of defects is considered an essential factor, depending mainly on how efficiently testing of different prediction models has been done. Earlier, most of the models were restricted to the use of feature selection methods that had limited effects in solving this problem in initial stage of software development. To overcome it, the application of software defect prediction model using modern nonlinear manifold detection (nonlinear MD) combined with SMOTE using four machine learning classification approaches has been proposed in a way that the challenging task of defect prediction has been categorized as problem of high-dimensional datasets, problem of imbalanced class, and identification of most relevant and effective software attributes. Then, statistically evaluated and compared performance of prediction model with or without SMOTE-nonlinear MD approaches and results validated that proposed SMOTE-nonlinear MD approach prediction model predicts defect with better accuracy than others using RMSE, accuracy, and area under the curve.

Keywords

Dimension reduction Defect prediction Friedman test High dimensional Imbalanced class Machine learning Nonlinear manifold detection Oversampling SMOTE Software datasets

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Group Data Sharing and Auditing While Securing Sensitive Information

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Abstract

In today's world, it can be said that cloud computing is a most important research topic nowadays. The reason behind this is the number of services provided by it to its users. Among them, there exists a service which allows a number of users to share their data with each other. This service is very helpful in collaborative environment as it improves its efficiency and has a number of potential applications. But the data shared might include some information which is sensitive and should not be shared with every other member of the group. To tackle the issue, this paper proposes a scheme which ensures the security of such sensitive data to be shared among a group of cloud users. For sharing data among them, block design-based key agreement protocol has been used in the proposed approach along with identity-based blind signature for verifying data's integrity. Later, a performance analysis in the end shows that the proposed scheme is efficient and stable.

Keywords

Data security · Sensitive information hiding · Weil pairing · Block design · Ring signature

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SOI FinFET for Computer Networks and Cyber Security Systems

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Chapter
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Abstract

Today, computer-based systems have become common in everyday life and these systems are used to store leverage information and people are more willing to communicate this sensitive information with the real world. So, computer networks have become the emerging domain for connecting physical devices like home appliances, vehicles, and other embedded electronics, software, actuators, and sensor-based systems, and security of these systems from cyberattacks is essential for secure communication. This results in the easy and safe communication between different entities. So, modern advanced computer systems with efficient integrated transistor technology provide the security and privacy to the computer-based real world. This chapter explores the advanced Silicon-on Insulator Fin Field EffectTransistor (SOI FinFET) technology which is the basic unit of integrated circuit used in every electronic gadget and computer hardware. In this chapter, performance analysis of device-D1 (high-*k* SOI FinFET structure) is done to implement the efficient computer hardware over a wide temperature range (200–450 K). The attempt is done to find out the ZTC (zero temperature coefficient) biased point of SOI FinFET device to have stable, reliable, and secure systems. The proposed device analysis will provide the hardware design flexibility in the electronic circuits, microprocessors, computer hardware, and thermally stable interfacing components for security applications of information technology.

The potential parameters of device-D1 like A_V (intrinsic gain), g_m (transconductance), V_{EA} (early voltage), g_d (output conductance), I_{off} (off current), I_{on} (on current), I_{on}/I_{off} ratio, C_{gs} (gate-source capacitance), C_{gd} (gate-drain capacitance), f_T (cutoff frequency), and SS (subthreshold slope) are subjected to analysis to evaluate the performance over wide temperature environment. The validation of temperature-based performance of device-D1 gives an opportunity to design numerous analog/RF and digital components in Internet cyber security infrastructure environments.

Keywords

Cyber security   Computer network   SOI FinFET   Temperature   Zero temperature coefficient

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Spectral Investigation of Heart Rate Variability Signals Using Stockwell-Transform

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Abstract— This paper discusses the use of Stockwell transform (ST) in time-frequency domain for spectral analysis of heart rate variability (HRV) signals. The ST is depicted numerically and compared with well-liked method of wavelet transform known as continuous Morlet wavelet transform (CMWT). The results of this study show that the normalized mean power and total normalized power in VLF (0.004Hz - 0.04Hz), LF (0.04 Hz – 0.15 Hz) and HF (0.15 Hz – 0.4 Hz) were improved as compared to CMWT for statistical significance value of [illegible] and [illegible]. For this analysis, Electrocardiogram (ECG) was recorded in fifteen normal subjects (mean age approximate 28 years, range 23 -34 years and mean hight approximate 162 Cm) in supine position for twenty minutes.

Keywords—Stockwell transform, scalogram, normalized mean power, ectopic beat, trend

I. Introduction

Time-frequency analysis of the heart rate variability (HRV) was used as a non-invasive tool to explain the different heart rate control mechanisms of the autonomic nervous system (ANS). The beat to beat variation of ECG signal's R-R interval is known as HRV. Using spectral methods, it is only possible to get details on how power is transmitted across frequency and time. Classification of HRV spectrum into three major frequency bands are high frequency (HF) band (0.15-0.4 Hz), low frequency (LF) band (0.04-0.15 Hz), and very low frequency (VLF) band (0.004-0.04 Hz). High frequency heart rate oscillations cause an arrhythmia of the respiratory sinus and indicate parasympathetic behaviors. Combined sympathetic and parasympathetic behavior is known to modulate low frequency heart rate oscillations. VLF band that may indicate the influence of various physiological mechanisms, including the renin-angiotensin system, vasomotor tone and heart beat regulation [1],[2],[3]. The time-frequency spectral power indexes derived from the time series of R – R intervals provide information related to autonomic cardiovascular neural regulation. In many clinical conditions, such as diabetes [4] hypertension [5], heart failure [6], and cardiac disease [7],[8],[9] spectral indexes can change [10]. Therefore decreased HRV is an important indicator of heart events such as sudden death in coronary artery disease [11] heart failure [12] and myocardial infarction. HRV was thus widely used as a predictive index for tracking clinical outcomes in several disorders involving the relationship between the autonomic nervous system and heart rate regulation [13].

In the frequency domain, HRV is studied, and the power spectrum of HRV does not reveal its temporal changes [14]. There are many physiological conditions of concern where the heart rate varies gradually over time and it may be very important to monitor these temporal changes. HRV signals are distinguished by signal properties varying in time i.e. they are non-stationary from the statistical perspective. Therefore, time-varying methods of signal processing form part of the regular range of biomedical signal analysis. Both the frequency of incidence and the shape and time-frequency characteristics of the transient signal components have a high diagnostic value [15],[16] leading to more frequent application of time-varying analytical methods. In HRV, signal components with time-varying properties may occur at different frequencies. Time-frequency study is conducted on the HRV data to demonstrate vagal tone and sympatho-vagal balance as a function of time[17],[18],[19].

The best known and most commonly used techniques for HRV time-frequency analysis are the Short time fourier transformation (STFT), Gabor transformation (GT), the continuous Morlet wavelet transformation (CMWT) [20],[21],[22], and the Smoothed Pseudo Wigner-Ville (WV). Because of constraints of set window width and also poor low frequency resolution the STFT can not monitor variable signal dynamics for non-stationary signal. The WV method used analytical signal (Hilbert transform) for process of HRV [23], which has smoothen the power spectral but with poor time-frequency power resolution due to cross terms in the spectrogram.

CWT is better method compare to all above methods for time-frequency analysis as its window width is variable by scaling. Therefore this method analysis is computationally efficient for non-stationary signal and produces reasonable result of these class of signal processing [24],[25]. Inspite of this compensation, there are several inherent performance restrictions of the CWT approach like, in CWT, an octave frequency scale is usually used, resulting in over-sampled low frequency representation and under-sampled representation at higher frequencies [26]. Nevertheless, wavelet has its own downside that the outcomes of their analysis depend on the choice of the base function for the mother wavelet. This can lead to a one-sided and a prior intuition about the signal characteristics. Consequently, only the signal characteristics that are well associated with the wavelet base function form have a chance of producing high value coefficients [27]. Any other functions will be obscured or ignored altogether. Therefore it does not have high time-frequency power and resolution of HRV signals in each frequency band (VLF, LF, and HF).Materials and Methods

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A review on developments of polyphase machines

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