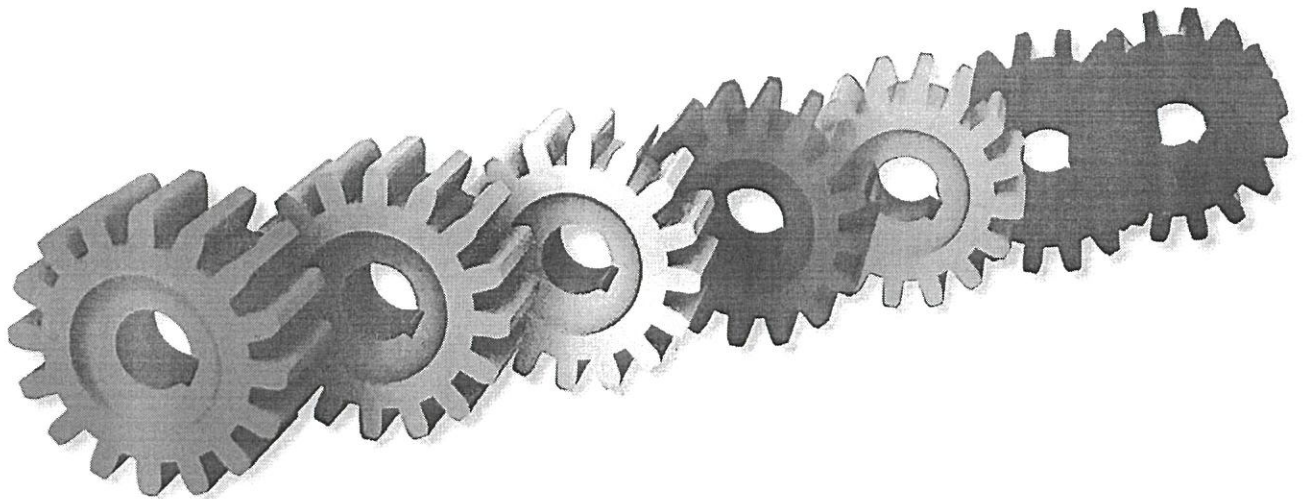




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Quality Management and Six Sigma



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Ab Initio Study of Oxygen Vacancy in Undoped and Co Doped Rutile TiO₂

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ABSTRACT

The electronic and magnetic properties of defect induced rutile TiO₂ was studied using the density functional theory with PWscf method. For this, Oxygen vacancy in TiO₂ and in Co doped rutile TiO₂ was created in 12 atom supercell. The band structure, total and partial density of states calculations were performed using Local Density Approximation plus Hubbard coefficient for the exchange correlation potentials. The calculated results showed the nature of ferromagnetism and reduction in band gap energy which is useful to enhance the photocatalytic activity of TiO₂ in visible light region as well as spintronic devices

Keywords— Vacancy, rutile, TiO₂, Density functional theory, Local Density Approximation

1. INTRODUCTION

Transition metals (TM) doped Titanium Oxide, one of the oxide based wide band gap diluted magnetic semiconductors are extensively studied for their potential applications in spintronic and photocatalytic devices¹. TM doped TiO₂ attracts a lot of research works both by theoretical and experimental methods. In case of theoretical works, the properties of TM doped TiO₂ was investigated by replacing the host Ti atom by a dopant atom. However, during the synthesis of TM doped TiO₂, it is quite common for the occurrence of Oxygen vacancies which largely affect the electronic, structural, magnetic and optical properties of TiO₂. Eventhough, the some researchers had studied influence of oxygen vacancy in TiO₂, the results were not the same². Moreover, effect of oxygen vacancy in undoped TiO₂ is not clear and O vacancy in Co doped TiO₂ has not studied so far well in the literature. So it is proposed to study properties of rutile TiO₂ containing Oxygen vacancy in doped and undoped system.

TiO₂ exhibits in three phases viz., rutile, anatase and Brookite. Out of these three polymorphs, rutile TiO₂ is the most general polymorph having tetragonal unit cell described by the space group P42/mnm. For the present work, 12 atoms supercell was constructed by extending the unit cell along z axis. Further, the Oxygen vacancy was created in TiO₂ by removing one oxygen atom. Subsequently, the study was carried out by creating the vacancy in Co doped TiO₂ (Ti₃CoO₇) in which one Ti atom was replaced by a cobalt. Co doped TiO₂ was found structural stability in ferromagnetic ordering and so it was selected for this present investigation (Figure.1 (a-d)). The lattice parameters of the TiO₂ unit cell are a = b =

4.5845 Å and c = 2.95331 Å at room temperature and internal parameter u = 0.30493³. Although, the local density approximation for the exchange correlation functional used in DFT calculation predicts the band gap, it had been seen that the band gap was underestimated⁴. To overcome this Hubbard correction was implemented in the DFT calculation to improve the band gap prediction.

2. COMPUTATIONAL METHOD

PWscf method was to calculate the electronic-structure properties within DFT using Plane Wave basis set and pseudo potentials⁵. Local Density Approximation plus Hubbard correction (LDA+U) was used to describe the valence electrons and ion core interaction. In this work, the energy cut-off of 40 Ryd and 400 Ryd for the wavefunctions and charge densities were used to calculate the band structure and magnetic properties. For the band structural studies, the Brillouin-zone integrations were performed using the Gaussian smearing technique with a width of 0.04 Ryd. The energy convergences were checked with respect to the cut-off energy and k-point Sampling. K point sampling grid of 16 × 16 × 12 was used for performing the structural stability in nonmagnetic (NM), ferromagnetic (FM)) and anti ferromagnetic (AFM) ordering. ELK-Full Potential Linear Augmented Plane Wave, local orbital code⁶ was used for intensive and accurate investigations on the magnetic properties.

3. RESULT AND DISCUSSION

To study the structural stability of these compounds the calculated total energies are computed for four compounds by varying the molecular volume as similar to our earlier works⁷ from 1.15 V₀ to 0.80 V₀, where V₀ = V_{exp}.

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Adiabatic Compressibility and Acoustic Impedance of Binary Solvent Systems by ANTON PAAR Equipment & Solvent Ion Interactions

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ABSTRACT

This communication reports adiabatic compressibility and acoustic impedance by using ultrasonic velocity and density data, obtained on the very sophisticated and very accurate "ANTONPAAR" set up Model DSA 5000 M (Supplied by Anton Paar, Graz, Austria) which gives highly reproducible data. The Ultrasonic velocity, Density and Refractive index at five different temperatures (298K, 303K, 308K, 313K, 318K) were determined for the electrolyte of Copper sulphate (penta hydrated) in the binary Aqueous mixture of Ethylene Glycol (EG). Three compositions of the aqueous solvent mixture, with percentage of the EG varying in steps of 10%, starting from 50% to 70%, by volume are chosen for the study. As many as twelve molal concentrations in the concentration range of the electrolyte (dissolved in each of the chosen binary solvent mixture of EG and water) from 0.1 to 1.2, are studied. Using this data, some important parameters (adiabatic compressibility and acoustic impedance) were evaluated with the help of Matlab Programmes. The conclusions about the solute-solvent interactions in binary electrolytic solutions, find vivid confirmation in our plots.

Keywords— Adiabatic compressibility, Acoustic impedance, concentration, Ultrasonic spectroscopy, molecular association, ANTONPAAR, EITPM.

1. INTRODUCTION

Studies involving density and ultrasonic velocity measurements are important for elucidation of different kinds of association, intermolecular interaction and their relative strength in various multi-component liquid systems [1-2]. Ultrasonic spectroscopy is an excellent non-destructive technique for probing the structure of materials. The ultrasound waves when applied to liquids give information about molecular motion. This thermodynamic study is a powerful tool in characterizing the various aspects of physico-chemical behaviour of the liquid mixture and studying the interaction between the liquid mixtures [3]. The variations in ultrasonic velocity and related acoustical parameters reveal several aspects about the structural changes associated with the liquid mixtures having interacting components [4]. The properties of Acoustic Impedance and the Adiabatic compressibility reckon simultaneously the compressional as well as the mass distribution of the ions of the binary liquid mixtures as well as the Electrolyte which give more comprehensive information about the structural and interactional aspects of the liquid mixtures [5,6]. Thermodynamic and acoustic studies of liquid-liquid mixtures have been pursued for a number of years as a means of probing the intermolecular interactions between molecules [7].

The present work is a similar attempt and our considerations, elucidate our approach to comprehend the details about the molecular association. We limit to molecular interactions of binary liquid mixture of ethylene glycol with electrolytes such as (aq. CuSO₄) at the temperatures 298, 303, 308, 313 and 318 K by measuring ultrasonic velocity and density within these conditions [8].

2. MATERIALS AND METHODS

All the chemicals namely CuSO₄ were obtained from SD Fine Chemicals Ltd., India. These chemicals were used without any further purification. The velocity of sound waves was found using very accurate "ANTONPAAR" set up Model DSA 5000 M (Supplied by Anton Paar, Graz, Austria) which gives highly reproducible data. with an accuracy of ± 0.5 ms⁻¹. The density was measured using an oscillating U-tube set up which forms a part of the setup and gave an estimated reproducibility of 0.000005 gm-cm⁻³. The liquid used for both the measurements together is 3 ml and all the measurements are taken under similar conditions with temperature alone being the variable. Riyazuddeen and Umama Gazal *et al* [9] in the determination of the Transfer Partial Molar Volumes.

Effect of Plasticizer on Conductivity of PEO based Polymer Electrolytes

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ABSTRACT

Poly (ethylene oxide) (PEO) based polymer electrolytes were prepared in the weight ratios (90:10), (80:20) and (70:30) by using NaClO_3 , KBrO_3 and KIO_3 alkali salts. Dimethyl formamide (DMF) was used as plasticizer and doped to the polymer electrolytes to enhance in the ionic conductivity. These polymer electrolytes were prepared by using the solution casting technique with methanol as solvent. The complexation of polymer and salt were evaluated by using X-ray diffraction (XRD) studies. The conductivity-temperature plots were achieved in the range of 304-373K. Conductivity plots were shown an increase in conductivity with increasing of temperature. The plots have two regions, one below and the other the melting point (T_m). The increase in conductivity is about 10 times larger in the plasticizer-added polymer electrolyte system compared with exclusive of plasticizer-added polymer electrolyte system.

Keywords— Poly (ethylene oxide); X-ray diffraction; plasticizer; ionic conductivity.

1. INTRODUCTION

polymer electrolytes are rising technology due to its various applications, such as batteries, fuel cells, electro chemical display devices / smart windows, Photo electrochemical cells, etc [1-6]. The key for solid state polymer electrolytes are their mechanical properties, ease of fabrication of their films of desirable sizes and their ability to form electrode-electrolyte contact. The majority of the studies in the field are dedicated to PEO, PPO based polymer electrolytes using alkali metal salts [7-12]. In this attempt, the author investigated solid state polymer electrolyte films have been prepared by using Poly (ethylene oxide), NaClO_3 , KBrO_3 and KIO_3 alkali salts. XRD experimental technique has been applied to study the complexations of Poly (ethylene oxide) with NaClO_3 , KBrO_3 and KIO_3 alkali salts. DC conductivity of these polymer electrolytes carried out at a temperature range of 304 to 373 K. The increase in conductivity is about 10 times larger in the plasticizer-added polymer electrolyte system compared with exclusive of plasticizer-added polymer electrolyte system.

2. EXPERIMENTAL

Solid state films of (thickness \cong 100 - 150 μm) of pure PEO (Aldrich, $M.W. \times 10^5$) and different compositions of complexed films of PEO with various NaClO_3 , KBrO_3 and KIO_3 alkali salts have been prepared in the weight ratios (90:10), (80:20) and (70: 30) by solution casting technique with methanol as solvent. The mixture of these solutions were stirred for 10-12 hrs, it is cast on to poly

propylene dishes and evaporated gradually at room temperature. The final products were vacuum dried carefully at 10^{-3} mbar. The XRD spectra of all the polymer electrolyte films were achieved by means of a SIEMENS/5000 X-ray diffractometer, (Cu K α radiation $\lambda = 1.5406\text{\AA}$) in the range $2\theta = 5$ to 50° . The dc conduction was measured using the lab made conductivity device [13-14], in the temperature range of 304 to 373 K.

3. RESULTS AND DISCUSSION

3.1 XRD Studies

PEO complexations with various NaClO_3 , KBrO_3 and KIO_3 salts have been broadly examined by using X-ray diffraction studies [11 & 15-16]. The X-ray diffraction (XRD) patterns of pure PEO, pure alkali, [PEO+ NaClO_3 + Plasticizer] are given in the Figure 1. An assessment of pure PEO and [PEO+ NaClO_3 + Plasticizer] reveals the following dissimilarities.

- The diffraction peaks observed between $2\theta = 10^\circ$ and 30° are found to be less intense in complexed PEO films than pure PEO films. This indicates that the addition of NaClO_3 salt to the polymer causes a decrease in the degree of crystallinity of the polymer PEO.
- Peaks corresponding to the uncomplexed PEO are also present together with that of [PEO+ NaClO_3 + Plasticizer] films showing the simultaneous presence of both crystalline uncomplexed and complexed PEO. Earlier workers [15-17] have reported similar results on PEO complexed systems.

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Theoretical investigations of Ni- and Cu-doped TiO₂

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Theoretical Investigations of Ni- and Cu-doped TiO₂

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Abstract

The electronic, magnetic and optical properties of rutile $Ti_{1-x}TM_xO_2$ (where TM: Ni, Cu and $x = 0.25$) have been investigated by the density functional theory with the plane wave self consistent field method. For the calculation of exchange correlation potential, the local density approximation along with Hubbard correction (LDA +U) was used. Electronic, magnetic and optical properties were calculated using 12 atoms supercell of rutile TiO₂ with one Ti atom replaced by a dopant transition metal atom. The band structure of doped rutile phase indicates the reduction of band gap leading to improvement in the photocatalytic properties of TiO₂ as well as enhancement in its magnetic properties. The observed magnetism is explained on the basis of spin polarization of d states of Ti with dopants. Optical calculations by full potential, linear augmented plane wave plus local orbital (FP-LAPW+lo) method with ELK code established the presence of optical transitions in the visible light region. These theoretical calculations gave a meaningful information and excellent prediction to develop TiO₂ for spintronics applications and photocatalytic applications in the visible region.

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Electronic-band structures and optical properties of transition metal doped Zinc oxide

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Abstract

Wide band gap Oxide based diluted magnetic semiconductors (ODMS) exhibit unique magnetic, magneto-optical and magneto-electrical effects and can be exploited as spintronic devices. Theoretical studies of transition metal (TM) doped zinc oxide which belongs to these class of materials has been attracting significant research interest in the recent years. In this paper, the electronic band structures, and band gap energies of ZnO doped with transition metal have been analyzed by ab initio calculations based on the density functional theory using quantum espresso PWscf code. For the band gap calculations, we have used both local density approximation (LDA) and generalized gradient approximation (GGA). The magnetic and optical properties of the materials have been studied using the above method. For all the theoretical calculations, the model structures of transition metal-doped ZnO were constructed by using the 16 atom supercell with one Zn atom replaced by a transition metal atom. The results are useful in understanding the band gap variations with doping and other related properties in oxide based diluted magnetic semiconductors such as ZnO.

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Feature and Sentiment based Linked Instance RDF Data towards Ontology based Review Categorization

D. Teja Santosh, B. Vishnu Vardhan, Member, IAENG

Abstract-Online reviews have a potential impact on the green customer who wants to purchase or consume the product through e commerce. Online reviews contain features which are useful for the analysis in opinion mining. Most of the today's systems work on the summarization of the features taking the average features and their sentiments leading to structured review information. Often the context of surrounding feature is undermined which helps while classifying the sentiment of the review. In web 3.0 machine interpretable Resource Description Framework (RDF) were introduced which helps in structuring these unstructured reviews in the form of features and sentiments obtained from traditional preprocessing and extraction techniques. The context data also supports for future ontology based analysis taking support of Wordnet lexical database for word sense disambiguation and Sentiwordnet scores used for sentiment word extraction. Many popular RDF vocabularies are helpful in the creation of such machine processable data. In the future work, such instance RDF data will be used in the OWL Ontology to reason the data to clearly identify the features and sentiments against the applied data set. These results are sent back to the interface as corresponding {feature, sentiment} pair so that reviews are filtered clearly and helps in satisfying the feature set of the customer.

Keywords-Opinion mining, Feature, Sentiment, Resource Description Framework, Ontology

I. INTRODUCTION

User involvement in writing online reviews for the experience on a specific product is increasing now a days and it is a driving factor in purchase decision making. In web 2.0, the social web is introduced and with this provision, its database is increased from time to time leading to the plethora of reviews. These reviews which are regularly fed into the site are not useful for certain cross section of people. This has led to the concept of Opinion Mining [2].

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The requirement for categorizing reviews on the basis of extracted features with corresponding sentiments is potentially increased in recent past. The obtained features and sentiments are used in converting the unstructured reviews into a form which is suitable for data analysis task. Semantic Web's Resource Description Framework (RDF) [3] is used to structure the review data useful for opinion mining. Major RDF vocabulary metadata are used in the creation of such RDF. Generally RDF allows data to be processed outside the environment where it was created. SPARQL queries can be targeted on the RDF data to validate the features and sentiments on the reviews. This forms the basis for creating a standard OWL Ontology [4] which is used as the structured data model (knowledge model) with rich semantics towards identifying feature based review categories. The obtained categorizes filter the reviews making the purchase decision faster and accurate.

II. RELATED WORK

Sentiment Analysis of online reviews has received major research work in identifying features and extracting the sentiment/opinion words. Mingqing Hu and Bing Liu's [5] work on Mining and Summarizing Customer Reviews in which various product features are identified using Apriori Association Algorithm technique. Then they were used Bipolar Adjective Structure in identifying the opinion words and its role in opinion orientation. Shitanshu Verma and Pushpak Bhattacharyya [6] worked on SentiWordNet lexical resource to extract sentiment attached with the features in the review.

Machine Learning techniques are limited in classifying the online reviews based on the binary polarity classes i.e., positive or negative. Research in this aspect has also gained importance for improving the machine's performance for future unseen reviews. Christopher C. Yang et al. [7] used naïve Bayesian classifier as Machine Learning algorithm and used only those features obtained from Information Gain for sentiment classification.

Ontology based Opinion Mining has also been researched extensively in literature. Larissa A. de Freitas and

Band Gap Engineering of Transition Metal doped Zinc Oxide using First Principles Density Functional Theory

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ABSTRACT

The electronic band structures, and band gap energies of ZnO doped with transition metal have been analyzed by ab initio calculations based on the density functional theory using PWscf code. For the band gap calculations local density approximation (LDA) is used. For theoretical calculations, the model structures of transition metal-doped ZnO were constructed by using the 16 atom super cell with one Zn atom replaced by a transition metal atom. The results are useful in understanding the band gap variations with doping and other related properties in oxide based diluted magnetic semiconductors such as ZnO.

1. INTRODUCTION

The density functional theory (DFT) is a computational quantum mechanical modelling method used to determine the properties of a many-electron system by the spatially dependent electron density. In many cases the results of DFT calculations for solid-state systems agree quite satisfactorily with experimental data. In DFT the key variable is the particle density which in principle, is responsible for calculating the corresponding ground-state wave functions. In other words, ψ is a unique functional of particle density. Consequently the ground-state expectation value of an observable is also a functional of particle density and in particular, the ground-state energy. Ab initio DFT computational methods are applied for the study of systems exhibiting high sensitivity to synthesis and processing parameters. Examples of contemporary DFT applications include studying the effects of dopants on phase transformation behavior in oxides, magnetic behaviour in dilute magnetic semiconductors and the study of magnetic and electronic behavior in ferroelectrics and dilute magnetic semiconductors.

Zinc oxide, one of the wide band gap semiconductor materials has been studied extensively due to its excellent properties such as high electron mobility, high thermal conductivity, strong piezoelectricity, wide and direct band gap, large exciton binding energy, and strong luminescence. Eventhough ZnO ($E_g = 3.44$ eV) hexagonal and cubic structure have been investigated for a quite long time, it is difficult to find the band structure theoretically due to the hybridization of Zn-3d and O-2p orbitals and draw conclusions on the influence of TM dopant on the structure and properties. In this work, it has been demonstrated a simple method to predict the band

structure and the effect of doping by the density functional theory (DFT) method. The theoretical calculations were performed using plane wave self consistent field method within local density approximation LDA+U (Hubbard coefficient) method is one of the method to correct band gap errors by applying a potential to the 3d and 2p electrons of Zn and O of ZnO. It is possible to calculate U by varying it empirically taking into consideration of properties to be calculated.

2. COMPUTATIONAL METHOD

First principle electronic band structure calculations and materials simulations based on density functional theory (DFT) can be carried out using Quantum Espresso which uses plane wave basis sets and pseudo potentials (PPs) to represent electron-ion interactions. The atomic cores in this code are described by separable norm-conserving (NC) pseudo potentials, ultra-soft (US) pseudo potentials, and projector-augmented wave (PAW) sets. The calculations were performed using the plane wave self-consistent field (PWscf) program within the local density approximation (LDA+U) and generalized gradient approximation for exchange correlation potential function. In this present work, the energy cut-off of 80 Ryd and 640 Ryd for the wavefunctions and charge densities were used to calculate the band structure and other properties. For the band structural studies, the Brillouin-zone integrations were performed using the Gaussian smearing technique with a width of 0.05 Ryd. The energy convergences were checked with respect to the cut-off energy and k-point Sampling. K point sampling grid of $16 \times 16 \times 14$ was used for calculation the band gap of undoped and doped ZnO.

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Auto Scaling and Load Balancing Services in Cloud Computing

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Abstract

Today Cloud technologies are revolutionizing in every industry in providing scalable services to consumers without spending huge cost in the beginning. The scaling of infrastructure to the needs of consumer is few minutes to hours and called as "On demand". Today cloud storage gives possibility to companies to expand as per the need instead of proactively buying huge infrastructure. This kind of expansion is exactly as per the need is called as "elastic nature" of resources "on demand" availability. Cloud computations means the power of using higher capacity CPUs, RAMs, storage space and Network bandwidth based on number of TPS (Transactions per Second). To provide these on demand services we mainly use Auto scaling and Load balancing services in cloud. Load balancing will share the load among the existing resources and auto-scaling will scale up and scale down the resources according the load on resources. These services are examined by using the amazon web services with EC2 instances [4].

I. INTRODUCTION

Cloud services are mostly used services in today's global market to simplify the things. By using these cloud technologies many organizations provide their services to their customers without delay and in faster manner. Cloud service providers will give us a chance to choose the architecture what we want i.e., how much capacity of RAM is needed and how much storage space we want etc., based on our requirement we choose the particular servers to handle our data.

In these days most organizations are expanding their business from traditional methods to cloud computing to provide faster response to the users, shares the virtual space among the people and also sharing of resources among them to provide reliable, faster and accurate services to the user. In general cloud computing is anything that delivers the services over the internet. These services are divided into three categories IaaS (infrastructure as a service), PaaS (platform as a service), SaaS (software as a service) [5]. IaaS service provides the infrastructure as demanded by the according to their need such as servers, storage etc., the user has the choice to choose multiple VMs and different OSs. The user also has the choice to specify when to request and release the

resources. In PaaS platform includes both hardware and software integrated with specific programming interfaces. In SaaS, the software resides on the service provider's server; we access those services without installing them on our local machine [1].

II. AUTO SCALING AND LOAD BALANCING

A. Load balancing

Load balancer accepts the incoming traffic from clients and reroutes the traffic to the backend servers (instances). These servers are distributed in same/different availability zones. Load balancer distributes the traffic evenly among the availability zones so it is important to have equal number of instances in each availability zone. To distribute the traffic evenly among the backend instances regardless of availability zones, we enable cross zone load balancing under our load balancer thus provides the better fault tolerance [7].

Based on, where your backend instances are present, we categorize the load balancer in 2 ways those are Internet facing load balancer and internal load balancer. In Internet load balancer instances are in public subnet whereas the internal load balancer routes the traffic to instances in the private subnet.

B. Auto scaling

Auto scaling helps us to maintain correct number of instances (specified by user) to serve the user-requests. Auto scaling group is a collection of instances. We also have the choice to specify minimum size of instances (the auto scaling group never goes below this size) and maximum size of instances (the auto scaling group never goes beyond this size).

An auto scaling group is created by using the launch configuration (launch configuration is a template that is used by the auto scaling group to launch the new instances). One auto scaling group will have only one LC (Launch Configuration), if you want to change the auto scaling group LC, first we have to create a new LC and then update the AS group. Scaling plans of an AS (Auto scaling) group can be done in many ways those are manual scaling, scale based on

The Probabilistic Encryption Algorithm Using Linear Transformation

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Abstract. The probabilistic encryption produces more than one ciphertext for the same plaintext. In this paper an attempt has been made to propose a probabilistic encryption algorithm based on simple linear transformation. The variable length sub key groups are generated using a random sequence. A randomly selected element is replaced by each element of the plaintext from the corresponding indexed sub key group. With this a cryptanalyst cannot encrypt a random plaintext looking for correct ciphertext. The security analysis and performance of the method are studied and presented.

Keywords: Hill cipher, Sub key groups, Pseudo Random number, Probabilistic encryption.

1 Introduction

The information to be transmitted must be secure against several attacks. This is achieved by using encryption and decryption techniques, which converts readable of information into unreadable form and vice versa. Many numbers of cryptographic algorithms are available to provide secured transformation of information, but the efficiency and strength of the algorithm is one of the most important aspects to be studied in the field of information security. With the development of probabilistic encryption algorithms a cryptanalyst cannot encrypt random plaintext looking for correct ciphertext because the encryption process produces more than one ciphertext for one plaintext. We consider linear transformation based cryptosystem which is a simple classical substitution cipher.

In 1929 Hill developed a simple cryptosystem based on linear transformation. It is implemented using simple matrix multiplication and it hides single character frequency and also hides more frequency information by the using large key matrix. But it is vulnerable to known plaintext attack and the inverse of every shared key matrix may not exist all the time. It is a simple traditional symmetric key cipher and the message is transmitted through the communication channel is divided into 'm' blocks, each of size 'n'. Assume that both 'n' and 'm' are positive integers and M_i is the i^{th} block of plaintext. This procedure encrypt each of the block M_i , one at a time using secret key matrix. It maps each character with unique numeric value like A=0, B=1 ... to produce the 'n' characters in each of the block. The i^{th} ciphertext block C_i can be obtained by encrypting the i^{th} plaintext block M_i using the following equation (1)

An Efficient Approach for Mining Positive and Negative Association Rules from Large Transactional Databases

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Abstract — In data mining association rule mining play vital role in finding associations between items in a dataset by mining essential patterns in a large database. Standard association rules consider only items present in dataset transactions. These types of rules are called as positive association rules. The other kind of rules called Negative association rules also consider the same items, but in addition considers negated items which are not present in dataset transactions. These two association rules are important in market-basket analysis to identify correlations that conflict with each other or correlations that complement each other. In this paper, we propose an algorithm that mines positive and negative association rules without adding any additional measure and extra database scans.

Keywords — Data Mining, Positive Association Rules, Negative Association Rules, Support, Confidence, Rules Correlation Coefficient.

I. INTRODUCTION

Data mining is an extraction method intended to discover correlated patterns contain in a large dataset. Data mining field uses a combination of machine learning, statistical analysis, modeling techniques and database technology. The intention is to find patterns, correlated relationships and inferring association rules that could provide more information about the data and might help for better future preparation.

A. Association Rule Mining

Association rule mining is a very essential data mining process that finds associations between items in a transactional dataset. These rules have been studied in the existing studies for their applications in many domains such as classification risk analysis, financial data analysis, process monitoring, data analysis, and fault identification etc. discovery of efficient and effective rules has been a major focus in the data mining research. From the well known Apriori algorithm there have been a significant number of variants and improvements of association rule mining algorithms. The market basket analysis is the classic example of association rule mining applications. The activities of the customers are analyzed with suggestions for purchasing diverse items in a shopping store.

The detection of intended itemsets in large volume of data can go ahead to significant selling and administration tactical decisions. Let us consider a situation, when a customer purchases office software then how much percentage of probability that customer purchases a antivirus software. Based on the above analysis of finding correlations, the shopping store personnel can arrange the items with the advanced planning to attract the users for improving the sales. The marketing people can think about different discounts plans to catch the attention of the customers. Most of the existing mining methods were developed to find the positive association rules between itemsets. Positive associations refer to correlations exist between itemsets in the transactional dataset which contain the item sets purchased collectively. There are some situations where negative correlations are used like, customers purchased office software do not purchase antivirus software. Keeping this in mind negative associations are also having equal importance to mine worth full information along with positive associations. The following chapters will describe about Positive Negative Association Rule Mining (PNARM) techniques.

II. BASICS OF ASSOCIATION ANALYSIS

Association rule describes the correlation between two or more itemsets. We can illustrate the association rule mining (ARM) process as follows: $I = \{i_1, i_2, i_3, i_4, \dots, i_n\}$ be a collection of items. D is the collection of transactions where each transaction T is a group of items such that $T \subseteq I$. Each transaction is identified with a distinctive identifier called $T \times ID$. A transaction T is said to contain X , a group of items in I , if $X \subseteq T$. The representation of an association rule is in the form: $X \Rightarrow Y$ which is also called as positive association rule (PAR), where $X \subseteq I$, $Y \subseteq I$, and $X \cap Y = \text{NULL}$ or Φ . The support of $X \Rightarrow Y$ is (S) in the transaction set D if S% of the transactions in D contains XUY . That is the support of above rule is defined as the probability that X and Y present jointly in number of transactions of dataset. There is another measure called confidence used to find the association among itemsets. The confidence (C) of rule $X \Rightarrow Y$ defines in the transaction dataset D when C% of transactions in D that contain X which include Y . The task of finding intended total association rules

Anomaly Detection Through Comparison of Heterogeneous Machine Learning Classifiers vs KPCA

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Abstract. The anomaly detection is applicable to wide range of critical infrastructure elements due to frequent change in anomaly occurrences and make sure to avoid all threats identified in regular. In this perception, we have to identify the abnormal patterns in applications and to model them by using a new adorned machine learning classifiers. In this paper we are investigating the performance by comparison of heterogeneous machine learning classifiers: ICA (Independent Component Analysis), LDA (Linear Discriminant Analysis), PCA (Principal Component Analysis), Kernel PCA and other learning classifiers. The Kernel PCA (KPCA) is a non linear extension to PCA used to classify the data and detect anomalies by orthogonal transformation of input space into (usually high dimensional) feature space. The KPCA use kernel trick by extract the principal components from set of corresponding eigenvectors and use kernel width as performance parameter to determine rate of classification. The KPCA is implemented on taking two UCI machine learning repository sets and one real bank dataset. The KPCA implemented with classic Gaussian kernel internally. Finally KPCA performance compared with projection methods (ICA, LDA, PLSDA and PCA), other kernel (SVM-K) and non-kernel techniques (ID3, C4.5, Rule C4.5, k-NN and NB) applied on same datasets using training and test set combinations.

Keywords: Anomaly detection · Kernel · ICA · LDA · PCA · SVM · KPCA

1 Introduction

The anomaly detection [2] is an emerging concept in the field of information security. The anomaly detection job is an abnormal pattern indicator (detect) and help to thwart the intrusive patterns or exploits which deviate to normal. The anomaly detection is subset of IDS (intrusion detection systems) primarily elaborated by Anderson [1]. He proposed an IDS based on two functional criteria: model based on events (i.e. Statistical anomaly detection [1, 18]), or rules generated from behavior (i.e. Rule based anomaly detection [2, 3, 18]). The two methods are fine in early inception of

RBDT: The Cascading of Machine Learning Classifiers for Anomaly Detection with Case Study of Two Datasets

Goverdhan Reddy Jidiga and Porika Sammulal

Abstract. The inhuman cause of behavior in computer users, lack of coding skills pursue a malfunctioning of applications creating security breaches and vulnerable to every use of online transaction today. The anomaly detection is in-sighted into security of information in early stage of 1980, but still we have potential abnormalities in real time critical applications and unable to model online, real world behavior. The anomalies are pinpointed by conventional algorithms was very poor and false positive rate (FPR) is increased. So, in this context better use the adorned machine learning techniques to improve the performance of an anomaly detection system (ADS). In this paper we have given a new classifier called rule based decision tree (RBDT), it is a cascading of C4.5 and Naïve Bayes use the conjunction of C4.5 and Naïve Bayes rules towards a new machine learning classifier to ensure that to improve in results. Here two case studies used in experimental work, one taken from UCI machine learning repository and other one is real bank dataset, finally comparison analysis is given by applying datasets to the decision trees (ID3, CHAID, C4.5, Improved C4.5, C4.5 Rule), Neural Networks, Naïve Bayes and RBDT.

Keywords: Anomaly detection, C4.5, Decision tree, Naïve bayes, RBDT.

1 Introduction

Anomaly detection [2] is a kind of intrusion detection to model the behavioral patterns in image and medical applications, novelties in industrial machine malfunctions, fraud accounting actions in financial banking sectors and also the

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A Novel Approach for Imputation of Missing Values for Mining Medical Datasets

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Abstract—Imputation of missing attribute values in medical datasets for extracting hidden knowledge from medical datasets is an interesting research topic of interest which is very challenging. One cannot eliminate missing values in medical records. The reason may be because some tests may not been conducted as they are cost effective, values missed when conducting clinical trials, values may not have been recorded to name some of the reasons. Data mining researchers have been proposing various approaches to find and impute missing values. In this paper, we propose a novel imputation approach for fixing missing values. The approach is based on clustering concept and aims at dimensionality reduction of the records. This serves the need to use the same records of lower dimension to be used for clustering and classification of medical records to arrive at accurate decision prediction. The case study discussed shows that the missing values can be fixed and imputed efficiently by achieving dimensionality reduction. The proposed approach for imputation also achieved dimensionality reduction to perform efficient prediction of missing values.

Keywords— *imputation; missing values; prediction; nearest neighbor, cluster, medical records, dimensionality reduction*

I. INTRODUCTION

Medical records preprocessing is an important step which cannot be avoided in most of the situations and when handling medical datasets. The attributes present in medical records may be of different data types. Also, the values of attributes have certain domain which requires proper knowledge from medical domain to handle them.

This is because of this diverse nature of medical records, handling medical records is quite challenging for data miners and researchers. The various preprocessing techniques for medical records include fixing outliers in medical data, estimation and imputing missing values, normalizing medical attributes, handling inconsistent medical data, applying smoothing techniques to attributes values of medical records to specify some of them.

Data Quality depends on Data Preprocessing techniques. An efficient preprocessing of medical records may increase the data quality of medical records. In this context, data preprocessing techniques have achieved significant importance from medical data analysts and data miners. Incorrect and improper data values may mislead the prediction and classification results, there by resulting in false classification results and thus leading to improper medical treatment which is

a very dangerous potential hazard. This research mainly aims at handling missing attribute values present in medical records of a dataset. The attributes may be numeric, categorical etc. The present method can handle all the attribute types without the need to devise a different method to handle different attribute types. This is first importance of our approach.

We outline research objective and problem specification in the succeeding lines of this paper and then discuss importance of our approach.

A. Research Objective

We have the following research objectives in this research towards finding missing values

- Obviously our first and foremost objective is to impute missing values.
- Aim at dimensionality reduction process of medical records.
- Classify new medical records using the same approach used to find missing values.
- Cluster medical records to place similar records in to one group.

B. Problem Specification

Given a dataset of medical records with and without missing values, the research objective is to fix set of all missing values in the medical records by using a novel efficient Imputation approach based on clustering normal medical records, so as to estimate missing values in medical records with missing values.

C. Importance of Present Approach

The importance of the present approach which we wish to propose has the following advantages

- The method may be used to find missing attribute values from medical records
- The same approach for finding missing values may be used to classify medical records
- The disease prediction may be achieved using the proposed approach without the need to adopt a separate procedure

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Kernel Centric Machine Learning Classifiers for Anomaly Detection with Real Bank Datasets

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Abstract— the machine learning is more effective today in anomaly detection to improve the classification accuracy. The use of powerful kernel based learning is very practical in current trends may expose accurate results in real time database applications. In this context, we need to use the new and adorned machine learning classifiers. In this paper we have given very successful and emerged kernels SVM (Support Vector Machines) which uses the marginal hyperplane uniquely determine the classes by mapping of data and KPCA (Kernel Principal Component Analysis) is an extension to PCA. Both used to classify the data and detecting anomalies by transforming input space into high dimensional feature space. The SVM kernel is use non-linear mapping function and inner product replace with kernel ingredients. KPCA extract principal components from set of corresponding eigenvectors and used as threshold with reference to kernel width. The SVM and KPCA are implemented by taking one real-time bank dataset and other from UCI machine learning repository sets. Finally performance compared with non kernel techniques (CART, k-NN, PLSDA, PCA) applied on same datasets using training and test set combinations.

Keywords— Anomaly detection, Kernel, KPCA, Machine learning, SVM

I. INTRODUCTION

The anomaly detection [1] is most prominent and future working platform in security of information to thwart the anomalous exploits by learning classifiers evolved in the machine learning with cascading concepts of data mining [2]. In this paper we are using kernel classifiers [18] to deal with to find the anomalous data occurrences in real world databases. The kernels [17, 18] are used as a class of similarity function in classification techniques to learn example statistics for the applications of patterns, vectors, points and real world data. The main function of kernel is find the relation by mapping the input data (space) to feature space which has high dimensional to get better classification towards our objective of work. The knowledge behind the kernel is to replace the dot product with a kernel by perform a transformation of linear function to non-linear function. The learning classifiers increase the high dimensional feature space and it is used to generate model to improve the performance of classification as well as detection [3]. The system issues also consider while designing of classifier model, because many of anomaly detection systems (ADS) are use the traditional machine learning approaches, but

degrade the speed of detection of anomalies. Anomaly detection aim is to detain the suspicious and abnormal actions which deviate from trained sets in learning model. In anomaly detection, applying kernel based machine learning classifiers like KPCA, KCCA, SVM, and KICA are more suitable to evaluate detection easy. Some ensemble machine learners also playing a major role to detect novelties (low false positives).

The anomaly detection [2, 3] is a branch of intrusion detection systems (IDS) to elevate independent outliers whose behavior is not near to most probable class. Today the anomaly detection is modernized with latest machine learning classifiers [3, 4] to strengthen anomaly detection rate, because of its strong statistical foundations to enhancing the dynamic and accurate learning that gives possible performance improvements. The conventional classification is based on heuristics, normal rules, patterns or signatures, and will detect attacks fall under the type of misuse. Now sound research is done today, also researchers thinking to heavy focus on anomaly detection by learning classifiers to predict the application level behavior. In this paper, SVM and KPCA [17] are used as anomaly detection techniques by extracting patterns from high dimensional data constructed from datasets and kernels takes classification role. The KPCA is an advance to PCA, which takes multivariate data and generate a new kind of co-ordinates called principal components by use of eigen values and orthogonal transformation of data coordinates.

In this paper we are using two well known kernels to model the data shown in fig.1, and some of existing popular kernels [18] are given here (page-2): Gaussian kernel, polynomial kernel, RBF kernel, PCA kernel, SVM kernel, kernel bayes rule and sigmoid kernel also used by some authors. The general symbols used in kernels: X, Y - input space, Φ - feature mapping function ($\Phi: X \rightarrow F$), A - Lagrange multiplier in SVM, K - kernel Function, F - feature space, Δ - maximum margin, M - weight of the kernel, d - degree, c - constant, σ - kernel width or bandwidth. Generally the kernel can define as $K: X \times X \rightarrow R$, such that $\Phi(x)^T \cdot \Phi(y) = K(x, y)$. K is kernel used to measure similarity as per Mercer theorem. The paper is organized as: section-II covers previous work related to our scope; section-III gives detailed procedure of KPCA and SVM; section-V carries experimental task and its results.

(5)

A Multibiometric Fingerprint Recognition System Based on the Fusion of Minutiae and Ridges

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Abstract. Fingerprints are widely used since more than 100 years for personal identification due to its feasibility, permanence, distinctiveness, reliability, accuracy and acceptability. This paper proposes a multibiometric fingerprint recognition system based on the fusion of minutiae and ridges as these systems render more efficiency, convenience and security than any other means of identification. The increasing use of these systems will reduce identity theft and fraud and protect privacy. The fingerprint minutiae and ridge features are ridge bifurcations and ridge endings respectively that are combined to enhance overall accuracy of the system. The existence of multiple sources adequately boosts the dimensionality of the feature space and diminishes the overlap between the feature spaces of different individuals. These features are fused at feature level as it provides better recognition performance because the feature set comprises abundant source information than matching level or decision level.

Keywords: Fingerprint, Feature level fusion, Hough Transform, Multimodal Biometrics, Minutiae, Ridges.

1 Introduction

Biometrics are automated methods of recognizing an individual based on their physiological (e.g., fingerprints, face, retina, iris) or behavioral characteristics (e.g., gait, signature). It is the ultimate form of electronic verification of physical attribute of a person to make a positive identification. Each biometric has its strengths and weaknesses and the choice typically depends on the application. No single biometric

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Comparison of properties affecting the performance of Hypercube Interconnection Networks

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Abstract: The performance of an Interconnection network can be considered as a key factor in the construction of parallel computers. Such performance criteria are useful in the selection of the interconnection networks while constructing the parallel computers as they depend upon the applications that are used. In this paper, we propose a methodology where different criteria affecting the performance of Hypercube Interconnection networks are evaluated and compared. This methodology is applied over a group of variants of Hypercube Interconnection networks and efficient type is suggested for applications.

Key words: Interconnection networks, performance criteria, Hypercube.

1. Hypercube Network.
2. Folded Hypercube Network.
3. Multiply Twisted Cube Network.
4. Multiple Reduced Hypercube Network.
5. Half Hypercube Network.

Hypercube Network:

According to Geometry, a Hypercube is n-dimensional figure which is analogous to a cube in 3 Dimension and a square in 2 Dimension. A Hypercube Interconnection network which is analogous to a square consists of four processors and a processor memory module is placed at every vertex of square. The diameter of the interconnection network is the minimum number of steps it takes for one processor to send a message to the farthest processor. So for eg, the diameter of a hypercube analogous to a square with 4 vertices is two. In a hypercube interconnection network which is analogous to a cube with eight processors and each processor and memory module being placed at each vertex of the cube, the diameter is three. Thus, if a system contains 2^n processors with each processor directly connected to n other processors. its diameter will be n. A hypercube network suffers from the disadvantage that it must be designed in powers of 2, so a machine must be built that could efficiently have many processors than that is actually required for the specific application.

Different types of Hypercube are shown below.

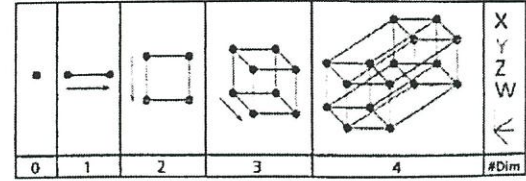


Fig. (a) Types of Hypercubes

I. INTRODUCTION

In the construction of parallel computers, interconnection of processors and linking the memory module to them effectively is not an easy task as more than one transaction takes place simultaneously. A single bus might not serve the purpose as it cannot transfer more than single message at a single point of time. Another option is the usage of a crossbar in which all the processors can be connected to each other. But the crossbar is complex in nature, expensive and it is difficult to be controlled when the number of processors to be interconnected increases. Thus Interconnection networks are suitable to be used as the media for intercommunication among the processors while constructing the parallel computers.

II. VARIANTS OF HYPERCUBE INTERCONNECTION NETWORKS

We have different variants of Hypercube interconnection networks. Some of them are shown below:

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Semantic Image Clustering using Region based on Positive and Negative Examples

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Abstract

With advances in information retrieval systems and various technologies, the amount of image databases in our world has been exploding day-to-day. Efficient retrieval of relevant images remains a challenging task in Content Based Image Retrieval (CBIR). Understanding the user needs and describing the images in semantic terms is an important and challenging task that requires integrating user interested query regions, visual features and semantic concepts. In this paper we address the provocative issues to reduce search space and semantic gap in CBIR. Semantic clustering is used before image retrieval to reduce the search space that is close to the user query target. Our proposed model introduces new technique of Semantic Clustering in two stages. In the first stage, initial semantic clusters are constructed from the database log file by focusing on user interested query regions. In the second stage, initial clusters are refined by the relevance feedback. We incorporated Relevance feedback model based on probabilistic feature weighting that uses Positive example (PE) to perform generalization and Negative example (NE) to perform specialization. Expected results show that the proposed system enhances the performance of semantic clusters.

Keywords : Content based image retrieval (CBIR), Negative example (NE), Positive example (PE), Relevance feedback (RF), Semantic image clustering.

1. INTRODUCTION

With the advances in image processing, information retrieval, and database management, there has been an extensive study on various Image Retrieval Systems. In image retrieval the motivational research has been moved from keyword based, to content based then towards semantic based image retrieval. Content Based Image Retrieval (CBIR) is an alternative to text based image retrieval where the low level features or high level visual features are retrieved for huge amount of image databases. One challenge in this area is difficulty in search from the large amount of image databases, which is time consuming process. Another challenge in this area is reducing the semantic gap. The discrepancy between low level image features and the richness of the user semantics is referred to as the Semantic gap. CBIR mainly consists of feature extraction and similarity matching. Recently, the

research focuses on CBIR systems that are fetching the exact cluster of relevant images.

Clustering is an unsupervised learning technique that can partition the data into groups of similar objects. Image Clustering is an important technique to organize the large amount of into clusters, such that intra cluster images should have similar meaning and inter cluster images should have dissimilar meaning. The fundamental objective of carrying out image clustering is to acquire content information the users are interested in from the image group labels associated with the image. The main goal of image clustering is to find a mapping of the archive images into clusters such that the set of clusters provide essentially similar information about the image archive as the entire image-set collection. Image clustering enables the implementation of efficient retrieval algorithms and the creation of a user-friendly interface to the image database. Image clustering is used to solve the problems of image segmentation, compact representation, search space reduction and semantic gap reduction. Compact representation for faster indexing and searching from large scale image repository is a crucial issue in image clustering. Symbolic level abstraction is used to map high level concepts to find user interested images. Visual level abstractions are used to find objects and their relations. Visual features are mapped to semantic concepts in order to form concept description that narrows the semantic gap. Research for solving semantic gap to extract relevant images is moving towards Semantic Clustering and it is focusing on direct mapping of visual features to semantic concepts.

Semantic image clustering is the concept of grouping unstructured images based on latent aspect of meaning. In image retrieval system, semantic clustering places a vital role by retrieving user interested meaningful images. The main objective of the semantic clustering is to reduce the search space and semantic gap. Searching user query relevant image as a whole will leads to increase the search space. User is searching to retrieve relevant images from the data base through the query. Most of the existing image retrieval systems are focusing on whole image as a similarity measure to the

Local Features Based Image Matching Using Sift Algorithm

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Abstract

The challenges in local-feature-based image matching are variations of view and illumination. Many methods have been recently proposed to address these problems by using invariant feature detectors and distinctive descriptors. However, the matching performance is still unstable and inaccurate, particularly when large variation in view or illumination occurs. In this paper, a view and illumination invariant image-matching method is proposed. Estimation the relationship of the relative view and illumination of the images, transform the view of one image to the other, and normalize their illumination for accurate matching is done iteratively. This method does not aim to increase the invariance of the detector but to improve the accuracy, stability, and reliability of the matching results. The performance of matching is significantly improved and is not affected by the changes of view and illumination in a valid range. The proposed method would fall when the initial view and illumination method fails, which gives a new sight to evaluate the traditional detectors. Two novel indicators for detector evaluation, namely, valid angle and valid illumination, which reflect the maximum allowable change in view and illumination, respectively are proposed.

1. INTRODUCTION

Image matching is a fundamental issue in computer vision. It has been widely used in tracking, image stitching, 3-D reconstruction, simultaneous localization and mapping (SLAM) systems, camera calibration, object classification, recognition, and so on. Image matching aim to find the correspondence between two images of the same scene or objects in different pose, illumination, and environment. Focus on local feature-based image matching. The challenges of this work reside in stable and invariant feature extraction from varying situations and robust matching. In image matching, key region or point of interest is often used as the local feature due to its stable performance in detection and description. A region feature is usually derived from a circle or ellipse with certain location and radius and is effective and efficient, compared with other types of features such as edges and contours. Therefore, region features are extensively used in real applications.

Interesting points are extracted from images and the region of interest is the associated circular or elliptical region using

the interesting point. Generally, Hough Space (SIFT) is used to extract the interesting point. SIFT (SIFT) is used as the interesting point since they are stable and easy to locate and describe. The radius of the region is determined by a priori setting. Hough space is the region scale invariant feature. The total number of features detected is the minimum number of the features extracted from the matched image.

Color, structure and texture are widely used to describe images. Descriptors with edge orientation information (SIFT) and HOG are used since they are more robust to scale, blur and rotation. Matching features (i.e. features from two images) are first matched when they are the nearest pair. A handful of distances can be used in practice, such as L1 distance, L2 distance, Histogram intersection distance, and earth mover's distance. If the nearest distance is higher than k times of the second nearest distance, the nearest matching pair will be removed. These are the very initial matching results. Then the priori hypothesis of the object transform filters the un-uniform transformed matches, imply, use plane objects to show the effectiveness of the proposed method.

For the multi transform problem, the proposed method could be also integrated. Random sample consensus (RANSAC) is used to select the uniform or multiple transformations set from all the matches.

The three parts of the detect-describe-match (DDM) framework determine the performance of image matching.

The first step is the basis of this framework. Unstable and variant features increase the difficulty of the next steps. Researches mostly focus on the first step for many years. Many extraction and have proposed many excellent descriptors. However, an important experience of a previous work is that all the state-of-the-art feature detectors are not directly invariant to the changes of view and illumination. The same interesting regions extracted from the matching images tend to be fewer and fewer when increasing the variation of view or illumination. For larger changes, there would be less or no local features that can be extracted from both images to be matched.

This describing region color, structure and texture are widely used to describe images in the next two steps.

AADHAR Integrated Biometric Vigilance System- A digital measure to curb malpractices In entrance tests

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Abstract- In recent years, increase in unemployment and corruption has raised the irregularities in entrance exams conducted by the state public service commission. Tricks such as impersonation, copying, manipulation of records/answer sheets are used to offer high marks for undeserving candidates, in exchange for kickbacks. Though there are various layers of security measures, the problem is deep rooted in entire process. Measures to strengthen the examination process and devoid it of corruption and malpractices is required to protect better human resources and skills. Further, providing transparency, fairness and accountability in exams conducted ensures equality, justice and build faith in citizens. In order to curb and check the corrupt practices in entrance tests, a digital registration and real time vigilance system is proposed in this paper. Registration of AADHAR number of candidates, invigilators, evaluators and board officials, and verification of their multi-biometrics at various stages of recruitment process solves bogus candidates, mismanagement of applications, verification of antecedents and nepotism. Installation of hi-tech electronic equipment like surveillance cameras and RF detectors in exam centre instil vigilance and stops impersonation and copying. Captured video data is also stored for future investigations, and scrutiny and accountability of invigilators and evaluators. Real time implementation of image processing techniques on high resolution video streams collected from networked surveillance cameras is used for face identification and anomaly detection on the spot. Further, the problem of manipulation of answer sheets is solved by employing coding techniques and visual secret sharing concepts of scanned answer sheets in the proposed method. Though the proposed system is costly, it is robust and will help bolster public trust, and resolves the nightmare of the candidates and authorities conducting the exam. Further it brings genuine candidates at the helm of administration, which is essential for realizing ethics in governance.

Keywords: AADHAR, Automated Surveillance Systems, Biometrics, Compressive Theory, Entrance tests, Impersonation, Image Processing, OMR, Visual Cryptography

1. Introduction

With an increase in rising competition, unemployment and desire to get into civil services, malpractices and corruption are in rise at every stage of examination/recruitment process. The series of incidents like Vyapam scam (Web-1), cancellation of Uttar Pradesh Provincial Service Examination, charges against chairman of Rajasthan Public Service commission's chairman and arrest of CM of Haryana, All India Pre Medical Test exam etc. shows that there is rampant corruption and abnormalities in State level Public Services Commissions. The corruption is widespread and is involved in almost every stage starting from the selection of members conducting the examinations, application filling, and malpractices in actual exam, evaluation, and interview. Tricks such as impersonation, copying, manipulation of records/answer sheets has become more common.

The recruitment or admission process of public service commission has become the nightmare to the candidates and authorities conducting the exam. Malpractices in such prestigious exams leads to social and economic inequality rises as only well to do can utilize power and money to get job or

Remote Monitoring and Control of a Mobile Robot System with Obstacle Avoidance Capability

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Abstract With the advancements in technology, the field of robotics and automation has gained tremendous popularity. Mobile Robots are being widely used in a number of places including production plants, warehouses, airports, agriculture, medical, military, and in hazardous environments to reduce human efforts. In this paper, we present the design and implementation of a mobile robot system with obstacle avoidance capability for remote sensing and monitoring. The proposed system enables the user (base station) to send necessary commands to the remote station (mobile robot) using Dual-Tone Multi-Frequency (DTMF) signals for robot teleoperation. Global Positioning System (GPS) and Global System for Mobile communication (GSM) technologies are used, which provide user with mobile robot location in the form of a Google map link. The system also provides the user with real time video monitoring of the remote area by using an internet enabled device. The user can also save the images and record the videos captured by the mobile robot IP webcam at the remote location, which can be stored in a public cloud for later use.

Keywords—Mobile Robot; Global Positioning System; GSM Modem; DTMF decoder, Ultrasonic sensors; IP webcam

I. INTRODUCTION

There has been a tremendous increase of interest in mobile robots and their applications, although the notion of web-based robotics is relatively new and still it is in infancy, but it has captured huge interest of many researchers worldwide. One of the applications of wireless mobile robots is to sense several variables in the environment. Mobile robots equipped with sensors can be used to perform some dangerous and laborious human tasks, especially in hazardous environments, where human involvement is less, impossible or dangerous [1].

Wireless Communications is the most evolving fields of application in present scenario, where different technologies can be used so as to have automated systems with flexibility, accuracy and reliability. Today's advanced wireless technology provides a convenient way for us to develop a mobile robot system that takes an advantage of remote monitoring and controlling by using the GPRS. Conventionally, many mobile robots have equipped with different wireless technologies such as Bluetooth, Wi-Fi, Wireless LAN, RF technology, etc.

Yeong Che Fai et al [2] explores the implementation of Bluetooth technology in mobile robots, which gives robots the capability to move around autonomously with more complicated and powerful algorithm. Feng Cui et al [3] have proposed a system in which WLAN (wireless LAN) with high gain antenna is used to realize teleoperation function that operators can use the virtual robot to control the real robot several kilometres away. An innovative mobile robot navigation technique using radio frequency identification (RFID) technology is demonstrated in [4], in which the main idea was to exploit the ability of a mobile robot to navigate a priori unknown environments without a vision system and without building an approximate map of the robot workspace. Wireless robots based on RF technology, have several drawbacks such as limited working range, limited frequency range and limited control. Yi Jincang et al [5] proposed a mobile robot system with intelligent obstacle avoidance capacity by adopting multi-sensor data fusion technology and obstacle avoidance algorithm based on fuzzy control. Use of a mobile phone with Dual-Tone Multi-Frequency (DTMF) technology for robotic control can overcome limitations of existing systems and provides robust control, working range as large as the coverage area of the service provider, no interference with other controllers and up to twelve controls using DTMF. So this system will be a powerful and flexible tool that can provide service at any time, and from anywhere with the constraints of the technologies being applied [6].

The mobile robot navigation is obviously a major requirement for a mobile robot to survive in a given environment or to fulfill its mission to reach the destination. This localization / navigation issue can be solved by using the Global Positioning System (GPS). GPS has become an efficient positioning tool for numerous civilian and military applications. GPS technology works under different weather conditions across the world. If the user has a GPS receiver, he can track location of objects or individuals in outdoor locations.

General Packet Radio Service (GPRS) is a packet-based mobile communication service. It offers faster data transmission via a Global System for Mobile communication (GSM) network within a range from 56Kbps up to 114 Kbps and continuous connection to the internet for mobile phone and computer users. In this project, the GPRS technology is

Implementation of Microcontroller Based Driver Assistance and Vehicle Safety Monitoring System

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Abstract A number of traffic accidents are reported every year due to driver's declined alertness during driving and also due to drunken driving. It is necessary to monitor various parameters in order to assist and alert the driver so that accidents can be avoided. In this paper, we present the design and implementation of a prototype driver assistance and vehicle safety monitoring system. This system measures various driver assistance parameters such as eye blinking, heartbeat, and alcohol consumption, and various vehicle parameters such as engine temperature, presence of harmful gases, obstacle distance, and vehicle location. The proposed system is built using Arduino UNO board consisting of ATmega328P microcontroller. Arduino Integrated Development Environment (IDE) tool is used to develop the necessary software. An LCD display is used at the dashboard side to display the monitored values and necessary action is taken by the microcontroller for safety of the driver and vehicle. A GPS receiver is used in the vehicle to determine its location. This position information is sent using GSM modem to the police/owner in the form of Google map position link, when the driver or vehicle condition is abnormal, so that vehicle can be tracked.

Keywords—Driver assistance; Vehicle Monitoring; Sensors; Arduino ATmega328P Microcontroller; GPS; GSM Modem

I. INTRODUCTION

Modern day cars represent a symbiosis of several electronic subsystems that collaboratively give a safe and sound driving experience. Vehicle safety and security is important in today's fast-paced society. Various electronic driver assist systems have been employed for ensuring ease and safety of the users. Long hours of monotonous driving, e.g. on highways, is exhausting and quickly leads to loss of concentration. This leads to driver drowsiness decreasing his ability to operate vehicle safely thereby increasing the risk of occurrence of accidents. A driver assistance and vehicle safety system constantly monitors the vehicle surroundings as well as the driver's behavior to detect potentially dangerous situations at an early stage. In critical driving situations, this system warns and actively supports the driver and, if necessary, intervenes automatically in an effort to avoid a collision.

Many electronic circuits are used for efficient vehicle control and monitoring such as circuits for monitoring vehicle

location and speed, fuel level, battery voltage, engine temperature, fire or spark detection in the engine, obstacle distance, and detection of different combustible gases. The complexity of the functions implemented in these systems necessitates an exchange of data between them. With conventional systems, data is exchanged by means of dedicated signal lines. Controller Area Network (CAN) is a high performance and reliable advanced serial communication protocol which effectively supports distributed real time control. CAN is widely used for automobile applications.

Several authors have reported methods of enhancing vehicle and driver safety. Danisman et al [1] proposed a method to monitor a drowsy driver automatically by visualizing the changes in eye locations using horizontal symmetry feature of the eyes. Standard webcam is used in real time to detect eye blinks. Galatsis et al [2] explored the implementation of a vehicle cabin air quality monitor. In this method, carbon-monoxide (CO) and oxygen (O₂) gas sensors are designed to continuously monitor the dangerous gas concentrations and alarm is set to intimate the driver. Ye sun and Xiong Yu [3] implemented a driver assistance system that measures the bio-potential signals of human without any physical contact by using a delicate sensor and electronic design which measures Electrocardiography (ECG), Electroencephalography (EEG) and eye blink of the driver. DSP algorithms are used to extract the features of physiological parameters. Murata et al [4] made an attempt to predict the decreased arousal level using Bayesian estimation method. This Bayesian estimation method enables to predict the critical point in time where the accident occurrence probability is high.

Various designs of driver assistance system reported in open literature use eye blinking, measurement of ECG and EEG to detect driver fatigue/ drowsiness and health condition [3]. Other designs present only monitoring of vehicle parameters such as fuel level, battery voltage, engine temperature, fire or spark detection in the engine, and detection of different combustible gases [5]. For practical implementation of a driver assistance and vehicle safety monitoring system within the vehicle, we need to use two microcontrollers containing CAN controllers/transceivers connected through a CAN bus. One microcontroller will be at

Implementation of Interactive Home Automation Systems Based on Email and Bluetooth Technologies

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Abstract—Automation systems are gaining lot of popularity nowadays and are being used at various places such as shopping malls, toll gates, airports, etc. In this paper, we present the implementation details of two schemes for home automation and control. The first scheme presents a prototype of Home Automation System (HAS) for remotely controlling the appliances at home through the subject of email. This system is based on ARM11 Raspberry Pi microcontroller board. Python Integrated Development Environment (IDE) is used for developing the necessary software. The second scheme uses Bluetooth technology for controlling the devices when we are at home. It uses a HC-05 Bluetooth module and Bluetooth Controller mobile application for switching on or off the appliances. Relays and LEDs are used as load to demonstrate the working of the system. This prototype design can be extended for several applications including surveillance, power monitoring, fault monitoring, power control and security.

Keywords—Interactive Home automation; Raspberry Pi; Python language; Arduino Uno; Bluetooth

I. INTRODUCTION

Home automation refers to the application of computer and information technology for control of home appliances and domestic features. Home automation results in convenience, energy efficiency, and safety benefits leading to improved quality of life. In a home automation system (HAS), there is a collection of interconnected devices for controlling various functions within the house. Mobile devices are ideal in providing a user interface in a home automation system due to their portability and wide range of capabilities [1]. When far from the house, the user might want to check the status of home appliances or even schedule actions for his return. Most of the home automation systems make use of different wireless communication standards such as Bluetooth, ZigBee, WiFi, and the Global System for Mobile Communication (GSM) to exchange data and signaling between various components. Wireless home automation systems have the advantage of better system flexibility and scalability.

II. LITERATURE REVIEW

Gurek et al [2] presented an Android based HAS that allows multiple users to control the appliances by an Android application or through a website. Transformation of a normal

house into a smart house while reducing the energy consumption is proposed in [3]. Van Der Weiff et al [4] have used a mobile phone with Java capabilities, a cellular modem and a home server for home automation. The user commands are given through mobile phone via cellular modem to home server to control the home appliances. Al-Ali and Al-Rousan [5] proposed a HAS with the combination of Java Server pages, JavaBeans and interactive C to monitor the home appliances. The controlling of home appliances can be done locally via embedded system board and remotely via web browser. ZigBee is a wireless standard with low power consumption. It is suitable for the wireless home automation network. Yang Li et al [6] proposed a system in which the ZigBee technology is used for home automation.

This paper presents implementation details of two prototype home automation systems based on Email and Bluetooth technologies along with the experimental results.

III. HOME AUTOMATION SYSTEM USING EMAIL

In the recent years, a number of internet service providers have emerged into the market, and are providing greater internet bandwidths at competitive rates. Due to this, access to the internet has become cheaper as compared to the past. As a result, the popularity of network enabled home appliances has been increasing greatly in recent years due to the simplicity and much higher affordability. A prototype of the email based home automation system is implemented on ARM11 Raspberry Pi board for remote control and monitoring of the home appliances when we are away from the home. The implemented system is interactive, efficient and flexible according to the user needs.

A. Block Diagram of Email Based Home Automation System

Figure 1 shows the block diagram of Email based home automation system. In this method, the home appliances are controlled through the subject of email. A WiFi router is used to connect the Raspberry Pi board to the Internet. The user requests for switching ON or OFF the home appliances by sending email to the Raspberry Pi email account indicating the desired operation in the subject field of the email. Based on subject of the email, Raspberry Pi switches the relays ON or OFF. Also, the system sends a reply email to the user immediately indicating the status of operation performed by

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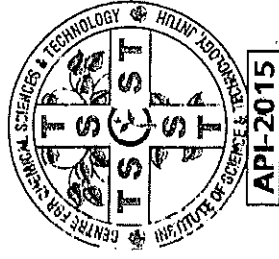


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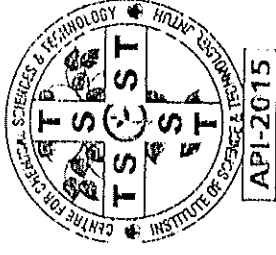
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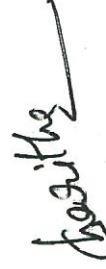
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A Wavelet based Multi Resolution Controller for Load frequency Control of Multi Area Deregulated Power System

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Keywords: Load frequency control, deregulation, wavelet based multi resolution controller and PI controller.

The dynamic model of two area thermal-thermal deregulated power system to address load frequency control problem is mentioned in Fig.2 [14-18].

Abstract

This paper presents design of wavelet based multi resolution controller to deal with load frequency control problem of multi area power system under deregulated environment. This proposed novel control strategy shall take care of nonlinearities in an effective manner. This proposed controller is tested on open access two area power system under one possible contract scenario. The performance of proposed method is compared with normal PI controller.

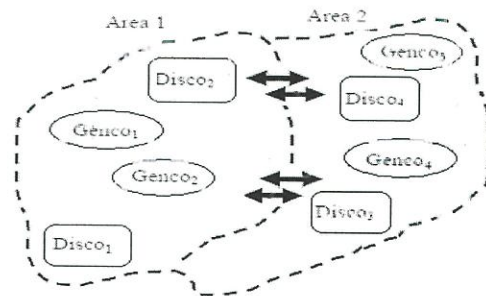


Fig 1 Configuration of two-area Power System connected with AC Tie-line.

1 Introduction

In power system load frequency control is more crucial problem due to frequency fluctuations there is a loss of economy to the country indirectly [1]. The fluctuation in loads causes the kinetic energy stored in the rotor altered [2], which affects the frequency deviations of the power system, due to frequency deviations, the undesirable operation of turbine and all power system components occurred [3]. Now a day's load frequency control problem concern to deregulated power system is very much attracted by the researchers due to its complexity. In deregulated environment design of load frequency controller is very much difficult due to more number of input parameters and also rapidly varying load demands of DISCOMs [4-12].

In this paper a wavelet based multi resolution controller proposed to solve load frequency control of multi area power system. In the design of the controller a decomposition technique is used to decomposed unwanted frequency signal and noise levels are reduce. Due to reduction of noise levels, there may be an improvement in the system dynamic response. The performance of proposed wavelet controller is compared to conventional PI controller under possible contract scenario.

The remaining paper presented the following. Section 2 the modelling of deregulated Thermal – Thermal system bilateral contracts is discussed. Design of multi resolution wavelet controller described in section 3. In section 4 simulation results are presented. Finally conclusions are given in section 5.

2 Mathematical Modelling of Restructured Power System for LFC Problem

The modelling of contracted demands and un-contracted demands are represented by *cpf*. The transactions of DISCOM with GENCO are represented by DPM matrix. The distribution of area control error between the areas is represented by *apf*.

The Area Control Error (ACE) is a function of frequency deviation and change in tie line power flow [19].

$$ACE_i = B_i \Delta f_{ierror} + \Delta P_{ierror} \quad i = 1, 2, \quad (1)$$

In deregulated power system the tie line power flow is a function of contract participation factor (cpf).

$$\Delta P_{tie\ 1-2\ scheduled} = \sum_{j=1}^2 \sum_{i=3}^4 cpf_{ij} \Delta PL - \sum_{i=3}^4 \sum_{j=1}^2 cpf_{ij} \quad (2)$$

$$\Delta P_{tie\ 1-2\ error} = \Delta P_{tie\ 1-2\ sched.} - \Delta P_{tie\ 1-2\ act.} \quad (3)$$

The transactions of DISCOMS with GENCO are given by [20]

$$DPM = \begin{bmatrix} cpf_{11} & cpf_{12} & cpf_{13} & cpf_{14} \\ cpf_{21} & cpf_{22} & cpf_{23} & cpf_{24} \\ cpf_{31} & cpf_{32} & cpf_{33} & cpf_{34} \\ cpf_{41} & cpf_{42} & cpf_{43} & cpf_{44} \end{bmatrix}$$

The Area Control Error participation factor is represented by *apf* for a multi-area power system consisting of M generators in a control area [21].

$$\sum_{j=1}^M apf_{ij} = 1 \quad (4)$$

The dotted and dashed lines in Fig.2 shows the load demand signals based on the possible contracts between GENCOS and DISCOs that carry information as to which GENCO have to follow a load demanded by that DISCO. These new information signals were absent in the traditional AGC scheme. The representation of two area power system with two plants is given in state space representation as [4].

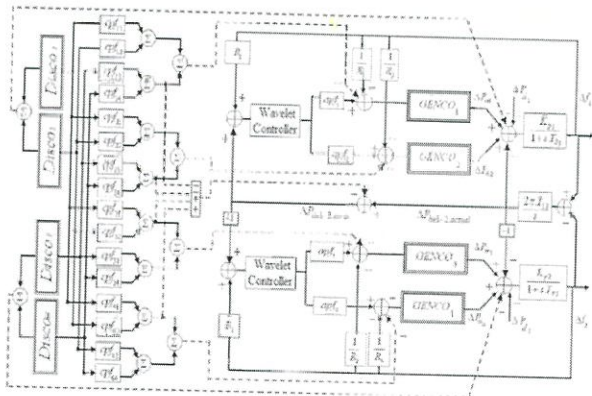


Fig. 2 Restructured system for LFC in a deregulated environment connected with AC tie line.

3 Design of Multi Resolution Wavelet Controller

In this paper a multi resolution wavelet controller is proposed to mitigate load frequency control problem of multi area power system in a deregulated environment. Wavelet transform approach is widely used in signal process, but in this paper first time wavelet transform is used for the design of a controller to encounter load frequency control problem [22-26].

The control law is given by

$$u = k_p g_p(e) + k_i \delta g_i(e). dt \quad (5)$$

where $g_p(\cdot)$, $g_i(\cdot)$ are linear functions.

In the design of multi-resolution wavelet controller the error signal is decomposed into packets of frequency known as wavelets.

The error signal is decomposed into

$$e = \sum_i k_i e_i \quad (6)$$

where, k_i is the control parameter.

Due to this wavelet decomposition technique the noise level can be eliminated. The control signal is generated by adding all these decomposed signals as shown in below Fig. 3 [27-29].

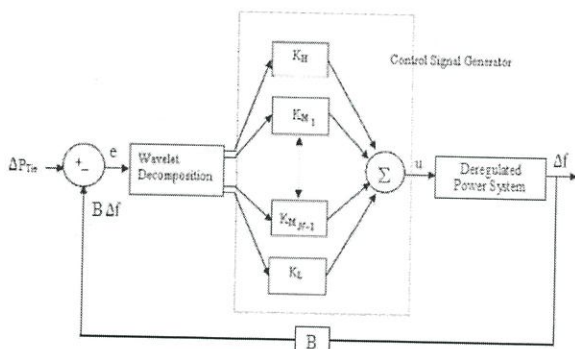


Fig. 3 Block diagram of Multi Resolution Wavelet Controller.

Let us consider a sampling signal $f(x)$ and function is represented in successive approximation type.

$$f^m(x) = \sum_{n=-\infty}^{\infty} f_{m,n} \phi(2^m x - n), m = 0, 1, 2 \dots \quad (7)$$

$$f(x) = \sum_m f^m(x) \quad (8)$$

The scaling function is a weighted sum of the shifted version is represented by

$$\phi(2^m x) = \sum_{ik} h(k) \phi(2^{m+1} x + k) \quad (9)$$

$m+1$ is number of approximations.

$$v^{m+1} = v^m \oplus w^m$$

w^m = information added upon moving from the coarser $f^m(x)$ to the finer $f^{m+1}(x)$ while describing about original function

$$f^{m+1}(x) = f^m(x) + \sum_{i=-\infty}^{\infty} f_{m,n} \psi(2^m x - n) \quad (10)$$

Wavelet is represented by $\psi(x)$ is related to scaling function as

$$\psi(2^m x) = \sum_k g(k) \phi(2^{m+1} x - k) \quad (11)$$

A mixed form N - level multi resolution wavelet series representation of the signal $f(x)$ is given by

$$f(x) = \sum_k C_N k \phi_N k(N) + \sum_{m=1}^N \sum d_m k \psi_m \cdot k(x)$$

$$C_{m,k} = \sum_k f(x) \cdot \phi_m \cdot k(x)$$

$$d_{m,k} = \sum_k f(x) \cdot \psi_m \cdot k(x)$$

$\phi(x)$, $\psi(x)$ complement functions of $\phi(x)$, $\psi(x)$ respectively.

The most effective approach in finding out discrete wavelet transform (DWT) is

$$h(k) = \sqrt{2} \sum_x \phi(x) \cdot \phi(2x - k) \quad (13)$$

$$g(k) = \sqrt{2} \sum_x \psi(x) \cdot \psi(2x - k) \quad (14)$$

$$g(k) = (-1)^k h(-kH) \quad (15)$$

The DWT consists of trend (c) and detailed coefficients (d). Initially in the analysis DWT we have to calculate the trend and detail signals. The trend signal attenuates the low frequency signal of original signal $f(x)$. The detailed signal attenuates the high frequency signal of the $f(x)$.

The output of multi resolution is the group of frequency signals at different frequency levels.

The combination of different frequency signals are summed at summing point.

f_H , represents the high frequency signals and f_L , represents the low frequency signals.

And N is the number of decomposition levels.

4 Simulation Results

In this section the performance of the proposed wavelet based MRPID controller has been studied under one possible contract scenario, simulations are performed for the contract scenario under various operating conditions and larger load demands.

In this scenario the performance of proposed controller is compared with conventional PI controller. The simulations are performed by using MATLAB-SIMULINK. The parameters for two area thermal - thermal system are given tables 1&2.

Contract scenario:

In this scenario, DISCO has the freedom to contract with any GENCO in there and other areas. So, the entire DISCOs contract with the GENCOs for power based on following DPM.

$$DPM = \begin{bmatrix} 0.2 & 0.3 & 0.5 & 0.0 \\ 0.3 & 0.2 & 0.0 & 0.7 \\ 0.5 & 0.0 & 0.2 & 0.1 \\ 0.0 & 0.5 & 0.3 & 0.2 \end{bmatrix}$$

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Date: 31st January 2016

**A COMPARATIVE ANALYSIS AND THD REDUCTION IN 3-PHASE 4-WIRE UNBALANCED
NON LINEAR LOADS**

[Paper ID- EEE1005]

A Paper Presented by: Dr. K. Srinivas
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Abstract

Power quality problem is the most sensitive problem in a power system. Most of the power pollution issues caused in power system is because of the unbalanced and nonlinear nature of loads. Due to large amount of non-linear equipment, compact and fluctuating loads cause problems of power quality is becoming more and more serious problems with time. To overcome this problem DSTATCOM used for mitigation of harmonics and reactive power compensation. The performance of the DSTATCOM depends upon control strategies.

The algorithm to compensate the nonlinear and loads in three phase four wire distribution system using shunt active power filter. In this algorithm a positive sequence extraction of the supply voltage and the theory Synchronous Reference Frame (SRF) Method were used. Where ever there are large numbers of nonlinear loads, there are harmonics will present in the distribution system. It is not uncommon for THD levels in industrial plants to reach 25%. Normally, THD levels in office settings will be lower than in industrial plants, but office equipment is much more susceptible to variations in power quality. Odd number harmonics (3rd, 5th, 7th, etc.) are of the greatest concern in the electrical distribution system.

In this paper the impact of unbalanced and non linear loads on source are studied and implemented using aforesaid algorithms. Then adding shunt active power filter in parallel to it, the filter currents are generated using SRF method. Hysteresis current controller is used to generate pulses for DSTATCOM. The THD analysis is done for 3 phase 4 wire systems and neutral current is observed balanced.

Key words: DSTATCOM, non linear loads, shunt filters ect

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FPGA APPLICATIONS TO 3-PHASE 4-WIRE DISTRIBUTION POWER SYSTEMS

[Paper ID- EEE1004]

A Paper Presented by **Dr. K. Srinivas**
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Abstract

The Efficiency of present symmetric encryption algorithms mainly depends on implementation cost and resulting performances. In addition to, it is implemented efficiently on a large variety of platforms in distribution power systems. Present symmetric encryption, like the Advanced Encryption Standard (AES) good tradeoff between cost, security and performances power systems harmonics analysis. While this approach is generally the most convenient, there exists context where more specialized ciphers are useful in active power filters. Some present symmetric encryption algorithms are targeted for hardware implementations and shows significant efficiency improvements on these platforms compared to other algorithms for unbalanced non linear load. From these algorithms, consider a general context where we have very limited processing resources (e.g. a small processor). It yields design criteria such as: low memory requirements, small code size, limited instruction set, i.e. Scalable Encryption Algorithm (SEA).

Scalable Encryption Algorithm (SEA) follows unusual design principle for unbalanced non linear load, harmonic elimination and calculation of THD. $SEAn,b$ is parametric in the text, key and processor size. Where n is plaintext size or key size and b is processor (or word) size. Many algorithms behave differently on different types of load in distribution power systems (e.g. 8-bit or 32-bit processors). In opposition, $SEAn,b$ allows to obtain a small encryption regularly targeted to any given processor, the security of the cipher being adapted in function of its key size. It also provides efficient combination of encryption and decryption. Those goals are particularly relevant in context where the same constrained device has to perform encryption and decryption operations (e.g. authentication). Finally, the simplicity of $SEAn,b$ makes its implementation straightforward in power quality problem.

The performance of SEA is investigated in field-programmable gate array (FPGA) devices. For this purpose, loop architecture of the block cipher is presented. The presented architecture is full flexibility for any parameter of the scalable encryption algorithm.

Keywords: FPGA, SEA, non linear loads, DSTATCOM ect

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SURVEY OF PHOTOVOLTAIC TECHNOLOGY SYSTEM SOFTWARE'S

[Paper ID- EEE1003]

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Abstract

Photovoltaic systems are presenting an alternative source for production of electricity in a sustainable way. Photovoltaic systems present an optimal solution for growing green house emissions which are depleting ozone layer, one of the major concerns in today's world. Due to increase in energy demand and fast depletion of available fossil fueprasadls, renewable energy resources have to be used to meet the requirements of near future. In India solar energy contributes to nearly 5% of production of electrical energy. Photovoltaic technology is advancing in such a way that it might lead to 50% of production of electrical energy. In this paper, survey of several software's has been provided for the Photovoltaic technology which allows sizing of PV system by taking panel and inverter specifications. Orientation, module type and arrangement and placement of inverters are the important parameters for PV technology. On simulation of these parameters output energy and efficiency are provided as result. Additionally load modulation for a year and economic evaluation for the PV system can also be done using these software's. Some software's analyze various PV systems such as grid connected; stand alone systems and solar pumps.

Keywords: Photovoltaic Technology, Energy Demand, Fossil Fuel, Renewable Energy Sources, PV software's.

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A NOVEL MULTI PATTERN STRING MATCHING ALGORITHM WITH WHILE SHIFT

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ABSTRACT

String matching plays a dominant role in digital computer world, because it is made up of huge digital information. Digital computer world users often face a problem to extract the relevant information from these huge digital data to their queries. Hence it requires efficient retrieval algorithms for retrieving relevant data from huge digital data. To retrieve relevant data, in this paper we proposed two retrieval algorithms called single pattern and multi pattern string matching algorithms with while shift.

Keywords

Digital computer world; Digital data; String matching, Single pattern; Multi pattern.

1. INTRODUCTION

String matching is an extensively studied problem in computer science, since it accomplishes significant tasks in many applications like Information retrieval, Intrusion detection, Genome comparison (e.g Human/Mouse), Phonebooks, Dictionaries, Search Engines, Bio-Informatics (Partrinity identification, Matrinity identification, DNA finger printing) and many more[1,2]. These wide range of applications need the improvement in searching because digital data in World Wide Web(WWW) is increasing day by day[3,4,5,6]. Due to the exponential increase of digital data with time, the string matching becomes impractical in conventional computers[7].

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To search in huge digital data, some researchers developed concurrent[8,9,10] algorithms that perform the searching concurrently by general purpose concurrent computers that increase the efficiency and decrease the search time. Due to its wide scope of applications still there is wide requirement to develop the novel algorithms.

The main contributions of this work are summarized as follows. This work offers a comprehensive survey at various aspects. This work suggests the single pattern, multi pattern and multi directional multi pattern string matching algorithms for both single and multi-core processing. The rest of this work is organized as, reviewing typical algorithms, algorithmic models and finally concluding the study.

2. LITERATURE

Classical and advanced string matching algorithms have been proposed in literature, like brute force algorithm [11], which is invented in the dawn of computer history, later re-invented by many researchers, Knuth & Pratt[12] invented a better one in 1970, which is published in 1976 named as "Knuth-Morris-Pratt", it is also re-invented many times, Boyer & Moore[13] found a better one before 1976, which is published in 1977, it is also re-invented many times.

Aho-corasick[14] developed a finite automaton based string matching algorithm that accepts all the strings in the pattern set. In practice it becomes slow for a large pattern set because of the worse cache locality in accessing a large transition table.

In 1995, Lecroq[15] developed Quick Search string matching algorithm, which is an efficient algorithm when using a short pattern during the text search. It is revisited by Klaib et al.[16] in 2007, but shows less efficient behavior for small patterns. In 1998, Charras et al.[17] developed skip search for string matching, which shows an efficient behavior for long patterns.

In 2012, MA Naser[18] revisited quick search and skip search algorithms and proposed the Quick-Skip Search Hybrid Algorithm for the exact string matching. It fulfills quick and skip search algorithm problems. In 2010, Safaa O et al.[19] suggested distributed environment with enhancing the Snort's string matching engine through a LAN of computers, where each

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An Innovative Approach for Imputation and Classification of Medical Records for Efficient Disease Prediction

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ABSTRACT

Imputation of medical records is a prime challenge when we deal with medical records. The imputed values affect classification of new medical records. This is because of this reason imputation gains its importance. In our present approach for imputation, we aim to carry imputation by first reducing dimensionality of medical records and then use the reduced dimension medical records to carry out imputation. The imputation is then followed by classification of medical records. We discuss a case study to show the process of imputation and classification of records using the proposed approach. The approach is demonstrated for categorical attributes in this paper and can be extended for numerical attributes also. The approach followed for imputation is class based clustering approach.

Keywords

classification, prediction, clustering, medical record, distance measure, dimensionality reduction, missing values

1. INTRODUCTION

Medical data records are challenging to handle because of various hidden challenges which are generated under various practical conditions. Many times when we aim to mine medical records, we have first challenge of imputation. This is mainly from the obvious and widely accepted fact that medical records are not free from missing attribute values. In this scenario, the process of imputation received wide range attention from data mining and data analysts. Medical data records must be also normalized and scaled to perform any analysis. The process of normalization must be done before imputation so that the imputation process yields correct results. This affects classification accuracies. There are several preprocessing stages a medical record must be processed before analysis is performed. Dimension of record is also a concern when it must be analyzed. We must see that dimensions which are not affecting the final accuracies be only eliminated or discarded. In [1], the researchers debate whether to

consider missing values or simply eliminate them from consideration for analysis. They discuss these using decision tree concepts. Clustering data records is a known problem and is also used for medical data. The work of authors in [2] mainly targets how to handle missing values using clustering. The support vector regression and clustering are used in [3] to perform imputation. [4,5] discuss various problems with missing values and how to handle mixed attributes respectively. In [6], authors discuss novel framework and a discussion on using auto regression method to handle missing values is done in [7]. The works in [8-14] also discuss how to handle MVs. In [15-17] authors come up with a new approach to handle MVs.

2. IMPUTATION AND CLASSIFICATION

The present work targets imputing missing attribute values and performing record classification after imputing. The approach is class based clustering approach. Here we cluster records with no missing values equal to number of classes. Then we obtain distance from these records to cluster centers. Our approach does not consider standard deviation of clusters generated.

We aim to achieve dimensionality reduction of records to a dimension equal to number of class labels. Then we represent these records as a vector of values. This is then followed by finding distance between these transformed records and missing attribute value records. The imputation is done considering record to which the test record distance is minimum.

2.1 Research Objective

To impute missing attribute values in a given dataset of medical records and then perform classification of medical records. This is aimed to be achieved by targeting dimensionality reduction of initial attribute set of dataset. In this process, we map initial m -dimensional records to p -dimensional records where p is number of decision classes in dataset. The process of filling missing values is carried out using this transformed low dimensional representation of medical records.

2.2 Problem Definition

Given a set of medical records having both missing and non-missing attribute values, we aim to fill all attribute values of medical records and achieve high classification

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Synthesis of Corey lactone diol: An Alternative, Improved Process from Cyclopentadiene

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ABSTRACT

In view of the importance of the Corey lactone diols, an efficient synthetic route has been developed for the synthesis of (-)-corey lactonediol, cyclopentadiene as substrate by employing Baeyer villiger oxidation, lactone ring formation reaction and prince reaction.

Keywords: Corey lactone diol, Baeyer villiger oxidation, lactone ring formation reaction and prince reaction.

INTRODUCTION

Corey lactone diols are widely useful in the synthesis of drugs, specially prostaglandins and agricultural chemicals¹⁻². Prostaglandins are physiologically active substances and play a vital role in various fields of drugs by maintaining homeostasis of the living body. Prostaglandins have already proved for their practical use in the fields of oxytocia³ (rapid parturition), improvement in peripheral blood stream, anti-ulcer, prevention of platelet agglutination, etc. The most effective method for chemical synthesis of prostaglandins involves 75 intermediates in which key intermediate as Corey lactones⁴. The present method deliberates the synthesis of optically active Corey lactone diol from selective amine coupling with lactone and reformation of lactone ring as an alternative, improved process from cyclopentadiene.

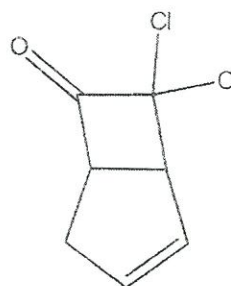
GENERAL METHODS

All reagents were purchased from Aldrich (Sigma-Aldrich, USA). Progress of the reactions was monitored by TLC, performed on silica gel glass plates containing 60 F-254. Column chromatography was performed with Merck 60-120 mesh silica gel. ¹H NMR spectra were recorded on a Bruker UXNMR/XWI-NMR-400 MHz spectrometer. ¹³C NMR (75 MHz) spectra were recorded on Bruker Avance-400 MHz spectrometer. Chemical shifts (δ) are reported in parts per million (ppm) downfield from internal

TMS standard. Peaks are labeled as singlet (s), doublet (d), triplet (t), quartet (q), and multiplet (m). ESI spectra were recorded on Micro mass, Optical rotations were measured with a Horiba-SEPA-300 digital polar meter.

EXPERIMENTAL

7, 7-dichlorobicyclo [3.2.0] hept-2-en-6-one(2)



To a stirred solution of cyclopentadiene(1) 20.0 g (1 mol), in n-hexane (150 mL), dichloro acetyl chloride 9.37 mL (0.32 mol), was added, drop wise added triethyl amine 10.17 g (0.33 mol) at 0°C and the mixture was stirred at room temperature for 16 h. After completion of the reaction by TLC, reaction mixture was filtered and concentrated under reduced pressure. The residue was purified by high vacuum distillation at 105°C to afford compound 2 as oil substance (19 g, 35.44%).

¹H NMR (400 MHz, CDCl₃): δ 2.55 (m, 1H), 2.8(t, 1H), 4.05(m, 1H), 4.25(m, 1H), 5.8(m, 1H), 6.05(m, 1H).

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ABSTRACT

Solid-state polymer electrolytes have been extensively investigated using various techniques such as (PEO) and (KNO₃) along with their complexed polymer electrolytes. The complexation have been estimated by using X-ray diffraction (XRD) and differential scanning calorimetry (DSC). Carbon monoxide gas sensors based on polymer electrolyte (PEO+KNO₃) electrolytes. Sensitivity at the various temperatures at different concentrations of different carbon monoxide gas concentrations.

Keywords: Polymer, poly (ethylene oxide), X-ray diffraction, gas sensors

INTRODUCTION

Solid-state polymer electrolytes technology emerging due to its high-tech advantages, such as long self-life, extreme temperature stability, widespread temperature range of operation and they can be prepared simply with low cost. These solids show considerable high ionic conductivities at their operating temperatures [1-5]. Polymer electrolytes can be designed in the form of thin film, thereby reducing the core resistance leading to gas sensing material applications. A limited number of reports have been observed on proton conducting polymer electrolytes and their application to gas sensors. Only few attempts were witnessed for the preparation of sensors using ionic conductors. Keeping these aspects in observation, the polymer electrolytes are used (PEO + KNO₃) polymer electrolytes

The complexation of the PEO and KNO₃ was investigated by using X-ray diffraction (XRD) and differential scanning calorimetry (DSC). (PEO + KNO₃) polymer electrolytes carbon monoxide gas sensors were investigated its characteristics at different temperatures and also at different concentrations of various carbon monoxide gas.

EXPERIMENTAL
Solid-state ionic conductors (PEO) (thickness 100-150 μm) of PEO (M_w = 4000) (weight (1x10⁻³) complexed with KNO₃ were prepared in the weight ratios (90:10) and (70:30) using methanol and water as solvent by solution-casting technique. The solutions were

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Opinion Mining of Online Product Reviews using Rough Set Reducts and Semantic Web Rules

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Abstract-Opinions are the perspectives of the users about the products they have used. These opinions are written in the review sites. These reviews reflect the experience of the user with the product over a considerable amount of time. The opinions vary from user to user about the features of the product. Extracting the discriminative product features from uncertain and incomplete reviews is a complex task. The classification of the opinion of these discriminative features leading to knowledge extraction is also an important task. To solve and carry out these functionalities, a mathematical approach called rough sets is used. Rough set provides the approach of finding the discriminative features from the set of given product features called reducts. These reducts preserve the existing knowledge expressed in the actual information system (containing all product features and reviews). These obtained reducts are further used in engineering Product Feature Ontology (PFO) and expressing the opinion orientation on the PFO using Semantic Web Rule Language (SWRL) rules. The learned rules by the machine is able to automatically classify the positive and negative opinions thereby helping the new user to decide about the product and take wise purchase decisions.

Keywords: Opinions, reviews, rough set, reduct, POT Ontology, SWRL rules

I. INTRODUCTION

Today E-commerce websites provide customers with the needed product information by giving various kinds of services to choose from. One such service is to allow the customer to read the end user online reviews. Online reviews contain features which are useful for the product analysis. These reviews vary from user to user. The size of the review database was increased from time to time leading to the surplus of reviews. It is found that diverse number of web sources for writing opinions exists.

These reviews were regularly fed into the system were not useful for certain cross section of people and finding the relevant sources of review information is found to be a formidable task. The product features as conditional attributes and the reviews with the decision class label as decision attribute are organized in a structured form which is known as information system. Identifying all the features from all the reviews and using them in automated reviews classification is a heavy job. Also all the identified features are not suitable for machine learning the review categories. Extracting the discriminative product features from uncertain and incomplete reviews is a complex task. The classification of the opinion of these discriminative features leading to knowledge extraction is also an important task. This has led to the concept of Opinion Mining [2].

Opinion Mining is carried out by using a mathematical approach called rough sets [1] and the concept of training less automatic opinion classification of the feature using Ontology [3]. Rough set provides the approach of finding the discriminative features from the set of given product features. These are called as reducts. These reducts preserve the existing knowledge expressed in the actual information system. The obtained reducts are further used in engineering Product Feature Ontology (PFO) and expressing the opinion orientation on the PFO using Semantic Web Rule Language [4] (SWRL) rules. The learned rules by the machine is able to automatically classify the positive and negative opinions thereby helping the new user to decide about the product and take wise purchase decisions.

AUTOMATIC MACHINE RECOGNITION OF FEATURES AND SENTIMENTS FROM ONLINE REVIEWS

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Today E-commerce websites provide customers with the needed product information by giving various kinds of services to choose from. One such service is to allow the customer to read the end user online reviews. Online reviews contain features which are useful for the analysis in opinion mining. Most of the systems work with the summarization of the features by taking the average features and their sentiments which leads to structured review information. Most of the times while classifying the sentiment of the review, the context of surrounding feature is undermined. In web 3.0 machine interpretable framework called Resource Description Framework (RDF) was introduced which helps in structuring these unstructured reviews in the form of features and sentiments obtained from traditional preprocessing and extraction techniques. The context data also supports for future ontology based analysis by taking the support of WordNet lexical database for word sense disambiguation. The SentiWordNet scores are used for sentiment word orientation. Many popular RDF vocabularies are helpful in the creation of such machine processable data. SPARQL queries are carried out on RDF data to learn the possibility for categorizing the reviews using feature information. This paves the way to engineer the OWL Ontology for reasoning the RDF data. These results were processed by the interface as a feature, sentiment pair so that reviews are filtered clearly and help in satisfying the customer centric feature set.

1. Introduction

Textual content is broadly grouped into two major categories: facts and opinions. Facts are the objective sentences about products, events and their properties. Opinions are by and large described as subjective terms that explain people's sentiments, appraisals or feelings toward entities, events and their properties. Opinions are important in order to make a decision, it is necessary to understand the views of other people. Prior to the existence of the web, a customer makes a decision by consulting the friends and family members. As the web is enrooted to the diversified fields, it has created a place to provide user involvement and content. The E-commerce field involved users to develop online reviews for the experience on a specific product. It has become the driving factor in purchase decision making. The social web was introduced and