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Proceedings of International Conference on Communication, Security and Optimization of Decision Support Systems



Organized by,
Department of Information Technology
February 23rd & 24th 2018, Friday & Saturday

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A Review on Modulation Techniques Used for Parallel Operation of Inverters with Droop Control of Voltage and Frequency

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Abstract—In this paper a control strategy using a three level space vector modulation (SVM) for two parallelly connected distributed generation units is presented. While connecting DG units parallelly load sharing between them becomes important factor. This controlling technique is basically based on P-F/Q-V droop control. P-F/Q-V droop control using SVM is helpful in maintaining the voltage and frequency stability as well as sharing the load proportionally from individual inverter. This method of droop control is implemented and compared with the P-F/Q-V droop control using S PWM. The simulation regarding the same is implemented in Matlab / Simulink and the results indicate that SVM based droop control is more effective than S PWM based droop control.



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Reliable Human Identification using Iris as a Biometric

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Abstract—Among various methods of personal identification iris recognition is regarded as the most reliable and accurate system available. The purpose of this paper is to represent iris recognition algorithm so as to prove its reliability as a biometric on the basis of its performance. The images selected for study are from CAS IA iris database. The classification is done on the basis of the most repeatedly occurring class using KNN classifier. Euclidian distance metric was employed to check the similarity between two iris images and the two images said to be matched if its value is less than or equal to threshold. The system was tested and shown an overall accuracy of 97.5 % with false rejection rate of 3% and false acceptance rate of 2%.

Keywords — Iris Recognition, Hough Transform (HT), Euclidean distance(ED).

I. INTRODUCTION

With rapid development of our society more advanced identification systems are in demand. Iris recognition system is gaining highest proportion among all the biometric identification systems. The most important characteristic of iris is its uniqueness in nature which leads to develop more and more accurate identification system.

The first working model of iris recognition was implemented by Professor John Daugman of Cambridge University in the 1990 [1] [2]. The Daugman's system is patented and many commercial developers are using it. A large number of studies have tested the Daugman system as well as commercially it has been used by many users and proved that it has zero failure rate when tested with millions of images. Few years later many other developers have designed the iris recognition system and acquired a great success. The few notable of them are Wildes et al. [3], Boles and Boashash [4]. The Wildes et al. system also has a flawless performance [3], whereas the Lim et al. system achieves an accuracy rate of 98.4 %. Though many developers have developed the algorithm but they could not achieved the accuracy and speed when compared with the Iris recognition system developed by Daugman.

The iris is a dark annular portion of the eye which is surrounded by muscle, tissue, blood vessels, cells and outer boundary within the eye as shown in figure.1 resulting in random and unique pattern for each iris. Due to this unique combination it is more suitable for biometric identification. In addition it also remains stable over the period of time. This unique pattern contains some redundant features and if utilized directly in the classifier it affects the performance of iris

recognition system resulting in low efficiency. The useful features can be extracted from digital eye image with help of

developed mathematical algorithms and the results can be stored in the form of code into a biometric template. The biometric template of digital eye image is usually created by the system. A database for different digital eye images is generated in the form of code and stored as biometric template for future comparisons. With the help of developed matching algorithms this biometric template is compared with previously stored template in the database in order to get the verification of the individual. Iris recognition technique consists of three basic stages.

1. Preprocessing
2. Feature Extraction
3. Image Matching

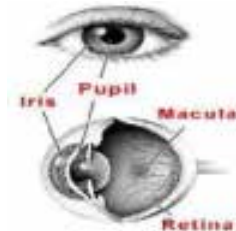


Figure.1 Eye Image

II. PREPROCESSING

Segmentation:

Iris is an inner portion between pupil and sclera. To separate iris portion from the digital eye image segmentation is used. A circular Hough Transform based automatic segmentation approach is used for inner and outer boundary location. It removes the redundant regions like eyelashes and eyelids present in lower and upper region of image. So sometimes specular reflections may occur inside the iris region. The segmentation method must be capable to partition these noises and locate inner and an outer boundary of the image. Generally pupil boundary which is an inner boundary of an iris portion is easily located using binarization. But it requires a good quality image.

i) Pupil Detection

In Hough method first gradient image is created from intensity image. The iris image is convolved with the sobel filters to convert into intensity image. sobel operator calculate the gradient of the image intensity at each point. Using canny edge detection technique edges of gradient image is found. To obtain the center the given formulas are used.

$$x_c = x - r * \cos(\theta)$$

$$y_c = y - r * \sin(\theta)$$

The accumulator stores the values of x_c and y_c for a particular value of r . The highest value stored in the accumulator counter is considered as the centre of the pupil as well as the radius.

ii) Outer boundary detection

Using histogram equalization Image is enhanced to have sharp variation at image boundaries and outer boundary can be easily detected. From the pupil center circles of different radius are drawn and their intensities lying over the periphery of the circle are boundary.



Figure.2: Inner and outer boundary detection.

Normalizat ion:

Normalizat ion is the process which converts the segmented iris image into polar form which helps to generate binarized code. This process is known as Unwrapping. Daugman's

Rubber sheet model is used for this purpose. Iris boundary and pupil boundary generally does not have concentric circles. This condition gives different reference points for conversion into polar form. Remapping method is used for conversion of Cartesian scale to polar scale considering pupil centre as reference point. This algorithm m remaps each point of the iris image to polar coordinates (r, θ) .



Figure. 3 Daug man's rubber sheet model

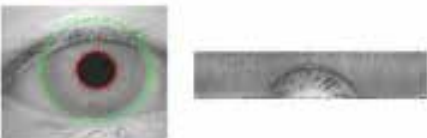


Figure 4. Normalized Iris into polar form

III. FEATURE EXTRA CTION

To extract the texture info rmationfro m an iris image wavelet transform algorithm m is used. The important characteristic of wavelet function is that it extracts the local frequency informat ion of an image, eliminates the redundant informat ion, reduces the noise from the image and reconstructs the iris image in the form o f binary vector. The input image is decomposed using wavelet transform. Th is is carried out in four levels with high pass and low pass filters. When wavelet

function is applied the image is divided in to four sub regions. These components are approximation image component (LL), horizontal detail co mponent (HL), vert ical detail co mponent (LH), diagonal detail co mponent (HH). The forth level component contains higher energy level therefore it is selected as an input image for the next level. The output of the DWT is then encoded into biometric template with phase quantization method and the iris code is generated as shown in figure 5 which is saved in a database for comparison between iris temp lates.



Figure 5:. Iris code

IV. IMA GE MATCHING

a) Classification Phase:

KNN algorithm is preferred particularly for dimensionally high input data. KNN algorithm m has lower error rate compared to other classifiers. It is a simplest form for classification and calculation among the others. In dimensional space the training patterns are plotted according to their observed feature values and labeling is done by their known class. [8] Within the same space an unlabelled test pattern is also plotted. The classification is done on the basis of the most repeatedly occurring class among its training patterns and its nearest neighbor patterns. Euclidian d istance metric is the most popular for KNN classification which measures similarity between feature vectors.

b) Matching algorithm

In matching algorithm m the degree of similarity between two feature vectors is determined. For distances comparison and computation of feature vectors Euclidean distance algorithm is used in our system which decreases the computational cost.

$$ED = \frac{1}{\sqrt{N}} \sqrt{\sum_{i=1}^N (A_i(x) - B_i(y))^2}$$

differentiates the same iris images from different iris database. The user is genuine if the matching score is less than or equal to reference threshold.

V. EXPERIM ENTA L RESULTS

The database used for study was taken from CASIA database and the performance verification of the system was carried out with two set of images in two intervals of 100 and 250 images respectively. It is observed that Hough transform performs better as compared to other localizat ion techniques and system has efficiently detected inner and outer boundaries of all images. The result shows that the iris recognition system performed perfect recognition with 100 eye images with zero percent false registration. The results are plotted with false acceptance rate and false rejection rate and found overall accuracy of 97.5 % with FRR of 3% and FAR 2% as shown in figure 6 and figure 7.

There may not be 100% matching Even if the same iris images

are compared, with the samples of iris images present in the database. Similarly, the matching score will have exactly the same value even if two very different iris images are compared. Solution to this problem is the decision of correct value of reference threshold value which basically

We compared the system with other systems on the basis of accuracy. The results show that the proposed algorithm has improved the recognition rate when compared with other systems proposed by Ma[6], Boles[7], Daugman[2]. They obtained 89.37%, 92.64 and 99.99 accuracy respectively.

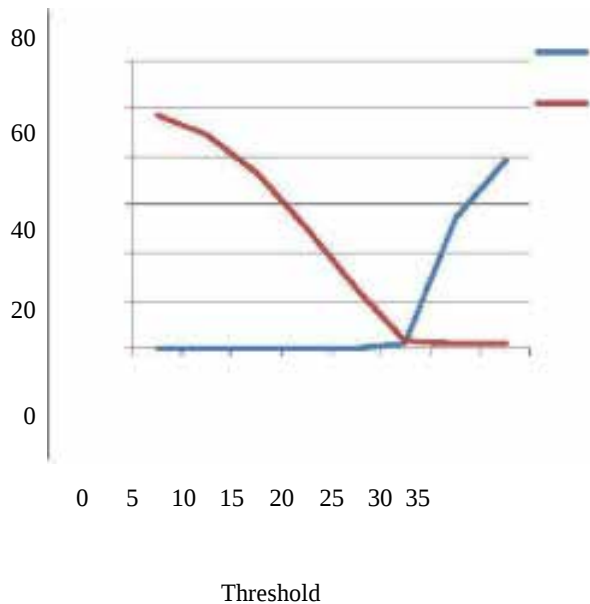


Figure 6: FA R/FRR – Threshold plot

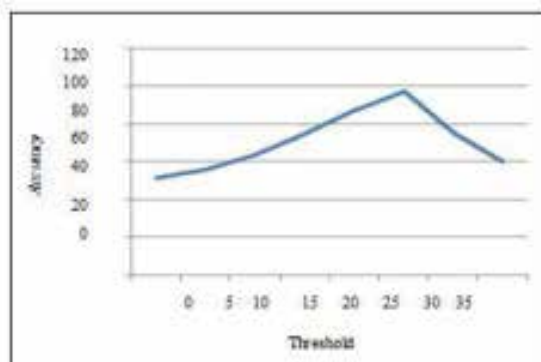


Figure 7: Accuracy-Threshold plot

VI. CONCLUSION

The iris recognition system that was developed proved to be a highly accurate and efficient system that can be used as a biometric. It is proved that iris recognition is one of the most reliable methods available today in the biometrics field. The accuracy achieved by the system was very good.

J.Daugman, "How is iris recognition work", IEEE Trans. Comput. Syst., Video Technol., vol. 14, no. 1, pp. 21-30, 2004.	REFERENCES
J.Daugman, "New methods in iris recognition", IEEE Trans. Syst., Man, Cybern., vol. 37, no. 5, pp. 1167-1171, 2007.	[1] J.Daugman, "New methods in iris recognition", IEEE Trans. Syst., Man, Cybern., vol. 37, no. 5, pp. 1167-1171, 2007.
R. Wildes, "Iris recognition: An emerging biometric technology", Proceedings of the IEEE, Vol. 85, No. 9, 1997.	[3] R. Wildes, "Iris recognition: An emerging biometric technology", Proceedings of the IEEE, Vol. 85, No. 9, 1997.
W. Boles, B. Boashash, "A human identification technique using images of the iris and wavelet transform", IEEE Transactions on Signal Processing, Vol. 46, No. 4, 1998.	[4] W. Boles, B. Boashash, "A human identification technique using images of the iris and wavelet transform", IEEE Transactions on Signal Processing, Vol. 46, No. 4, 1998.
C. H. Daouk, L. A. El-Esber, F. D. Kamoun and M. A. Al Alaoui, "Iris Recognition" IEEE ISSPIT 2002 page 559	[7] C. H. Daouk, L. A. El-Esber, F. D. Kamoun and M. A. Al Alaoui, "Iris Recognition" IEEE ISSPIT 2002 page 559
L. Ma, and T. T. "Person Recognition Based on Wavelet Transform and Probabilistic Neural Network (PNN)", volume 14, number 3, 519-533 Aug 2014.	[9] L. Ma, and T. T. "Person Recognition Based on Wavelet Transform and Probabilistic Neural Network (PNN)", volume 14, number 3, 519-533 Aug 2014.
Legendre Moments and KNN Classifier "ISSN August 2013.	[10] Legendre Moments and KNN Classifier "ISSN August 2013.
International Journal of Signal Processing, Image Processing and Pattern Recognition Vol. 8, No. 2 (2015), pp. 1-10	



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Fuzzy Approach to Risk Assessment in Construction Industry

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Abstract—Compared with many other industries, the construction industry is subjected to more risk due to the unique features of construction activities. Risk management aims at identifying sources of risk and uncertainty, determining their impact and developing appropriate management response. Risk Analysis is the process of identifying the risk issue to determine its likelihood and its impact on the project. Risk management process includes risk identification, risk analysis and risk response. A fuzzy system shows definite applicability with in the field of risk analysis. Also fuzzy logic is highly illusory and connected to imprecise and ambiguous data which is common in construction projects. Fuzzy membership functions and linguistic variables can be used for solving problems detected in the construction industry based on the temperament of construction, which are widely noticed as complicated, full of uncertainties, and probable on fluctuating environments. This logic is perfect to deal with the unforeseen risks in a project's development. This methodology provides a rapid and dynamic tool for project evaluation, by allowing the project manager to scrap unwanted projects without putting the minimum amount of effort into an analysis. This methodology can also be generalized and therefore have the capability of being used in the project evaluation in many different kinds of industries not only the construction industry. This study describes the overview of various studies carried out on the use of fuzzy logic as a support of evaluation of total project risk. Also, it is an effort directed towards a specific understanding of the efficiency of fuzzy logic in construction management.

Keywords—Risk management, fuzzy system, risk analysis.

I. INTRODUCTION AND LITERATURE REVIEW

Fuzzy Set Theory, proposed in 1965 by LA Zadeh, is not only focused on well-defined and precise data, but also in uncertain and fuzzy data (MathWorks, 1995). This theory provided the real world to be expressed mathematically, thus the exact boundaries created by classical mathematics have been removed, and uncertainty took place in the decision-making processes (Steyn, Stokar, 2014). In almost every field of science and technology, the widespread use of fuzzy set theory with the new perspectives supplied to decision-making in industrial systems to the subject of the classic operations research studies have expanded the domain (Aziz, 2013). Risk classification is an important step in the risk assessment process, as it tries to design the distinct risks that may influence a project.

Many approaches have been put forward in the literature for classifying risks. Chen et al (2004) proposed 15 risks related to project cost and categorized them into three groups: resource factors, management factors and parent factors. Shen (1997)

figured out eight main risks responsible for project delay and ranked them based on a questionnaire survey with industry practitioners. Abdou (1996) classified construction risks into three groups, i.e. construction finance, construction time and construction design. Chapman (2001) organized risks into four subsets: environment, industry, client and project. Shen (2001) classified them into six groups in accordance with the nature of the risks, i.e. financial, legal, management, market, policy and political. Perry and Hayes (1985) gave an extensive list of factors gathered from several sources, and classified in terms of risks retainable by contractors, consultants and clients.

The application of “fuzzy techniques” has been gaining popularity to the research area of construction management over the past decade.

After Zadeh (1965) introduced fuzzy set theory and fuzzy logic other researchers such as Tah and McCaffer (1993), Car and Tah (2001), Choi et al (2004), Zeng et al (2007), Nieto et al (2011) introduced Fuzzy set theory based risk modelling and analytical methods that deal with ill defined, imprecise and complex risk analysis problems.

Andi (2004) in the first step, project risks were identified. Influence diagramming technique was employed to identify and to show how the risks affect the project cost elements and also the relationships among the risks themselves. The second step is to assess the project costs with regards to the risks under consideration. Using a linguistic approach, the degree of uncertainty of determined project risks is checked and computed. The problem of dependency between risks is taken into consideration during this analysis. For the final step, a method using fuzzy logic is provided for allocating appropriate contingency. Two types of contingencies: project contingency and management reserve are suggested to accommodate the risks.

Manisha.Ingle, *etal.*(2010) The author reported the methodology to solve risk analysis problems with the purpose of determining the project's validity. The model presented was developed using fuzzy logic and designed for the software development industry. Fuzzy logic was used since it is a tool capable of modeling complex and uncertain or vague data using simple terminology such as IF THEN statements. This logic is perfect to deal with the uncertainty of risks in a projects development. This methodology provides a quick and efficient tool for project managers for project evaluation, by allowing the project manager to discard the useless projects without putting much effort into analysis. The result in this paper deals with the probability and impact of a project's delay which determines the usefulness of the project. This methodology can also be generalized and therefore have the capability of being used in the project evaluation in many different kinds of industries like construction industry.

Pejman Rezakhani(2011)author describes the development of a risk analysis model to assess the risk associated with construction project. At the end of the paper, the proposed model is used to assess the associated risk with the construction operations based on the evaluations of three evaluators. The results arrived from this model indicate a systematic and effective way of risk analysis.

Nieto-Morote, F. Ruz Vila (2011) presents a risk assessment methodology based on the Fuzzy Set Theory, which is an effective way to deal with subjective judgement, which is used to structure a large number of risks. The proposed methodology incorporates knowledge and experience acquired from many experts, since they carry out the risks identification and their classification, and also the subjective judgements of the parameters which are considered to assess the overall risk factor: risk impact, risk probability and risk discrimination. All of these factors are expressed by qualitative scales which are defined by trapezoidal fuzzy numbers to capture the vagueness in the linguistic variables. The most notable differences with other fuzzy risk assessment methods are the use of an algorithm to handle the inconsistencies in the fuzzy preference relation when pair-wise comparison judgements are necessary, and the use of trapezoidal fuzzy numbers until the defuzzification step. An illustrative example on risk assessment of a rehabilitation project of a building is used to demonstrate the proposed methodology.

Kangari and Riggs (1989)presented a risk analysis model (1989), which makes use of Fuzzy set theory (FST) as a risk assessment tool, consisting of three modes as follows: natural language computation, a fuzzy set's evaluation of risk, and linguistic approximation (Taroun, et al., 2011). Specifically, the linguistic approximation method handles subjectivity issues in construction risk assessments by finding the nearest natural language expression for the estimated fuzzy set numbers using Euclidean distance.

Rekik Ali et al (2017)proposed a fuzzy decision making approach for project selection problem under uncertainty. An evaluation is provided as an illustration of the proposed approach. In the conclusion, the author showed how this method can help decision makers in the selection of appropriate project based on their profitability.

Yu et al. (2009)proposed a multi criteria decision analysis tool for credit risk evaluation using fuzzy set theory. The tool is developed to initially allocate results obtained from alternative competing credit evaluation techniques in the form of fuzzy opinions, then aggregated into a group consensus and, lastly, defuzzified into a discrete numerical value to support an ultimate credit decision. Human reasoning, expert knowledge and imprecise information are considered valuable inputs in the estimation of operational risk.

Carr and Tah (2001)using fuzzy approximation and composition, the relationships between risk resources and consequences on project performance is identified and quantified. The model allows for the risk parameters using linguistic approach and formulation of rules using the relationship between the likelihood, severity and impact of the risks.Zeng et al. (2007)hybridized fuzzy reasoning and the AHP approach to handle subjective assessments and prioritize diverse risk factors, respectively (Taroun, et al. 2011). The model quantifies the risk magnitude (RM) of risk by integrating a risk parameter called the factor index (FI), which evaluates the magnitude of the possible risk and combines it with the risk

likelihood (RL) and risk severity (RS) into a fuzzy inference system. The system utilized a modified fuzzy AHP to capture and convert the expert's fuzzy information and subjective judgment.

KattiRhushikeshSiddhappaetal.(2016)the authors report the methodology to solve risk analysis problems related to Construction industry with the purpose of determining the project's usefulness. Fuzzy logic is perfect to deal with the uncertainty risk plays in a projects development. This methodology provides a model which consists of five stages: Risk classification, natural language representation, fuzzy assessment aggregation, fuzzy weighted average computation, linguistic approximation. This methodology provides customizable standard terms for likelihood and severity quantification.Ossama et al (2013)proposed a process of risk assessment is about risk quantification and determining appropriate controls. The issue under this study is the application of Fuzzy Logic to develop a Fuzzy Model to enhance the risk assessment process which is dealing with uncertainties that arise in each phase of the risk assessment process.

Banaitiene et al (2011) present a research in area of construction projects. The aim of the research is to discover how construction companies perceive the significance of the construction projects risks they face and the extent to which they employ potential risk responses. Zhang and Li (2011) presents the use of fuzzy mathematical theory and gray relational analysis method in the risk evaluation of construction project. Singh and Tong (2005) stated that contractor selection in a multi-criteria environment is largely dependent upon the uncertainty inherent in the nature of construction projects and subjective judgment of decision makers. For this reason, they used a systematic procedure, based on FST, to evaluate the capability of a contractor to deliver the project as per the owner's requirements. The notion of Shapley value was used to determine the global value or relative importance of each criterion in accomplishing the overall objective of the decision-making process.

Zhang et al. (2004) observed that it is always problematic to define uncertain information input for construction-oriented discrete-event simulation. Therefore, they proposed incorporating FST with discrete-event simulation to handle the vagueness, imprecision, and subjectivity in the estimation of activity duration. Based on an improved activity scanning simulation algorithm, a fuzzy distance ranking measure was used in fuzzy simulation time advancement and event selection for simulation experimentation. Baloi and Price (2003) factors' modeling, assessment, and management. Their preliminary indications showed that FST is a viable technology for modeling, assessing, and managing global risk factors that affect construction cost performance and therefore a fuzzy decision framework for risk management can be successfully developed.Oliveros and Fayek (2005) developed a fuzzy logic model that integrates daily site reporting of activity progress and delays, with a schedule updating and forecasting system for construction project monitoring and control. This model can help with the analysis of the effects of delays on a project's completion date because the use of fuzzy logic allows linguistic and subjective assessments to be made, and thereby suiting the actual practices commonly used in the construction industry.

II. REVIEW OF RESEARCH GAPS

From literature survey following research gaps are observed and discussed here as, The construction industry mainly focuses on low-price based environment. But the need of the time is to focus on the quality management program which is by using appropriate methodology for risk analysis. Through Fuzzy set theory a system was introduced for analyzing various risks and decision making problem associated with construction industry.

The construction industry has witnessed the failure of many projects due to varying reasons such as technical risks, logistical risks, management related risks, environmental risks, financial risks, socio-political risks. Also the current trend observed in the construction industry is to focus on the selection of appropriate method for determination of analysis of risk analysis. All these incidents have led to the impression that the current system of risk assessment is inefficient in selecting the proper method used for quantitative risks meeting the demands and challenges of present times and hence needs to be reviewed accordingly.

Using Fuzzy Logic in establishing Initial Condition in accordance to predict Final Conditions. This would directly help in reducing the construction defects.

III. REVIEWING FUZZY LOGIC APPLICATIONS IN CONSTRUCTION MANAGEMENT

Fuzzy Logic applications can be grouped into following categories. (1) Decision making (2) Performance (3) Evaluation/Assessment (4) Modelling.

Fuzzy Logic applications in decision making: Singh and Tong (2005) used a system based on fuzzy set theory to evaluate the capability of a contractor to deliver the project as per owner's requirement. Seo et al (2004) proposed a methodology based on fuzzy set theory which helped in decision making for building planners and industrial professionals. Tam et al (2002) proposed a non-structural fuzzy decision support system which helped in deciding the site layout planning for different projects. It combines both expert judgement and computer decision modelling which makes the work easier. Fayek (1998) developed a bidding strategy model using fuzzy logic. He stated that this model can help to achieve objectives of bidding as well as help the contractor in bidding. Wang and Liang (2004) developed a fuzzy model which helped the project managers to minimize project costs, project time, crashing costs. Zhang and Tam (2003) developed a decision making model that helped in timely resource allocation. Ng et al (2002) developed a fuzzy decision making model for procurement selection. Lin and Chen (2004) pointed out that bidding process is associated with uncertainty and complexity. They used fuzzy logic and subjective judgement and natural language representation such as nature, competition value of bid opportunity, resource capabilities etc. Fuzzy weighted average theory was used.

Fuzzy Logic applications in performance: Ermiyas Tesfaye et al (2016) suggested a chronological development of risk analysis methodology, techniques and model undertaken in construction projects. The research concludes that the techniques used in risk analysis are mostly based on fuzzy expert system. Zheng and Ng (2005) pointed out that by using the concept of fuzzy sets, project

managers and planners can represent and assess the range of possible time-cost values and their associated degree of belief (i.e. conversion into membership functions). They stated that this model can support decision makers in analyzing their time-cost optimization decision in a more flexible and realistic manner.

Mete et al (2015) used fuzzy pert and cpm to improve the project of an online internet branch. Fuzzy activity times of three different firms are used, using triangular fuzzy numbers for fuzzy data the fuzzy cpm and fuzzy pert optimization are analysed. Zhang et al. (2004) observed that it is always problematic to define uncertain information input for construction-oriented discrete-event simulation. Therefore, they proposed incorporating fuzzy set theory with discrete-event simulation to handle the vagueness, imprecision, and subjectivity in the estimation of activity duration, particularly when insufficient or no sample data are available. Based on an improved activity scanning simulation algorithm, a fuzzy distance ranking measure was used in fuzzy simulation time advancement and event selection for simulation experimentation. Baloi and Price (2003) discussed the core issues of global risk factors' modeling, assessment, and management. Their preliminary indications showed that FST is a viable technology for modeling, assessing, and managing global risk factors that affect construction cost performance and therefore a fuzzy decision framework for risk management can be successfully developed.

Oliveros and Fayek (2005) developed a fuzzy logic model that shows daily site reporting of activity progress and delays, with a schedule updating and forecasting system for construction project monitoring and control. This model can help with the analysis of the effects of delays on a project's completion date because the use of fuzzy logic allows linguistic and subjective assessments to be made, and thereby suiting the actual practices commonly used in the construction industry. Knight and Fayek (2002) used fuzzy logic to predict potential cost overruns on engineering design projects. By doing so, it assists in assessing the amount of possible risk on a project and the likelihood of making a profit on the job. In particular, the research used fuzzy logic to model the relationships between the characteristics of a project and the potential risk events that may occur, and the associated cost overruns caused by combinations of the project characteristics and risk events.

Fuzzy Logic applications in Evaluation/assessment: Kumar et al. (2000) developed a methodology to incorporate linguistic variables into workable mathematical propositions for the assessment of working capital using FST after considering the uncertainty associated with many of the project resource variables. Sánchez et al. (2005) developed a fuzzy set-based approach for representing and synthesizing information about the various kinds of variables involved in the evaluation of a project's value in the context of construction in civil engineering. Tah and Carr (2000) used a hierarchical risk breakdown structure representation to develop a formal model for qualitative risk assessment. To do so, a common language for describing risks was first presented, which included terms for quantifying likelihoods and impacts in order to achieve consistent quantification.

The relationships between risk factors, risks, and their consequences are represented on cause and effect diagrams through the application of fuzzy logic, and the concepts of fuzzy association and fuzzy composition. Shang et al. (2005)

developed an innovative risk assessment approach for distributing project teams. The approach was based on a client and server architecture and used fuzzy logic and web-based technology. It was found that the use of a web-based risk assessment system for distributing project team members had major benefits in terms of use of linguistic terms to express risk assessment, ease of communication, ease of maintenance, and greater consistency.

Fuzzy Logic applications in Modelling: Wei and Wang (2004) developed a comprehensive framework, which combined objective data obtained both from external professional report and subjective data derived from internal interviews with vendors, to select an appropriate Enterprise Resource Planning (ERP) project. By doing so, a hierarchical attribute structure was suggested to evaluate the ERP projects systematically. In addition, FST was adopted to aggregate the linguistic evaluation descriptions and weights.

IV. CONCEPT OF FUZZY LOGIC

Fuzzy sets can generally be expressed mathematically as follows:

$$A = [x / \mu A(x)] \quad (1)$$

in which A = fuzzy set, $\mu A(x)$ = a membership value between zero and one, and x = an element of universe X . In order to make it simple, x can be defined as a scale element between zero and ten, which in this study is figured out as the degree, from lower to higher, of uncertainty.

The basic structure of a fuzzy inference system consists of three conceptual components: a rule base, which contains a selection of fuzzy rules; a database which defines the membership function used in the fuzzy rules; and a reasoning mechanism which performs the inference procedure upon the rules and given facts to derive a reasonable output or conclusion. Fig 1 shows the basic structure of fuzzy system.



Fig 1: Basic structure of fuzzy system

V. REVIEW SUMMARY

This review papers concentrates to highlight Fuzzy logic system adopted in risk analysis methodology which can be applied with ease to construction industry accordingly to maintain high quality for the projects delivered. This high quality could be achieved by reducing risks associated with project completion time, project costs, crashing costs, resource allocation etc. Thus final conditions of any project can be predicted by analysing risks associated with a particular project before implementation of the project i.e. in

the planning stage. Hence the focus of the Fuzzy logic system used in risk analysis is to establish best suited way to minimize risk and the time and cost associated with the risks. Proper evaluation and analysis of risks will help decide justification of costly measures to reduce the level of risk. Some risks such as natural disasters are virtually unavoidable and effect many people. A risk is defined as the potential for complications and problems with respect to the completion of a project and the achievement of a project goal and as an uncertain future event or condition with the occurrence rate of greater than 0% but less than 100% that has an effect on atleast one of project objectives (i.e., scope, schedule, cost, or quality, etc.). A common procedure for all fuzzy risk assessment methods includes defining the parameters, defining the risk severity with which the project assessed and converting them into linguistic terms which transforms them into corresponding fuzzy numbers. In the next step, a fuzzy inference rule block is established which shows the relationship between the input and output variables. The final step is defuzzification, which converts fuzzy results into exact numerical values. All the researchers have recommended taking into account of impreciseness, vagueness and fuzziness of the risk factors involved in a construction project to assess the total project risk successfully. Fuzzy set theory provides an efficient and useful way to deal with the problems in decision making. The method allows the translation of subjective judgement into linguistic terms which provides a flexible way for risk assessment.

REFERENCES

Agnieszka Dziadosza-Mariusz Rejmentb, Risk analysis in construction project - chosen methods. Operational Research in Sustainable Development and Civil Engineering - meeting of EURO working group and 15th German-Lithuanian-Polish colloquium (ORS DCE 2015) Risk analysis in construction project - chosen methods.

Andi Lecturer, Construction Management Post-Graduate Program, Petra Christian University, Surabaya, Appropriate Allocation of Contingency using Risk Analysis Methodology. Civil Engineering Dimension, Vol. 6, No. 1, 40–48, March 2004 ISSN 1410-9530.

MsManisha.Ingle, 2Dr.Mohammad Atique, 3 Prof. S. O. Dahad , Govt.Collage of Engg., Amravati, International Journal of Advanced Engineering Technology, Risk analysis using fuzzy logic, IJAET/Vol.II/ Issue III/July-September, 2011

A. Nieto-Morote, F. Ruz-Vila International Journal of Project Management, Vol. 29 (2011). ISSN 0263-7863, A fuzzy approach to construction project risk assessment.

Pejman Rezakhani M.Sc. Student, Kyungpook National University, School of Civil and Architectural Engineering, Korea, Fuzzy Risk Analysis Model for Construction Projects, international journal of civil and structural engineering , Volume 2, No2, 2011

Debasis Sarkar Goutam Dutta, A Framework of Project Risk Management for the Underground Corridor Construction of Metro Rail, Indian Institute of Management Ahmedabad, W.P. No. 2011-02-05 February 2011

Ossama Y. Abul-Haggag¹, Walied Barakat², Application of Fuzzy Logic for Risk Assessment using Risk Matrix, International Journal of Emerging Technology and Advanced Engineering, , Volume 3, Issue 1, January 2013.



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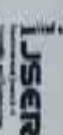
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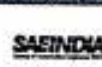
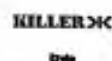


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Skill Development for Skilled India

M. S. Balasubramani, Sharif Thim

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Abstract - Our prime minister says "Only a graduation certificate is not enough. We need skills. We need to concentrate on skill development." Knowledge and Skills are important factors for economic growth of a country. Literacy provides knowledge but the process of "learning by doing or on-job-training" equips skilled workforce. Providing skill development training to Indian youths and utilizing the demographic status of it in India is a huge scope of generating skilled workforce in the country. Indian government considered the skill development as a major policy agenda to train 500 million youth of the country by 2020 for the vision Skill India a success. Now, our country needs reengineering the Vocational Education and Training (VET) system to enhance youths' capabilities as per the labor market demands to improve productivity to strengthen competitiveness of the country. Therefore, investment in training and skill development has been considered as an asset of many organizations. The effects of meaningful and successful training will lead to organizations' improvements. It will also bring changes in managerial behaviors and systems with widest possible spectrum both commercial and industrial sectors. This paper aims at sections I, II, III, IV, V and VI deals with implementation of skill development in India.

Key Words - Skill-India, Skill, Development, Economic, Growth, On-Job-Training, Commercial, Industrial.

I. INTRODUCTION

"Our Country requires Heroics"

Saint Vivekananda said, "We want that education, by which character is formed, strength of mind is increased, intellect is expanded, and by which one can stand on own feet." To make this vision success and to create heroics, Skill India is an initiative of the Government of India which offers courses across 40 sectors to empower its 65% of working age youth with skill sets for more employable and more productive in their work environment. Through this skill development of the youth, our country's economy, youth's economic and standard of living will be developed [1].

II. PROCESS OF SKILL DEVELOPMENT

Since India's independence, our government first time focused on enhancing employability of the youth through skill development with IT ecosystem. It has been brought under Skill India for reaping better results in Vocational Education and Training (VET). On 15 July 2015, on the occasion of World Youth Skills Day, Honorable Prime Minister launched National Skills Development Mission (NSDM) to create convergence across sectors and states in terms of skill training activities with the

objectives *create, fund, and enable* a large number of Indian youths to take up industry-relevant skill training and develop necessary frameworks for standard and quality assurance. It is sure that it will help us securing a better livelihood and become "Market-Makers" where market mechanisms are ineffective [1].

Ministry of Skill Development and Entrepreneurship aims to achieve the vision of 'Skill India' by its functional arms - National Skill Development Agency (NSDA), National Skill Development Fund (NSDF), 33 Sector Skill Councils (SSC), 187 Training Partners registered with National Skill Development Corporation (NSDC). It also intends to work with universities to develop a more flexible and responsive Vocational Education and Training system to train many more of semiskilled to become skilled workers to international level by using public/private partnerships [1].

Even the youngest workforce in India is more than China and Singapore still it is behind them in imparting skills. There is a huge hope of supplying skilled workforce after applying the current skill gaps in the country. Through the Integrated Livelihood Development Programmes the challenges of unemployment and underemployment are carefully tackled and improved self-confidence among women and the quality of life for the community. Now, they are engaged in financially productive trades such as Broom-Making, Sanitary Napkin Making, Mushroom Farming, Pickle & Papad Making among many others based on geographical location and demands [1].

It is every citizen's responsibility to co-ordinate in all skill development efforts for the removal of disconnect between demands and supply of skilled manpower and to build vocational and technical training framework for innovative thinking in both existing and creative jobs.

A. Maintaining Integrity

Skill Development is a mental process and more complicated than classroom learning. "Visuals sense the sight, Auditory senses the hearing and Kinetic conveys movement as in drama and body-language." This statement proves that providing training and skill development programme is very important for improving a candidate's decision-making abilities at techno-oriented or managerial-oriented situations. Now, we present a table with case studies related to training centers and its trainees' employment [4].

The result of the above table is an example to the quote - Drop by drop the ocean forms [1].

B. Importance of Early Brain Development To Human Development

The paper investigated the research of human's early brain development of Dr. James Fraser Mustard, Founder Chairman of The Founders' Network, Canada by whom his government was convinced to invest in supports for families on better the lives of children. His research says, "Babies begin to learn about the world around them from a very early age - including during the prenatal, perinatal (immediately before and after birth) and



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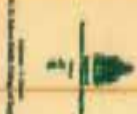
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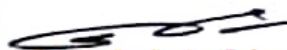


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Identification of Trustworthy Sellers and Buyers in E-commerce

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Abstract - One of the major reasons observed for the fear in minds of thousands of people today to carry out e-commerce transactions for their daily shopping purpose is the lack of trust. In spite of its cost effectiveness, e-commerce lacks the personal relation or contact with the vendor. It is very important to remove this fear from the minds of buyers. The only solution is to build a robust Trust Reputation System (TRS) which will provide helpful information in support of specific trusty sellers and feedback providers thereby contributing in taking the correct decision in any electronic transaction.

As a result, a new architecture for TRS in e-commerce application is proposed in this work which provides a trustful reputation score for each aspect of a targeted product or service, trust degree of the user and ranking to the feedback based on its trustworthiness. In fact, the main part of the architecture lies in an intelligent layer that proposes five point questions from a collection of prefabricated feedbacks summarizing other user's textual feedbacks about the specific aspect of the targeted product obtained using text mining tools and algorithms, to each user who wants to provide his/her recommendation. This ensures that there will be reviews of trusted users only and the product and services will get the perfect ratings according to their aspects and in turn will help customers to build a trust in online transactions.

Index Terms - Trust Reputation System, trust degree, prefabricated feedbacks.

I. INTRODUCTION

With the rapid growth of data and information available in e-commerce applications, there has been uneasiness in the minds of millions of users about their privacy. Hence, users need to feel secure while purchasing a product or a service for the continuous development of e-commerce. Although cryptography and digital signatures and certificates assist users to make their transaction safer, they remain in adequate to construct a trustful reputation about a product or a service. In fact, they also have to trust the product they want to buy, its quality and the cost of product because trust is a significant factor in any social relationship especially in e-commerce transactions. That's the reason why users rate available products on various web blogs in the e-commerce application and also leave their comments and textual feedbacks in lots of discussion forums.

Trust Reputation System (TRS) is suggested in e-commerce applications so as to create trustworthiness among a group of buyers or participants. This will help them to know the trustworthy products, their aspects and also sellers based on the product's characteristics and their past experiences. The choice of e-commerce users depends highly on user's opinions about the different aspects of product, in order to build their own trust and reputation. Therefore feedbacks, scores, reviews, and the recommendation given by other users are very crucial for the assessment of trust reputation. Hence, the reliability and authenticity of this information needs to be verified before it is visible to the buyers.

The central idea of this system consists of essential mechanisms that aim to recognize mischievous interventions of users whose intention is to deceive or distort the reputation score of a product positively or negatively. In the literature, there are many works that propose algorithms for calculating a reputation or ratings based on the semantic analysis of textual feedbacks in order to a trust score for the product and especially the trust degree of the user.

In contrast to these papers, the attitude adopted by the user is analyzed towards specific prefabricated feedbacks which are stored in knowledge base. The user is going to give his opinion on a scale of 1 to 5 points on those prefabricated feedbacks, whose number varies from 2-10 depending on the choice of user. The degree of trustworthiness for each prefabricated feedback is already calculated. In fact, the text mining algorithm is used to classify users' feedbacks by categories of product and their aspects in a knowledge base depending on their semantic content. The algorithm is also checks whether the user's appreciation about the aspect of a product is in accordance with the review associated to it.

The bottom line is that the proposed TRS algorithm is used to calculate the trust degree of the user based on the trustworthiness of his/her feedback. The trustworthiness evidence depends on user's reaction and choices. Even if the user is very trustworthy, his degree of trust may be incremented by only a low value if the feedback he has evaluated or assessed has low trustworthiness, and the same is done in the reverse condition. Finally, the trust degree of seller is calculated based on various scores of its products. Also the objective of TRS is to give only trustworthy reviews and

produces the global score of the product which will help the user to take decisions in their online transactions. The technique of 5-point questions is a multi-level result technique that helps calculate the trust degree of the user in a very detailed dimension.

The rest of this paper is organized as: In section 2 we have discussed the terminology of trust and reputation systems. Section 3 presents some literature survey done by us. The algorithm and flowchart of our TRS are detailed in section 4. Finally, we come up with our expected results and concluding remarks along with the future work.

II TRUST AND REPUTATION DEFINITIONS

Reputation and trust must be assigned closely to web content in order to estimate usefulness of web content and to use its trustworthiness. We need to create a social interaction, to develop further relations in order to collect more and more information and then filter them and decide about their reliability using TRS [1]. Also, the rating targets at calculating the reputation. A reputation algorithm calculates somehow the reputation of the content from ratings [9].

In our work, we have included the analysis of textual feedbacks for generating the reputation score of the product and its various aspects. However, we need to go through some of the definitions of trust and reputation:

Definition 1:

The definition of Trust is closely related to the willingness to pay, in online markets such as Amazon, the actual selling price without taking an adequate reflection of the “underlying” trust of other buyers in the seller or even the product. [1]

In e-commerce, being trustful is a quality which characterizes a product that a user promises to know from a past experience which is more trustful, or because other users say that it is a reliable product.

Definition 2:

Trust is also considered as a subjective evaluation of the potential outcomes and risks involved by relying on a partner. [1].

Definition 3:

Reputation is generally said or believed to be about a person's or things character or ranking. Related to products and services, it is the subjective opinion based on feelings, past experiences and the viewpoint of a circle of “trustful” people. Reputation is often used in the sense of the community's general reliability and trustworthiness evaluation of a service entity [7].

Therefore, this trust reputation needs to be gathered, collected and filtered in order to generate the most trustful

reputation associated to a service, a product or a user. Hence, Trust Reputations Systems are available tools and techniques to gather; collect and filter the feedbacks of trustful people in order to calculate the most reputed service or a product or a user.

Definition 4:

TRS towards the whole community of buyers and sellers is significant classes of decision support tools that can help reduce risk when dealing with in transactions and interactions online. From the community viewpoint, it represents an application of social interaction, moderation and control, as well as a method to assess trust by improving the quality of online markets and communities. [10]

III LITERATURE SURVEY

The authors of many papers like [4] and [7] have proposed their work in several TRS architectures with different algorithms to calculate the reputation score of the online products. The author of paper [6] proposed a novel robust Trust-aware Social Influencer method that considers the evolutionary trust relationship and the variations of historical social influences of participants, which can help deliver more accurate social influences evaluation results in e-commerce.

Hasnae RAHIMI, Hanan EL BAKKALI's [1] paper gives the basic idea of trustworthiness and also explains the use of prefabricated feedback asked to the user. The global reputation score of product is calculated with the help of user appreciation about the product and the trust degree of the feedback given by the user.

Ankita Thakkar, Mrs. Deepali Vora [2] proposed a system which is feeded by the trust score of a product and trust weight of the person to get the decision of whether to buy a product or not that helps the user in decision making.

The system proposed by Gatha kumar, Durai Raj Vincent PM [3] gives the factors which are responsible for gaining trust in online transactions that helps in calculating the trust degree about the contents of the online retailing site.

The system proposed by Yi Yi Thaw, Ahmad Kamil, Mahmood, P.Dhanapal Durai Dominic [5] described the role of security, privacy and risk perceptions of consumers to shop online. Also, the trust of the consumers is negatively associated with perceived risks in online transactions. However, there is no significant impact from perceived security and privacy to trust in e-commerce.

Even in studies attempting to provide more complex and robust reputation methods such as [7] and [8], some issues are still not taken into consideration, such as the update of the trust degree of the user after each feedback, and the agreement between the given rating which is a scalar value and the textual feedback associated to it.

Time is significant in calculating a reputation score because old ratings should get less weight than current ones using a specific method related to the age of the rating in time [8].

In the proposed architecture, for each user who wants to leave a rating (appreciation) and a textual feedback (semantic review), we analyze his attitude toward a number of short and selected feedbacks prefabricated and stored by product in the knowledge base. This user's review is going to be reached by any other user. As a result, we need to know the trust degree of the user and determinate the trust degree of the feedback.

IV PROPOSED SOLUTION

At the beginning, the user gives rating and a textual feedback on a specific product. The TRS need a text mining algorithm which aims to get the given information and verify the concordance between the user's given appreciation and the textual feedback, so as to avoid and eliminate any contradiction.

Once the concordance is verified, system redirects the user to an interface of selected pre-fabricated feedbacks. So as long as feedbacks are added in the data base of origin, a text mining algorithm is going to make pre-fabricated feedbacks with different categories and fill out the knowledge base. The text mining algorithm would contain a part of learning in order to automatically fill out the knowledge base. The user is invited to enter his choice on a scale of five points for each feedback of the displayed selection. Each feedback has already a degree of trustworthiness which represents the trust degree of the user who is the provider of the feedback. Then the proposed reputation algorithm gets the user's opinion on each review in addition to the trustworthiness degree of those feedbacks and uses them to generate a trust degree for the user. Then the global trust score of the product is calculated based on different aspects of the product.

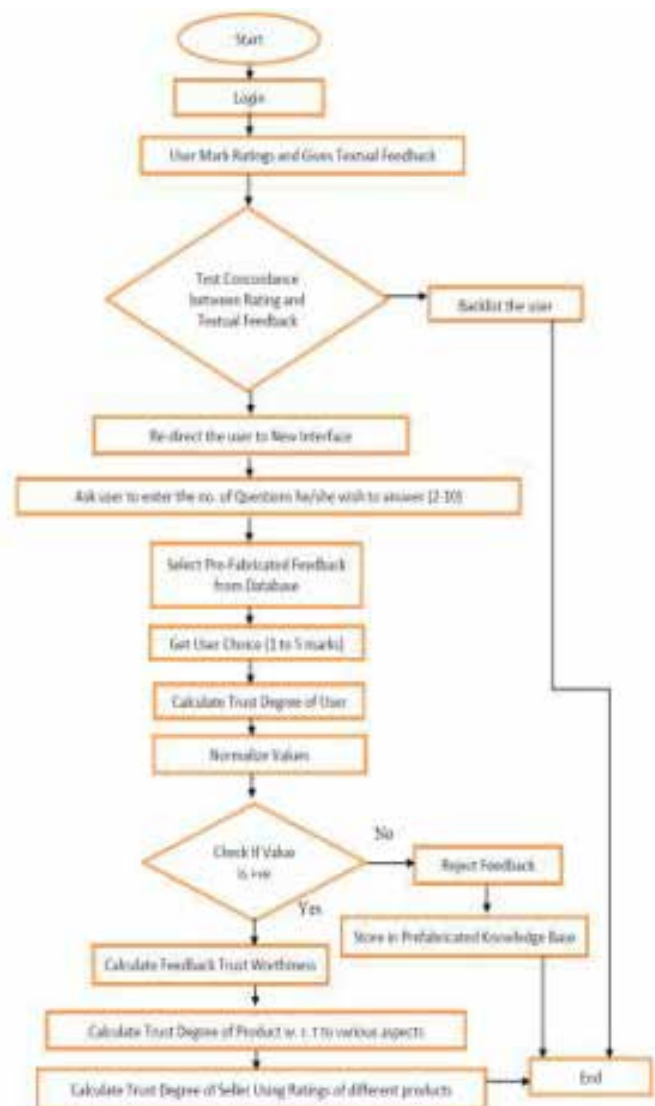
V TRS ALGORITHM

The steps of the TRS algorithm are as follows:

1. User logs in to the system
2. User will mark his/her ratings aspect wise and provide the textual feedback about the product.
3. Verify the concordance between the user appreciation and the textual feedback.
4. If the concordance is verified, display to the user a selection of the most recent pre-fabricated feedbacks about the product user is concerned with; else blacklist the user.
5. This selection of feedbacks is rated by the user on the scale of 1-5 points.
6. Extract data from data base concerning the trustworthiness of the prefabricated feedback and the previous trust degree of the user.
7. Generate (new user) / update (old user) the trust degree of the user using the trustworthiness of the feedback and the user's choice.

8. Normalize the trust degree of the user to match the threshold values $[-10, 10]$.
9. Calculate the score of the provided feedback and store it in knowledge base for further use.
10. Generate the trust score of each aspect of the product using the user's trust degree as a coefficient and his/her ratings as the marks.
11. Calculate the global trust score of the product.
12. Based on the entire product's score belonging to a particular seller, calculate the trust degree of the seller.

VI FLOWCHART



VII EXPECTED RESULTS

As the user gives rating and a textual feedback on a specific product, it is tested for contradiction by TRS. Once the concordance is verified, system redirects the user to an interface of selected pre-fabricated feedbacks. The user is invited to enter his choice on a scale of five points for each feedback of the displayed selection. Then the proposed

reputation system generates the following output, if the user is not blacklisted:

- Trust degree of the users,
- The global trust score for each aspect of the product,
- The global trust score of the product
- Score of the feedback and
- Ratings of the seller

CONCLUSION

In this system, a Trust Reputation System will be designed based on the analysis of the user's attitude towards a collection of prefabricated textual feedbacks of previous users in the knowledge base. A Trust Reputation algorithm is proposed which attempts to calculate the trust degree of the user according to his subjective marking from one to five points and the feedback trustworthiness. The proposed reputation algorithm also calculates the global trust reputation score of the product for its different aspects and generates the trustworthiness of the user's given feedback. Finally, the system generates the rating for the sellers based on its products. As a perspective, this system might increase the accuracy in trustworthiness of users in e-commerce.

REFERENCES

- [1] Hasnae RAHIMI, Hanan EL BAKKALI, —A New Reputation Algorithm for Evaluating Trustworthiness in E-Commerce Contextl, IEEE 2013
- [2] Ankita Thakkar, Mrs. Deepali Vora, — Trustworthiness and Analysis of Sentiment of user's Semantic Feedbacks in ECommerce, International Journal on Recent and Innovation Trends in Computing and Communication, Volume: 3, Issue: 2, February 2015
- [3] Gatha kumar, Durai Raj Vincent PM, —The Measurement and Validation of Trust in E- Commerce Relationships, International Journal of Advanced Research in Computer Science and Software Engineering, Volume 3, Issue 4, April 2013
- [4] Y. Liu, J. Zhang, and Q. Zhu: Design of a Reputation System based on Dynamic Coalition Formation. Proceedings of Third International Conference, SocInfo 2011, Singapore, October 6-8, 2011. Proceedingspp 135-144.
- [5] Yi Yi Thaw, Ahmad Kamil Mahmood, P.Dhanapal Durai Dominic, —A Study on the Factors That Influence the Consumers' Trust on E-commerce Adoptionl, International Journal of Computer Science and Information Security, Volume: 4, No: 1 & 2, 2009
- [6] Zhu, Feng, et al. "Robust Approach to Finding Trustworthy Influencer in Trust-Oriented E-Commerce Environments" International Conference on Service-Oriented Computing. Springer International Publishing, 2016.
- [7] A. Josang and Ismail, Roslan and Boyd, Colin. A survey of trust and reputation systems for online service provision. Decision Support Systems 43(2):pp. 618-644. (2007)
- [8] A. Jøsang, J. Golbeck: Challenges for Robust Trust and Reputation Systems. 5th International Workshop on Security and Trust Management (STM 2009), Saint Malo, France, September 2009.
- [9] S. Steinbrecher, S. Groß, and M. Meichau: Jason: A Scalable Reputation System for the semantic Web. In the proceedings of IFIP International Federation for Information Processing 2009.
- [10] J. Golbeck J. Hendler: Inferring Reputation on the Semantic Web. In the proceedings of WWW 2004, May 17-22, 2004, New York, NY USA. ACM.



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Numerical Analysis of Solar Air Heater with Compound Turbulators

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Abstract:

In the present study, the 2D numerical simulation of solar air heater with compound turbulators on the absorber plate is investigated. The compound turbulators is a combination of transverse square ribs with 60° V shaped grooves in between. The depth of the 60° V-grooves is kept equal to height of the square rib. The effect on the average heat transfer, friction factor and thermo hydraulic performance parameter (THHP) has been studied and compared with the experimental work. The Aspect ratio of the duct is 50, the rib to height ratio is 0.40, pitch ratio (P/e) is 10 and Reynolds number (Re) ranges from 3000 to 18000. The problem is simulated using FLUENT 16.0 solver, using standard $k-\epsilon$ turbulence model with advanced wall treatment. The results shows significant enhancement of heat transfer rate with compound turbulators.

Key words: Solar air heater; CFD; Compound turbulators.

Nomenclature:

e	Rib height
D_h	Hydraulic diameter
P	Pitch
P/e	Pitch ratio
W	width of duct
H	Height of duct
W/H	Aspect ratio (AR)
Re	Reynolds number
Nu_r	Nusselt number for ribbed duct
Nu_0	Nusselt number for smooth duct
Nu_r/Nu_0	Normalized Nusselt number
f	Friction factor for ribbed duct
f_0	Friction factor for smooth duct
f/f_0	Normalized friction factor
$Nu_r/Nu_0 / (f/f_0)^{1/3}$	THHP (Thermohydraulic performance factor)

I. INTRODUCTION

Solar air heaters are device to convert solar energy into useful thermal energy. These are primarily ducts with high W/H ranging from 6-50. Implementing small height ribs helps to break the laminar sub layer and increase the turbulence, which increases the heat transfer rate from the absorber plates. Many researchers have contributed in the study of these devices through experimentation [1-3]. CFD simulations for fully developed flow in a ribbed duct with $k-\epsilon$ model have studied by several authors to understand the heat transfer characteristics and flow behaviour [4-6]. Solar air heaters are one such application where ribs are mounted on periodically to enhance the heat transfer. This work deals with numerical simulation of combinations of rib on the absorber plate of a solar air heater. 2D simulation has been performed to evaluate the performance. The results of CFD have been validated and compared with the experimental results [1]. The results of analysis are in close agreement with the experimental results.

II CFD SIMULATION

Geometry is created in ICEM 16.0 and 2D simulation of the solar air heater has been investigated with the commercial CFD code ANSYS FLUENT (version 16) using $k-\epsilon$ RANS turbulence model with enhance wall treatment. The system configuration used for simulation work comprises of RAM 32 GB, Intel(R) Xeon(R) CPU E5-2609v2 processor, 2GB graphic card. The assumptions under which simulation has been carried out are as follows:

- (1) Single phase incompressible turbulent flow across the duct.
- (2) Steady state 2D flow.

Influence of Insert Geometry and Cutting Parameters on Surface Roughness of AISI 1040 Steel in Turning Process

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Abstract : In this study effect of insert geometry and cutting parameters on surface roughness of AISI 1040 steel in turning process were investigated. CVD coated carbide inserts with two different shapes such as 'C' and 'T' were used. AISI 1040 steel bars were used for experimental study. Taguchi's L9 orthogonal array were used for design of experiments. Experiments were conducted on both CNMG and TNMG type inserts separately. Three factors (cutting speed, feed and depth of cut) and three levels (low, medium and high) experiments were conducted and statistical analysis of variance was performed. The experiments have been conducted using L9 orthogonal array in a SPEED LX 200 MAJOR CNC lathe machine. Turning process carried out on the EN 8 steel. The optimum cutting condition was determined surface roughness were evaluated by the analysis of variance (ANOVA).

Key Words: Turning, insert geometry, Taguchi Method, ANOVA, Surface roughness.

I. INTRODUCTION

In the study of metal cutting, the output quality is rather important. A significant improvement in output quality may be obtained by proper tool and work piece combination, optimizing the cutting parameters. Tool insert is not only improves output quality, but also ensures low cost manufacturing. Tool insert include tool insert geometry such as nose radius, approach angle, rake angle, angle of inclination, clearance angle etc. Cutting parameters include feed rate, cutting speed, depth of cut, cutting fluids and so on.

In machining of parts, surface quality is one of the most specific customer requirements where major indication of surface quality on machined parts is surface roughness value [1]. EN8 or 080M40 is unalloyed medium carbon steel which has medium strength and good tensile strength; it is suitable for manufacture of shafts, studs, keys, general purpose axles etc [7]. Taha et al. [2] were compared the experimental surface roughness value with theoretical surface roughness of two types of insert, „C“ type and „T“ type. The feed rate varied within the recommended feed rate range. It observed that there are large deviations between measured and theoretical surface roughness at low feed rates (0.05mm/rev) for both inserts. Patel et al. [3] have considered a novel approach for optimum cutting tool insert selection strategy. In this approach, two well-known Multiple Attribute Decision Making (MADM)

methods such as Simple Additive Weighting (SAW) and Weighted Product Method (WPM) use for a case study of tool insert selection for better surface finish in CNC (Computer Numerical Control) turning operation. In these methods their relative performance are compared with respect to ranking of alternative and from ranking they have selected best tool insert for better surface quality during turning operation on alloy steel using CNC turning centre. Bhattacharya et al. [4] have investigated the effect of cutting parameters on surface finish and power consumption during high speed machining of AISI 1045 steel using Taguchi design and ANOVA. The result showed a significant effect of cutting speed on surface roughness and power consumption, while the other parameters have not substantially affected the response. Thangarasu et al. [5] studied relationship with the basic parameters to the responses namely Surface roughness (Ra) and Material Removal Rate (MRR). Depth of cut for better surface finish and material removal rate. The Ra and MRR is resultant of various controllable process parameters are Spindle speed, Feed rate and Depth of Cut. Depth of cut was found as the most critical factor for attaining the desired MRR while reducing the value of surface roughness. Kabra et al. [6] studied on three machining parameters as process parameters: Cutting Speed, Feed rate and Depth of cut. The experimentation plan is designed using DOE and Minitab-16 statistical software is used. Optimal values of process parameters for desired performance characteristics are obtained by design of experiment. Prediction models are developed with the help of regression analysis method using Minitab-16 software and finally the optimal and predicted results are also verified with the help of confirmation experiments. Ilhan Asilturk and Harun Akkus [8] obtained the effect of cutting parameters on surface roughness in hard turning using the Taguchi method. In this study, dry turning test carried out on hardened AISI 4140 (51 HRC) with coated carbide cutting tools. The statistical methods of signal-to-noise (S/N) ratio and analysis of variance (ANOVA) are applied to obtained effect of cutting parameters on surface roughness. Kumar et al. [13] obtained the effect of spindle speed and feed rate on surface roughness of Carbon Alloy Steel in CNC turning. In this study, five different carbon steel used for turning are SAE 8620, EN8, EN19, EN24 and EN47. As a result, it was

concluded that the surface roughness increased with increased feed rate and it higher at lower speeds and vice versa.

The objective of this study is obtain optimal turning conditions (cutting speed, feed rate and depth of cut) for minimizing the Ra when turning EN 8 steel material with three different CVD coated carbide inserts and also select the best insert. These cutting inserts are selected by MADM (Multiple Attribute Decision Making) method. Taguchi's L9 Orthogonal Array was used in the design of experiment. Furthermore, analysis of variance (ANOVA) is performed to see which process parameters are statistically significant.

II. EXPERIMENTAL DETAILS

A. Material

For this study, AISI 1040 steel bars were used. The samples were selected as 40 mm diameter and 50 mm cutting length. This steel is especially recommended for the manufacture of shafts, studs, keys, general purpose axles, camshafts etc. It has 32 HRC hardness.

Table 1: Chemical composition of AISI 1040 steel

C %	Si %	Mn %	S %	P %
0.4	0.3	0.5	0.06	0.06

B. Cutting inserts

In present work CVD (TiN) coated carbide inserts were used as the cutting tool material. The TaeguTec inserts with the ISO designation of CNMG 120408 FG-TT5100 (80° Rhombic insert) and TNMG 160408 FG-TT5100 were used. For TNMG insert MTJNR 2525 M16 tool holder were used. For CNMG insert PCLNL 2525 M12 tool holder were used. The cutting tool inserts were selected by MADM (Multiple Attribute Decision Making) method.

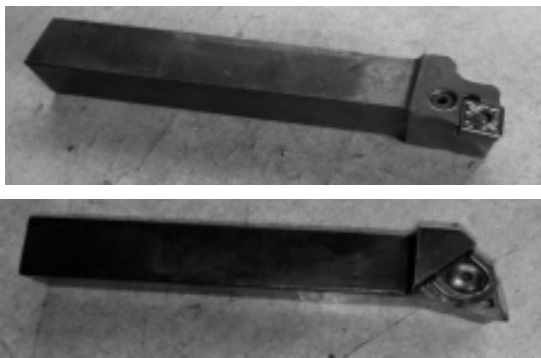


Figure 1: „C“ & „T“ Cutting tool insert with tool holder

C. Cutting condition

The cutting tests were carried out under wet environment using SPEED LX 200 MAJOR CNC lathe which have maximum spindle speed of 3500 rpm and a maximum spindle power of 15 kW.

The tests were designed according to Taguchi L9 Orthogonal Array and conducted in wet cutting conditions. Water soluble oil (Metcut brand) was used as coolant. Totally, 9 experiments were performed by the combinations of cutting parameters on both „C“ and „T“ tool inserts. The cutting parameters are given in Table 2.

Table 2: Cutting parameters

Factor	Cutting parameters	Level 1	Level 2	Level 3
Vc	Cutting speed (m/min)	150	200	250
F	Feed (mm/rev)	0.2	0.25	0.30
DOC	Depth of cut (mm)	0.5	1	1.5

D. Surface roughness measurements

The measurements were performed with Mitutoyo's SJ-201 Surftest surface roughness tester within sampling length 2.5 mm. Average surface (Ra) was measured.



Figure 2: Mitutoyo's SJ-201 Surftest surface roughness tester

III. DESIGN OF EXPERIMENTS

Taguchi's L9 Orthogonal Array was used in the design of experiment. The main objective of Taguchi method is to ensure quality in the design phase. Taguchi technique also allows controlling the variations caused by the uncontrollable factors which are not taken into consideration at traditional design of experiment.

Taguchi technique converts the objective function values to signal-to-noise (S/N) ratio for measure the performance characteristics of the levels of control factors against these factors. Signal-to-noise (S/N) ratio is defined as the desired signal ratio for the undesired random noise value and shows the quality characteristics of the experimental data [10, 11].

The experimental design has been shown in Table 4 (all factors are in coded form).

Table 3: Process variables and their limits

Process variables			
Values in coded form	(Vc) (mm/min)	(F) (mm/rev)	(DOC) (mm)
-1	150	0.2	0.5
0	200	0.25	1
1	250	0.30	1.5

Table 4: Taguchi's L9 Orthogonal Array

L9 (3**3)

Factors: 3

Runs: 9

Exp. No.	Vc	F	DOC
1	-1	-1	-1
2	-1	0	0
3	-1	1	1
4	0	-1	0
5	0	0	1
6	0	1	-1
7	1	-1	1
8	1	0	-1
9	1	1	0

Depending upon type of response, S/N ratio characteristics can be divided into three categories given by Eqns (1)-(3), when characteristic is continuous [9]:

- Nominal is the best characteristic,

$$\frac{S}{N} = 10 \log \frac{\bar{y}}{s^2} \quad (1)$$

- Smaller is the better characteristic,

$$\frac{S}{N} = -10 \log \frac{1}{n} (\sum y^2) \quad (2)$$

- Larger is the better characteristic,

$$\frac{S}{N} = -\log \frac{1}{n} (\sum \frac{1}{y^2}) \quad (3)$$

This indicated that engineering systems behave in such a way that the manipulated production factors can be divided into three categories: where, $\bar{y}$ is the average of observed data, S^2 is the variation of y , n the number of observations, and y the observed data or each type of the characteristics. Deviation between experimental and desired values is defined as loss function in the Taguchi technique. This loss function is then converted into S/N signal-noise ratio [12].

Table 5: The results of experiments and S/N ratios values for insert CNMG 120408 FG

Exp. No.	Vc	F	DOC	Ra ₁	S/N Ration
1	150	0.2	0.5	2.83	-9.4309
2	150	0.25	1	4.06	-12.3819
3	150	0.30	1.5	4.43	-13.1793
4	200	0.2	1	3.51	-11.1981
5	200	0.25	1.5	4.01	-12.2132
6	200	0.30	0.5	4.14	-12.5882
7	250	0.2	1.5	2.87	-9.45513
8	250	0.25	0.5	3.91	-11.8657
9	250	0.30	1	4.38	-12.9281

In the Taguchi technique, the optimum cutting conditions required for the best surface roughness were obtained by using Eq. (1), „the smaller-the better“ signal-noise ratio. S/N ratios obtained from this

equation are given in Table 2. ANOVA is used to evaluate effect of the cutting parameters on surface roughness. The optimum combination of the cutting parameters (i.e. cutting speed, feed rate, and depth of cut) is determined by the help of ANOVA and S/N ratios. Finally, confirmation experiments are done using the optimum machining parameters which were found by Taguchi optimization technique and thereby validation of the optimization is tested.

Table 6: The results of experiments and S/N ratios values for insert TNMG 160408 FG

Exp. No.	Vc	F	DOC	Ra ₂	S/N Ration
1	150	0.2	0.5	1.56	-4.34968
2	150	0.25	1	2.31	-7.60422
3	150	0.30	1.5	3.02	-9.60014
4	200	0.2	1	1.65	-4.86076
5	200	0.25	1.5	2.44	-8.06241
6	200	0.30	0.5	2.54	-8.39911
7	250	0.2	1.5	1.72	-5.15357
8	250	0.25	0.5	2.16	-7.04365
9	250	0.30	1	2.75	-9.06637

IV. RESULTS AND DISCUSSIONS

The most essential criterion in the Taguchi technique for analyzing experimental data is signal-to-noise ratio. In this experimental study, the S/N ratio should have a maximum value to obtain optimum cutting conditions, according to the Taguchi method. Thus, the optimum cutting condition was found as -9.4309 and -4.34968 S/N ratios for Ra₁ and Ra₂ respectively in L9 orthogonal array in Table 5 and Table 6. The optimum cutting conditions, which were the cutting speed of 150 m/min, the feed rate of 0.2 mm/rev and the depth of cut of 0.5 mm (1 1 1 orthogonal array) were obtained for the best Ra₁ and Ra₂ values. Out of three cutting inserts CNMG 120408 FG gives lower Ra values and more maximum values of S/N ratios so it indicates that TNMG 160408 FG insert gives best surface finish. Level values of the factors obtained for Ra₁ and Ra₂ according to the Taguchi design, are given in Table 7 and Table 8. Figure 3 and 4 shows the graphic of the level values given in Table 7 and Table 8. Therefore, interpretations may be made according to the level values of Vc, F, and DOC factors given in Table (7 and 8) and Figure (3 and 4) in determining optimum cutting conditions of experiments to be conducted under the same conditions. The average S/N ratio for every level of experiment is calculated based on the recorded value as shown in Table (7 and 8).

Table 7: S/N response table for Ra₁ factor.

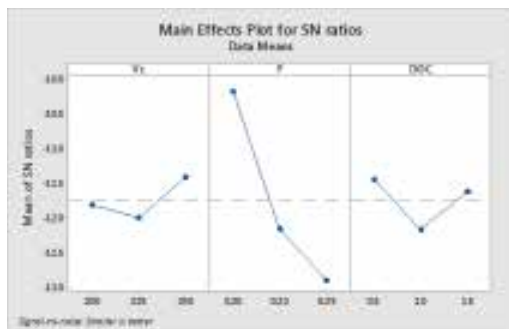
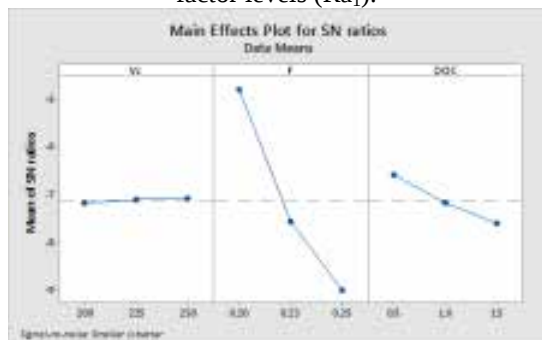
Level	Vc	F	DOC
1	-11.81	-10.18	-11.45
2	-12	-12.15	-12.17
3	-11.42	-12.9	-11.62
Delta	0.58	2.72	0.72
Rank	3	1	2

Table 8: S/N response table for Ra_2 factor.

Level	Vc	F	DOC
1	-7.185	-4.788	-6.597
2	-7.107	-7.57	-7.177
3	-7.088	-9.022	-7.605
Delta	0.097	4.234	1.008
Rank	3	1	2

The different values of S/N ratio between maximum and minimum are (main effect) also shown in Table (7 and 8). The feed is one factors that have the highest difference between values, (for $Ra_1 = 2.72$) and (for $Ra_2 = 4.234$) respectively.

The other two factors such as cutting speed and depth of cut has very low difference values compared to feed. According to the Taguchi prediction that the larger difference between values of S/N ratio will have a more significant effect on surface roughness (Ra). Thus, it can be concluded that increasing the feed will increase the Ra significantly.

**Figure 3:** The graphic of mean of S/N ratios versus factor levels (Ra_1).**Figure 4:** The graphic of mean of S/N ratios versus factor levels (Ra_2).**Table 9:** Analysis of Variance of SN ratios for Surface roughness Ra_1

Source	DF	Adj SS	Adj MS	F-Value	P-Value	% contribution
Vc	2	0.07887	0.003943	0.88	0.532	3.1642
F	2	2.17807	1.08903	24.31	0.04	87.3814
DOC	2	0.14607	0.07303	1.63	0.38	5.8601
Error	2	0.0896	0.0448			3.5946
Total	8	2.4926				100.0000

MINITAB is Statistical Analysis software that allows to easily conducting analysis of data. The MINITAB 17 program studies the experimental data and then provides the calculated results of signal-to-noise ratio. In this experimental work, the software has given the signal-to-noise ratio for surface roughness. The effect of different process parameters on surface roughness are calculated and plotted as the process parameters changes from one level to another. The use of both ANOVA and S/N ratio statistical method makes it easy to analyze the results and hence, make it fast to reach on the conclusion. From figure (3 and 4) it can be seen that with increase of feed rate surface roughness value would increase. If compare two figures it can be seen that feed rate affects the surface finish than other cutting parameters. Best surface roughness value is obtained at low value of feed rate. In addition, the graph shows that TNMG 160408 FG insert type gives better surface finish as feed rate increase as compare to other type of insert.

The significant parameters influencing the surface roughness Ra_1 and Ra_2 are determined using analysis of variance (ANOVA). It helps in formally testing the significance of all main factors and their interactions by comparing the mean square against an estimate of the experimental errors at specific confidence levels. In ANOVA if the P value of factor is less than 0.05 then that factor is significant and if P value is more than 0.05 then that factor is insignificant. Table (9 and 10) shows the analysis of variance for surface roughness Ra_1 and Ra_2 . It is clear from the table (9 and 10) that feed rate is the most significant factor for surface roughness Ra_1 and Ra_2 . Effect of cutting speed and depth of cut is insignificant in the present study as compared with other cutting parameters for surface roughness Ra_1 and Ra_2 .

Table 10: Analysis of Variance of SN ratios for Surface roughness Ra_2

Source	DF	Adj SS	Adj MS	F-Value	P-Value	% contribution
Vc	2	0.00607	0.003033	0.84	0.543	0.312
F	2	1.81727	0.908633	252.4	0.004	93.394
DOC	2	0.11527	0.057633	16.01	0.059	5.924
Error	2	0.0072	0.0036			0.370
Total	8	1.9458				100.000

V. CONCLUSION

From the analysis of the results in the turning process using the signal-to-noise (S/N) ratio approach, analysis of variance (ANOVA) and Taguchi's optimization method, the following can be concluded from the present study.

- Highest surface finish (lowest Ra) is obtained at a cutting speed of 150 m/min, feed rate of 0.2 mm/revolutions and a depth of cut of 0.5mm.
- Best surface roughness at high cutting speed (i.e. 250 m/min) is obtained from TNMG 160408 FC insert.
- The results of Taguchi method shows that feed rate is most significant parameter which affects the surface finish than the other cutting

parameters. The cutting speed and depth of cut are least significant parameters.

- Best surface roughness is obtained from TNMG 160408 FG insert than CNMG 120408 FG insert.
- The results of ANOVA for surface roughness show that feed rate is most significant parameter which affects the surface finish than other cutting parameters. The cutting speed and depth of cut are least significant parameters.
- Satisfying results were obtained so that they may be used in future research work and industrial studies.

VI. SCOPE FOR FUTURE WORK

- One can also use SYSTAT or SAS Software rather than using MINITAB for the Design of experiment.
- One can go for L_{27} orthogonal array Taguchi design or 3^k full factorial design for obtaining greater result than the L_9 orthogonal array.
- One can also use cutting force as an additional factor with addition to cutting speed, feed and depth of cut. Then make full factorial design of 2^4 or Full factorial three level design in form of 3^4 and can do optimization process.

REFERENCES

- [1] M. Anthony Xavier, M. Adithan, Determining the influence of cutting fluids on tool wear and surface roughness during turning of AISI 304 austenitic stainless steel, Journal of Materials Processing Technology 209, 2009, 900-909.
- [2] Zahari Taha, H.K.Lelana, Hideki Aoyama, "Effect of insert geometry on surface roughness in the turning process of AISI D2", The 11th Asia Pacific Industrial Engineering and Management System Conference, 7-10 December, 2010.
- [3] Nikunj V. Patel, R. K. Patel, U. J. Patel, B. P. Patel, "A novel approach for selection of tool insert in CNC turning process using MADM methods", International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958, Volume-1, Issue-5, June 2012.
- [4] A.Bhattacharya, S.Das, P.Majumdar and A. Batish, "Estimating the effect of cutting parameters on surface finish and power consumption during high speed machining of AISI 1045 steel using Taguchi design and ANOVA", Prod. Eng.Res.Devel, Volume 3, pages 31-40, 2009.
- [5] V. S. Thangarasu, G. Devaraj, R. Sivasubramanian, "High speed CNC machining Optimization of process parameters", International Journal of Engineering, Science and Technology Vol. 4, No. 3, pp. 66-77, 2012.
- [6] Ashish Kabra, Amit Agarwal, Vikas Agarwal, Sanjay Goyal, Ajay Bangar "Parametric Optimization & Modeling for Surface Roughness, Feed and Radial Force of EN-19/ANSI-4140 Steel in CNC Turning Using Taguchi and Regression Analysis Method", International Journal of Engineering Research and Applications (IJERA) ISSN: 2248-9622 Vol. 3, Issue 1, pp.1537-1544, 2013.
- [7] <http://www.steelexpress.co.uk/engineering/steel/EN8.html>.
- [8] Ilhan Asilturk, Harun Akkus, "Determining the effect of cutting parameters on surface roughness in hard turning using the Taguchi method" Measurement 44 (2011) 1697–1704.
- [9] R. Shetty, R.B. Pai, S.S. Rao, R. Nayak, Taguchi's technique in machining of metal matrix

- composites, J. Braz. Soc. Mech. Sci. Eng.31 (1) (2009) 12–20.
- [10] M. Kurt, E. Bagci, Y. Kaynak, Application of Taguchi methods in the optimization of cutting parameters for surface finish and hole diameter accuracy in dry drilling progress, Int. J. Adv. Manuf. Technol. 40 (2009) 458–469.
- [11] M. Gunay, A. Kacal, Y. Turgut, Optimization of machining parameters in milling of Ti–6Al–4V alloy using Taguchi method, e-J. New World Sci. Acad. Eng. Sci. 6 (1) (2011) 428–440.
- [12] Vikas Upadhyay , P.K. Jain, N.K. Mehta, “In-process prediction of surface roughness in turning of Ti–6Al–4V alloy using cutting parameters and vibration signals” Measurement 46 (2013) 154–160.
- [13] N. Satheesh Kumar, Ajay Shettyb, Ashay Shetty, Ananth Kb , Harsha Shetty, “Effect of spindle speed and feed rate on surface roughness of Carbon Steels in CNC turning” International Conference on Modeling, Optimization and Computing (ICMOC 2012).
- [14] D.C. Montgomery, (1997), Design and analysis of experiments, 4th edition, John Wiley & sons.



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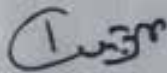
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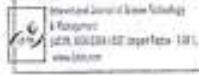
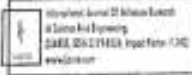
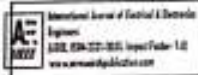
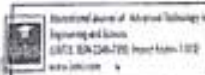
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Usability trends and access of Online Social Network by Indian population and its analysis

2 Author(s) M. A. Deshpande, R. K. Rana View All Authors

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Abstract

Document Sections

- I. Introduction
- II. Related Work
- III. Methodology
- IV. Results and Analysis
- V. Conclusion

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Figures

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Keywords

Metrics

Abstract:

Online Social Networking sites are getting much popular day by day. Well known sites such as Facebook, LinkedIn, Twitter, Orkut and Google+ have millions of users across the globe. The user base of facebook alone is more than 1.23 Billion. With the wide popularity of the Online Social Networks (OSN) in India, the numbers of users of these OSN are increasing tremendously in India as well as around the globe. This paper analyses some of the factors including reasons for joining OSN, behavior of users regarding friends, groups, access pattern of the user, time spend on OSN, effect of OSN on personal life etc. User's attitude and behavior based on surveyed data from more than seven hundred users using a questionnaire consisting 27 questions focusing the behavior of Indian users in the areas of usability trends and access of Online Social Networks. As per the literature survey done by us this is the first of its kind of work to analyze the Indian population's usability trend and behavior in OSN.

Published in: 2015 International Conference on Next-Generation Technologies in the Engineering Field (ICNTE)

Date of Conference: 9-10 Jan. 2015

INSPEC Accession Number: 14954334

Date Added to IEEE Xplore: 05 February 2015

DOI: 10.1109/ICNTE.2015.7029918

ISBN Information:

Publisher: IEEE

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I. Introduction

Online Social Networking sites (OSN) are becoming quite common today. Almost every person has

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An Extended Approach for Securing the Short Messaging Services of GSM using Multi-threading Elliptical Curve Cryptography

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Abstract—Currently, mobile phones are not only used for formal communication but also for sending and receiving sensitive information. Short Messaging Service's(SMS) are one of the popular ways of communication. Sending an SMS is easy, quick and inexpensive. However, when information is exchanged using SMS, protecting the short messages from the known attacks like man in the middle attack, reply attack and non-repudiation attack is very difficult. Such attacks on SMS security are hindering their application. This paper evaluates performance of elliptical curve cryptography by implementing it with threading and without threading. Based on the results of evaluation the one with the best performance is chosen for end to end SMS security.

Keywords—Public key cryptosystem, SMS Security, Elliptical curve cryptography

I. INTRODUCTION

Nowadays, most cell phones are used for their original intent i.e. making telephone these devices are also loaded with other features that are often little used or even ignored. One service that users have started, fully exploiting, in recent years is, Short Messaging Services. This basic service allows the exchange of short text messages between subscribers [1]. It has been accepted because it is simple, fast and cost effective. Data in figure 1 from the GSM association shows the growth in SMS usage per subscriber, averaged worldwide. It is evident that the volume of SMS per month doubled approximately every six months, a trend that has continued, until now [2]. SMS messages are handled by the Short Messaging Service Center(SMSC). The cellular provider maintains SMSC for the terminating devices. The SMS message which is to be send to the end device uses the highest payload of 140 octets. This upper payload limit restricts the maximum number of characters that can be sent to the terminating device based on the type of encoding used. Such as if 7 bit encoding are used, then maximum message length will be 160 characters, similarly maximum message length that can be sent by 16 bit encoding is 70 characters.

The figure 2 depicts the general system architecture for sending and receiving SMS messages with the SMSC. Each service provider operates one or more SMSCs. Mobile user's SMS messages are sent through a wireless link via a cell tower to the SMSC. The SMSC access protocols enable interactions

between two SMSCs or interactions between external Short Message Entities (SMEs) and an SMSC. SMEs are software applications on network elements (such as a mobile handset) or hardware devices that can send and receive short messages [1].

A. Application of Short Messaging Services

SMS is versatile; its services are growing day by day. SMS will grow in popularity as a marketing communication vehicle over the next few years. The unique qualities of SMS will make it a powerful weapon in the modern marketing mix [3]. CeS-LAP is developed to improve the current services provided by Lembaga Air Perak(LAP). This system is aimed at providing better complaint system, customer information system and expectantly an alternative way for customer to check their unpaid bill [4]. Mobile messaging architecture provides, the capability of sending limited-size data messages to subscriber's cellular phone. SMS can be used for providing real-time information of the public transport service system. This system allows a subscriber to receive travel information on demand. It primarily provides information to its subscriber through short messages, which is delivered to GSM mobile phone [5]. Nowadays, banking sectors are also providing many services through the SMS these services are gaining the increasing popularity.



Fig. 1. Increase in SMS usage

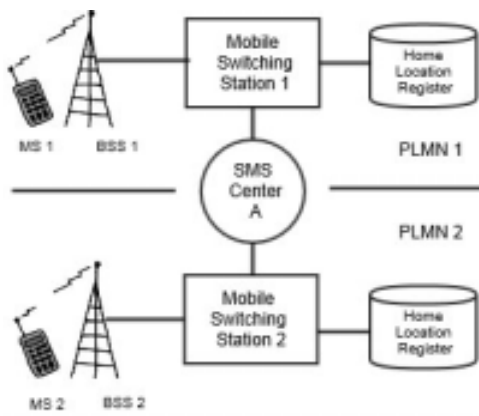


Fig. 2. The GSM network architecture

B. SMS Threats

Known SMS threats have been listed below:

- **SMS Spoofing:** By applying SMS spoofing; one can use an arbitrary mobile station or a computer to inject SMS messages into the system with the originator set to a specific mobile station [6].
- **BTS Spoofing:** Base Transceiver Station(BTS) does not authenticate itself to the mobile station. Therefore, anyone possessing the necessary equipment can operate its own BTS to which a target mobile station will automatically subscribe as soon as the BTS is the one closest to that target [7].
- **Man in the Middle Attack:** The weakness in the A5 cryptography family was discovered by A. Biryukov & A. Shamir [8]. In [9], Barkan et al. describe several practical attacks on the GSM network, eventually leading to a man in the middle attack.
- **Replay of Messages:** Since arbitrary person can intercept SMS transmission from a mobile station to the base transceiver station, messages can also be replied. This may not be of interest in the typical SMS scenario, the technology as well used for Machine to Machine communication(M2M) [10].
- **Message Disclouser** By default the encryptions is not applied to the SMS; messages can be read by the operators who have access to the message system at SMSC, or it can be intercepted and snooped during the transmission [10].

The A5/x algorithm, which is the GSM standard for encrypting transmitted data, can easily be compromised [8]. Therefore, there is a need to provide an additional end to end encryption on the transmitted message.

In our paper, section I introduces SMS and its security threats. Section II explains the work done so far for securing the SMS in literature. Section III gives the theory of using elliptic curves for cryptography. Section IV explains method proposed for implementation of multi-threaded ECC. In section V, Experimental results are given; and in section VI we have concluded the paper, and future work has been suggested.

II. RELATED WORK

In the literature, many authors have explored different encryption techniques to provide confidentiality to transmitted SMS messages. Some of these works are presented in this section. Boja and Paul et al. [11] have proposed m - learning tool. They have proposed a solution that will secure the SMS content as well as will have the minimal impact on the device performance. The solution implements a symmetric encryption scheme and is used by a distributed m-learning architecture. Grillo A. and Lentini et al. [12] has proposed Trusted-SMS system, which allows users to exchange non-repudiable SMSs, digitally signed with the Elliptic Curve Digital Signature Algorithm(ECDSA). This system can fit in many scenarios, such as commercial transaction, bureaucratic delegation. In a study by Lisonek and Drahansky [13], they showed the differences in the use of symmetric and asymmetric cryptography for securing the SMS. Based on the results, they have implemented the RSA asymmetric key cryptography for securing the SMS and developed the mobile application. Hassinen et al. [14] in his study explained how to provide the security, confidentiality and authentication to the SMS. He has explained how to send/receive and store the text message without providing the additional hardware support. M. Toorani and A. Beheshti [15] have proposed, "SSMS is a new application layer protocol that provides the confidentiality, integrity, authentication, non-repudiation, public verification, and forward secrecy of message confidentiality." Shushan Zhao and Aggarwal et al. [16] has proposed a new solution for a secure messaging channel using identity-based cryptography. This solution provides end-to-end security from the service provider to mobile users, and between mobile users. Hossain, A. and Jahan et al. [17] has presented a security scheme for improving the SMS security. At first, plaintext of SMS would be made as cipher text with the help of existing GSM encryption technology, then this cipher text would be digitally signed with the help of public key signature. The proposed scheme will give total authenticity, data integrity, confidentiality, authorization and non-repudiation, which are the most essential issues in m-commerce or mobile banking and in secure messaging.

III. ELLIPTIC CURVE THEORY

Elliptic Curve Cryptography(ECC) is a public key cryptography proposed by two scientists Kobitz and Miller [18], [19]. The security of ECC lies on discrete logarithm problem. It is a full exponential algorithm which is very difficult to break. ECC gives same level of security, as RSA with less key size, for example, 160 bits key of ECC is equivalent with 1024 bits key of RSA. Elliptic curve cryptography is based on elliptic curve equation. Any elliptic curve over binary field is given by equation (1)

$$y^2 + xy = x^3 + ax + b \quad (1)$$

Equation (1) gives the formula for elliptic curve over binary field.

Here a and b is constant. User can change values of a and b to get different elliptic curve equations. This a and b should satisfy following constraint, $16a^2 + 47b^3$ should not be equal to zero.

Any elliptic curve over prime field is given by equation (2)

$$y^2 = x^3 + ax + b \mod p \quad (2)$$

Equation (2) gives the formula for elliptic curve over Prime Field.

Here a, b and p are constants, p is a prime number which is used for limiting number of points on the curve. More is the value of p, more points will be generated and more will be the security.

How this elliptic curve is used for cryptography is explained in section IV. Table I, shows the comparison between ECC and RSA [20].

TABLE I. EQUIVALENT KEY ECC AND RSA ACCORDING TO NIST

ECC Key Size (Bits)	RSA Key Size (Bits)	Key Size Ratio
163	1024	1:6
256	3072	1:12
384	7680	1:20
512	15360	1:30

IV. PROPOSED METHOD

In elliptic curve cryptography, to convert plain text into cipher text, following steps are executed.

- 1) Convert text into ASCII format
- 2) Generate points on elliptic curve
- 3) Generate keys of users
- 4) Encrypt text

The detailed elliptic curve cryptography algorithm is given below. In this paper, we have modified the work proposed by [21] to ECC implementation with threads. Elliptic curve cryptography starts with generating points of a curve.

A. Generate points of a curve

Input: $a, b \in F_p$, $GF(P)E := y^2 + xy = x^3 + ax + b$

Output: Point(x,y) $\in E(F_p)$

Procedure gen points(a,b,p): return Point(x,y) $\in E(F_p)$

- 1) Initialize x to 0
- 2) Repeat
- 3) for each $X \in E(F_p)$
- 4) Compute $\text{sqrt}(y) = x^3 + ax + b - xy$
- 5) until x is not equal to p

B. Generate keys of a user

Input: $a, b \in F_p$, $GF(P)E := y^2 + xy = x^3 + ax + b$

Output: $K1 \in F_p, K2(x2, y2) \in E(F_p), K3 \in F_p, K4(x4, y4) \in E(F_p)$

Procedure gen Keys (a,b,p): return keys

- 1) Repeat
- 2) For each Point $P(x, y) \in E(F_p)$
- 3) If point $G(x, y) \in E(F_p)$ is a base point then
- 4) Select random integer $k1 \in GF(P)$ as private key
- 5) Multiply $k1$ with $G(x, y)$ to get public key $k2(x2, y2) \in E(F_p)$
- 6) Send (k1, k2) to receiver.
- 7) Until there are no more points

C. Point Multiplication in ECC

To multiply any number K with point p(x,y) we repetitively apply point doubling and addition operations.

Input: $a, b \in F_p$, $F_p \in GF(P)E := y^2 + xy = x^3 + ax + b$, Point $k2(x, y) \in E(F_p), k1 \in F_p$

Output: $p(x, y) \in E(F_p)$

Procedure point mult(k1, k2) : return point p(x,y)

- 1) Repeat
- 2) For each parallel processor
- 3) For each point $P(x, y) \in E(F_p)$
- 4) Repeat
- 5) $L = k1 \mod 2$
- 6) If $L=0$ then
- 7) Double point $P(x, y)$ using following formulae
- 8) $S \leftarrow [(3x^2 + a) / 2y] \mod p$
- 9) $2p \rightarrow Q(XR, YR): [(S^2 - 2x) \mod p, (S(x - XR) - y) \mod p]$
- 10) Double point $P(x, y)$ using following formulae
- 11) $S \leftarrow [(3x^2 + a) / 2y] \mod p$
- 12) $2p \rightarrow Q(XR, YR): [(S^2 - 2x) \mod p, (S(x - XR) - y) \mod p]$
- 13) Else
- 14) Triple point $P(x, y)$ using following formulae
- 15) $3P \rightarrow R(Xr, Yr) \rightarrow P + Q \rightarrow P + 2P:$
- 16) $S \leftarrow [(YR - y) / (XR - x)] \mod p$
- 17) $P + Q = R$
- 18) $Xr \leftarrow (S^2 - x - XQ) \mod p$
- 19) $Yr \leftarrow (S(x - XR) - y) \mod p$
- 20) End if
- 21) $L \leftarrow L/2$
- 22) Until $L \leq 0$
- 23) Until there are no more points
- 24) End

D. Encrypting Text

Input: $a, b \in F_p$, $F_p \in GF(P)E := y^2 + xy = x^3 + ax + b$, Point $k2(x, y) \in E(F_p), k1 \in F_p$, plaintext

Output: $P(x1, y1, x2, y2) \in E(F_p)$, cipher text of each char of plaintext Procedure Encrypt Text (a, b, K2(x, y), k1):

- 1) Repeat
- 2) For each char of plain text
- 3) Convert char into its ASCII format
- 4) $(x1, y1) \rightarrow \text{PointMult}(k1, G)$
- 5) For each point $P(x, y) \in E(F_p)$
- 6) Select random point Pm
- 7) $(x2, y2) \rightarrow \text{PointMult}(k1, k2) + pm$
- 8) Until there is no more text

E. Decrypting Text

Algorithm Decrypt text()

Cipher text will be $kG, pml + k * kAp$
Calculate $pm = pml + k * kAp - kbkG$

ECC has following four advantaged over RSA which we have achieved in our implementation.

- 1) Less storage space
- 2) Less processing power because of a small key size
- 3) Less bandwidth consumption because of less key size and small cipher text
- 4) Less time for encryption

F. Adding Multiple Threads

Threads are used to achieve parallelism. Threads share same resources, as a process. As thread and process lie on same memory, the switching time between them get minimized. The program performance increases when it contains multiple threads. ECC contains many parallel operations, which can be executed separately by separate threads.

Generating points of elliptic curve is a time-consuming process. So, separate threads can be called for generating subset of points of a curve. Furthermore, the point multiplication and text encryption can be done with multiple threads. It increases the performance of ECC.

For Example: For Multiplying scalar 10 with point P(X,Y), one thread(T1) will calculate 2P and another thread(T2) will calculate 3P. Then 10P will be calculated in following way:

$$T1 = 2P + 2P = 4P$$

$$T2 = 3P + 3P = 6P$$

Final result will be:

$$(\text{Result of } T1) + (\text{Result of } T2) \text{ i.e. } 4P + 6P = 10P$$

separate threads can be called for generating subset of points of a curve as given below.

```
pthreadcreate (&thread1, NULL, genpoints (void*) point);
```

```
pthreadcreate (&thread2, NULL, Generate keys (void*) point);
```

```
Point.x = 18;
```

```
Point.p = 37;
```

```
pthreadcreate (&thread3, NULL, genpoints (void*) point);
```

After creating thread1, call genkeys () method with second thread. It increases the performance of ECC.

V. EXPERIMENTAL RESULT

We have evaluated the performance of elliptical curve cryptography with threading and without threading by implementing them in JAVA. The results of the evaluations are summarized in table II and III. Finally, an android application as shown in figure 3 is developed to provide end to end security to the SMS messages. Execution time is used for the performance evaluation. Execution time is the time taken to process SMS plaintext into cipher text. The average of the execution time is calculated using the formula in 3 and the results are tabulated in Table II.

$$Exe_t = \frac{1}{t_n} \sum_{n=1}^{t_n=4} exe_n \quad (3)$$

In Table II the time required for execution of ECC with thread and without thread is shown. The values have been calculated by keeping the field size constant and changing the key size. The graph is generated from the table II which is shown in figure 4

In table III we have calculated the execution time by keeping the key size and file size as constant and varying the field size, the graph as shown in figure5 have been drawn by using the values calculated in Table III the average of the values has been calculated by using the formula 3



Fig. 3. End to End SMS Security Application

TABLE II. COMPARISON OF ECC WITH MULTITHREADING AND WITHOUT MULTITHREADING BY KEEPING FIELD SIZE CONSTANT

Key Size	Execution Time in Milliseconds For ECC without multithreading	Execution Time in Milliseconds For ECC with multithreading
106	967	888
132	1001	908
160	1089	982

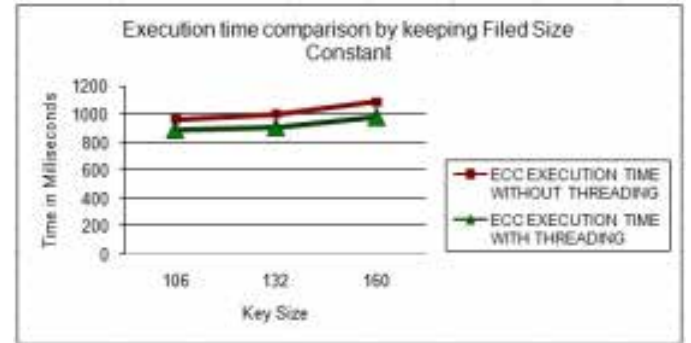


Fig. 4. Execution time comparison by keeping Field size constant

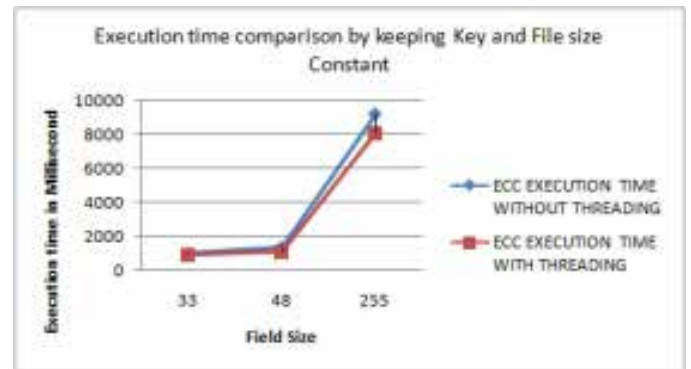


Fig. 5. Execution time comparison by keeping file size constant

VI. CONCLUSION AND FUTURE WORK

In this paper, we have studied the vulnerabilities which exist in the short messaging services and evaluated the per-

TABLE III. COMPARISON OF ECC WITH MULTITHREADING AND WITHOUT MULTITHREADING BY KEEPING FILE SIZE CONSTANT

Field Size	Execution Time in Milliseconds For ECC without multithreading	Execution Time in Milliseconds For ECC with multithreading
33	987	916
48	1330	1055
255	9225	8075

formance of elliptical curve cryptography without thread and with thread. Based on the results as shown in table II and III we can conclude; the performance of ECC with thread is better than ECC without thread. Finally, elliptical curve cryptography with threading is implemented to ensure end to end security against man in the middle attack. As shown in table I, ECC requires smaller key size compared to RSA for providing the same strength of the security. The advantage of ECC is higher speed, lower power consumption, which is beneficial for resource constrained devices like mobile.

While experimenting, we found that converting the plain text into cipher text for message transmission increases the actual length of the message which incurs extra cost for sending the message. In future, data compression can be used to compress the encrypted message before sending it. Compression will reduce the message length, which in turn results in reducing the additional cost required for sending the message.

REFERENCES

- [1] J. Brown, B. Shipman, and R. Vetter, "Sms: The short message service," *Computer*, vol. 40, no. 12, pp. 106–110, Dec 2007.
- [2] K. A. et. al. (2008) Sms:how does it works. [Online]. Available: <http://www.services.eng.uts.edu.au/userpages/kumbes/publichtml/ra/sms/>
- [3] S. Doyle, "Software review: Using short message services as a marketing tool," *The Journal of Database Marketing*, vol. 8, no. 3, pp. 273–277, 2001.
- [4] A. Idris, A. Basari, and N. Zubir, "An application of sms technology for customer service centre," in *Soft Computing and Pattern Recognition, 2009. SOCPAR '09. International Conference of*, Dec 2009, pp. 633–636.
- [5] L. T. Ching and H. Garg, "Designing sms applications for public transport service system in singapore," in *Communication Systems, 2002. ICCS 2002. The 8th International Conference on*, vol. 2, Nov 2002, pp. 706–710 vol.2.
- [6] S. L. T. at the Telco., "When gsm goes bad," in *Network Security*, Jan 2003, pp. 10–12.
- [7] S. Security. (2010) The gsm standard (an overview of its security). [Online]. Available: www.sans.org/readingroom/whitepapers/telephone/gsmstandardanoverview
- [8] A. Biryukov, A. Shamir, and D. Wagner, "Real time cryptanalysis of a5/1 on a pc," in *Proceedings of the 7th International Workshop on Fast Software Encryption*, ser. FSE '00. London, UK, UK: Springer-Verlag, 2001, pp. 1–18. [Online]. Available: <http://dl.acm.org/citation.cfm?id=647935.741059>
- [9] E. Barkan, E. Biham, and N. Keller, "Instant ciphertext-only cryptanalysis of gsm encrypted communication," *Journal of Cryptology*, vol. 21, no. 3, pp. 392–429. [Online]. Available: <http://dx.doi.org/10.1007/s00145-007-9001-y>
- [10] M. Toorani and A. Beheshti, "Solutions to the gsm security weaknesses," in *Next Generation Mobile Applications, Services and Technologies, 2008. NGMAST '08. The Second International Conference on*, Sept 2008, pp. 576–581.
- [11] C. Boja, P. Pocatilu, and A. Zamfiroiu, "Secure sms communications for m-learning services," in *Proceedings of the 5th European Conference on European Computing Conference*, ser. ECC'11. Stevens Point, Wisconsin, USA: World Scientific and Engineering Academy and Society (WSEAS), 2011, pp. 480–484. [Online]. Available: <http://dl.acm.org/citation.cfm?id=1991016.1991097>
- [12] A. Grillo, A. Lentini, G. Me, and G. Italiano, "Transaction oriented text messaging with trusted-sms," in *Computer Security Applications Conference, 2008. ACSAC 2008. Annual*, Dec 2008, pp. 485–494.
- [13] D. Lisonek and M. Drahansky, "Sms encryption for mobile communication," in *Security Technology, 2008. SECTECH '08. International Conference on*, Dec 2008, pp. 198–201.
- [14] M. Hassinen, "Safesms - end-to-end encryption for sms," in *Telecommunications, 2005. ConTEL 2005. Proceedings of the 8th International Conference on*, vol. 2, June 2005, pp. 359–365.
- [15] M. Toorani and A. Beheshti, "Ssms - a secure sms messaging protocol for the m-payment systems," in *Computers and Communications, 2008. ISCC 2008. IEEE Symposium on*, July 2008, pp. 700–705.
- [16] S. Zhao, A. Aggarwal, and S. Liu, "Building secure user-to-user messaging in mobile telecommunication networks," in *Wireless Telecommunications Symposium, 2008. WTS 2008*, April 2008, pp. 151–157.
- [17] A. Hossain, S. Jahan, M. Hussain, M. R. Amin, and S. Newaz, "A proposal for enhancing the security system of short message service in gsm," in *Anti-counterfeiting, Security and Identification, 2008. ASID 2008. 2nd International Conference on*, Aug 2008, pp. 235–240.
- [18] N. Koblitz, "Elliptic curve cryptosystems," *Mathematics of computation*, vol. 48, no. 177, pp. 203–209, 1987.
- [19] V. S. Miller, "Use of elliptic curves in cryptography," in *Lecture Notes in Computer Sciences; 218 on Advances in cryptology—CRYPTO 85*. New York, NY, USA: Springer-Verlag New York, Inc., 1986, pp. 417–426. [Online]. Available: <http://dl.acm.org/citation.cfm?id=18262.25413>
- [20] Certicom. (2004) An elliptic curve cryptography (ecc) primer. [Online]. Available: <http://www.certicom.com/index.php/ecc/>
- [21] S. Vigila and K. Muneeswaran, "Implementation of text based cryptosystem using elliptic curve cryptography," in *Advanced Computing, 2009. ICAC 2009. First International Conference on*, Dec 2009, pp. 82–85.

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Exposure fusion for concealed weapon detection

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Abstract:

In recent years there has been a need to improve the security of the general public as well as the safety of public assets like airports and buildings for which, the biggest hurdle is detection of weapons concealed underneath a person's clothing. It is desirable sometimes to be able to detect concealed weapons from a standoff distance, especially when it is impossible to arrange the flow of people through a controlled procedure. Therefore, we propose a novel algorithm to generate one multi-exposed - multi-modal image from a set of visual images with multiple exposures and a set of infrared images with multiple exposures. The method employs homomorphic filter, entropy of blocks and blending approach for image fusion. Experiments were performed on different sets of multi-exposed images by varying the block size and the blending parameter which shows that the proposed method outperforms the results obtained without homomorphic filter.

Published in: 2014 2nd International Conference on Devices, Circuits and Systems (ICDCS)

Date of Conference: 6-8 March 2014

INSPEC Accession Number: 14685242

Date Added to IEEE Xplore: 16 October 2014

DOI: 10.1109/ICDCSyst.2014.6926141

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Detection and prevention of Profile Cloning in Online Social Networks

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Abstract:

Online Social Networking sites are getting much popular day by day. Well known sites such as Facebook, LinkedIn, Twitter, and Google+ have millions of users across the globe. With the wide popularity there are lot of security and privacy threats to the users of Online Social Networks (OSN) such as breach of privacy, viral marketing, structural attacks, malware attacks and Profile Cloning. Profile Cloning is the identity theft of existing user's profile credentials and create a fake profile using these credentials. Further this profile is misused for defaming the legitimate profile owner as well as sending false friend requests to his friends. In this paper we discuss a few outcomes of our survey and an experiment performed on Facebook, LinkedIn and Google+ for detecting Profile Cloning using a methodology designed by us. We suggested some countermeasures that can be followed by the users as well as OSN providers to protect the users from profile cloning attacks.

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EFFECT OF ALUMINIUM POWDER MIXED EDM ON MACHINING CHARACTERISTICS OF DIE STEEL (AISI D3)

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Abstract- Powder mixed electric discharge machining (PMEDM) is a recent innovation of EDM for enhancing its capabilities. The objective of present research work is to study the influence of process parameters such as peak current (Ip), pulse on time (Ton) and Aluminium powder concentration on machining characteristics of AISI D3 die steel with round copper electrode. The machining characteristics are evaluated in terms of material removal rate (MRR), tool wear rate (TWR) and surface roughness (SR). It is found that aluminium powder mixed in dielectric fluid significantly affect the machining performance.

Index Terms- Powder mixed EDM, material removal rate, tool wear rate, surface roughness, AISI D3 die steel.

I. INTRODUCTION

Electric discharge machining (EDM) is non conventional machining process used for machining hard and difficult-to-machine materials such as heat treated tool steels, super alloys and carbides etc. In this process a pulse discharge occurs in a small gap between the work piece and the electrode and removes the unwanted material from the parent metal through melting and vaporizing. There is no direct contact between electrode and workpiece. Its unique feature of using thermal energy to machine electrically conductive parts regardless of hardness has been its distinctive advantage. It is commonly used in mould, die making industry and in manufacturing of automotive, aerospace surgical components. However, EDM suffers few limitations such as, low machining efficiency and poor surface finish. To overcome these limitations the electrically conductive powder particles are mixed in the dielectric fluid, which reduces its insulating strength and increases the spark gap distance between the tool and workpiece. This new hybrid material removal process is called Powder mixed EDM (PM-EDM). In PM-EDM a suitable metal powders such as Aluminium, Copper, Silicon etc. are mixed into the dielectric fluid. When a suitable voltage is applied between workpiece and tool, an electric field is generated. The added powder particles fill up the spark gap. It increases the spark gap. These high electric field energies powder particles. These particles act as conductors. These conductive particles form chains at different places under sparking area, which bridges the gap between tool electrode and work piece material. Due to this bridging effect, the gap voltage and insulating strength of dielectric fluid reduces which facilitates easy short circuiting and hence early explosion in the gap between tool electrode and work piece material. Due

to this, series discharges takes place within the gap. Due to increase in number of discharging per unit time, rapid sparking takes place that causes faster erosion from work piece surface. At the same time the added powder particles enlarged the plasma channel. [7]. Due to this, electric density decreases and hence uniform distribution of sparking takes place. This leads to uniform erosion on work piece which results in improvement in surface finish. The objective of present research work is to study the variation of material removal rate, tool wear rate and surface roughness with the variation of process input parameters i.e. Peak current, Pulse on time and concentration of aluminium powder in the dielectric fluid of EDM.

II. LITERATURE REVIEW

Based on the literature review carried out, the contribution to the research pertaining to PMEDM is as discussed below:

Zhao W.S. et al. [1] studied the application of powder mixed EDM in rough machining. The machining efficiency of PMEDM can be highly increased by selecting proper discharge parameters (increasing peak current and reducing pulse width) with better surface finish in comparison with conventional EDM.

Kuang-Yuan Kung et al. [2] studied the effect of powder mixed electrical discharge machining (PMEDM) of cobalt-bonded tungsten carbide (WC-Co) on MRR and EWR. Powder used: Aluminium, electrode material: copper, dielectric fluid: Commercial grade mineral oil (EDM-44). Processing parameters such as discharge current, pulse on time, grain size, and concentration of aluminum powder for the machinability evaluation of MRR and EWR were considered.

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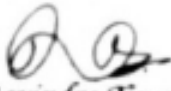
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 14. Upadhyay, E.M., Rana, N.K.: Exposure fusion for concealed weapon detection. In: IEEE 2nd International Conference on Devices, Circuits and Systems—ICDCS 2014, IEEE XPLORE, New York
 15. Upadhyay, E.M., Rana, N.K.: Contrast enhancement in exposure fusion for concealed weapon detection. In: 3rd International Conference on Recent Trends in Engineering and Technology, ICRITET 2014, Elsevier, Amsterdam
 16. Waxman, A.M., Aguilar, M., Baxter, R.A., Fay, D.A., Ireland, D.B., Racamato, J. P., Ross, W. D.: Opponent-color fusion of multi-sensor imagery: visible, IR and SAR. Proc. IRIS Passive Sens. 1, 43–61 (1998)
 17. Aguilar, M., Fay, D.A., Ross, W.D., Waxman, A.M., Ireland, D.B., Racamato, J.P.: Real-time fusion of low-light CCD and uncooled IR imagery for color night vision. Proc. SPIE 3364, 124–35 (1998)

Contrast Enhancement for Multi exposure Infrared Images

Ekta Upadhyay, Dr N.K.Rana

Abstract—Image enhancement aims at improving the quality of image for better visualization. The paper focuses on increasing the contrast of infrared images taken under different exposures from dark to bright. It also determines which technique suits well to sight a weapon hidden beneath a person's clothing that is an application of infrared imaging. We have compared the techniques taking different metrics into consideration as user observation, image sharpness, entropy, structural content and normalized cross correlation. These metrics provide analyses of the implemented work which has relevance to the end user application of concealed weapon detection using infrared imaging. Homomorphic filtering seems to outstand as it preserves both, the brightness and local contrast.

Index Terms— Infrared images, contrast enhancement, homomorphic filter, histogram equalization (HE), entropy, sharpness, structural content (SC), normalized cross correlation (NCC), concealed weapon detection CWD.

Introduction

With currently available cameras and technologies, there may be situations, where no single image of a static scene or object may be uniformly exposed. Parts of the image can be underexposed, while others are overexposed at the same time [1]. When irradiance across a scene varies greatly, there will always be over- or under-exposed areas in an image of the scene. Scene irradiance may vary because of non-uniform lighting, local surface reflectance, surface orientation, and shadows. An over- or under-exposed area carries less information than the same area when well-exposed. To capture details about an entire scene, it is necessary to capture images at multiple exposures. Therefore, by fusing multi-exposure images, dynamic range in an image can be reduced and uniformly exposed image is obtained with better information content. Infrared imagers utilize the temperature distribution information of the target to form an image. Normally they are used for a variety of night-vision applications, such as viewing vehicles and people. The underlying theory is that the infrared radiation emitted by the human body is absorbed by clothing and then re-emitted by it. As a result, infrared radiation can be used to show the image of a concealed weapon only when the clothing is tight, thin, and stationary [2], [3]. Before an image sequence is presented to a human observer for operator-assisted weapon detection or fed into an automatic weapon detection algorithm, it is desirable to preprocess the images to maximize their exploitation.

The preprocessing steps considered in this section include contrast enhancement and filtering for the removal of shadows, wrinkles, and other artifacts.

Contrast enhancement techniques can be broadly divided into two major areas of research: (1) Global contrast enhancement techniques and (2) Local contrast enhancement techniques. Global contrast enhancement techniques are simple but they use only global information collected over the entire image [4]. Local contrast enhancement techniques adjust pixel values over smaller regions of an image to improve the visualization of structures in both the darkest and the lightest portions of the image at the same time.

Histogram equalization is a technique by which the dynamic range of the histogram of an image is increased. It flattens and stretches the dynamic range of the image's histogram and resulting in overall contrast improvement [5]. Histogram equalization assigns the intensity values of pixels in the input image such that the output image contains a uniform distribution of intensities. This technique can be used on a whole image or just on a part of an image. First, HE does not preserve the average brightness of the input image in the output image. Therefore, the processed output image will often appear unnaturally bright or “washed out.” Also, the method is indiscriminate. It may increase the contrast of background noise, while decreasing the usable signal. To overcome these drawbacks, numerous variations of the classic HE technique have been published [6], [7], [8].

Homomorphic filtering is a frequency domain method for contrast enhancement [9]. Homomorphic filtering can compress the range of image in brightness, while it increases the contrast. Traditional homomorphic filtering is based on Fourier transform, which has higher resolution in frequency domain and lower resolution in spatial domain. So the method can eliminate the nonuniformity luminance distribution of image, and keep its original state. It has been used in a variety of applications like shadow identification [10], underwater image pre-processing [11], [12], contrast enhancement for raised or indented characters [13], and seismic data processing [14]. Homomorphic filtering sharpens features in an image by enhancing high frequencies and sharpening object edges [15]. It also flattens lighting variations in an image, bringing details out of shadows. It provides simultaneous dynamic range compression (reducing

illumination variation) and contrast enhancement (increasing reflectance variation). Homomorphic filtering can thus prove to be most effective on images that have large variations in lighting.

This paper compares the results from two different approaches of contrast enhancement techniques. Section II discusses the Histogram Equalization method. Section III covers contrast enhancement by homomorphic filtering. Section IV provides a comparison of the two techniques using metrics like user observation, image sharpness, entropy, structural content and normalized cross correlation.

Histogram equalization

Histogram Equalization is a technique that generates a gray map which changes the histogram of an image and redistributing all pixels values to be as close as possible to a user –specified desired histogram. It allows for areas of lower local contrast to gain a higher contrast. It automatically determines a transformation function seeking to produce an output image with a uniform Histogram [7]. It is accomplished by linearizing the cumulative density function of the image intensity levels.

Let $X=\{X(i,j)\}$ be an image composed of L discrete gray levels i.e. $X=\{X_0, X_1, \dots, X_{L-1}\}$. For a given Image X , the probability density function $p(X_k)$.

$$p(X_k) = \frac{n_k}{n} \quad (1)$$

Where,

- $K=0, 1, \dots, L-1$.
- n_k represents the number of times that the level X_k appears in the input image X .
- n is the total number of samples in the input image.
- $p(X_k)$ is associated with the histogram of the input image which represents the number of pixels that have a specific intensity X_k .

The cumulative density function for this histogram would be given as in Eq. 2:

$$\text{cdf } x(i) = \sum_{j=0}^i p(x_j) \quad (2)$$

Histogram equalization seeks a transformation of input pixel values to output pixel values that will make this cumulative density function as nearly linear as possible across the range of pixel gray levels. That is

$$\text{cdfx}(i) = K i \quad (3)$$

The Matlab function *histeq* was used as the particular reference method for contrast enhancement implementation. The *histeq* function enhances the contrast of images by transforming the values in an intensity image, or the values in the color map of an indexed image [16].

The Histogram Equalization method does not take the mean brightness of an image into account. It may result in over enhancement and saturation artifacts due to the stretching of the gray levels over the full gray level range. Also, the method is indiscriminate. It may increase the contrast of background noise, while decreasing the usable signal. To overcome these drawbacks, numerous variations of the classic HE technique have been published [5].

Homomorphic filtering

Homomorphic filtering sharpens features in an image by enhancing high frequencies and sharpening object edges [9]. It also flattens lighting variations in an image, bringing details out of shadows. It provides simultaneous dynamic range compression (reducing illumination variation) and contrast enhancement (increasing reflectance variation). Homomorphic filtering can thus prove to be most effective on images that have large variations in lighting. This model considers that the image is been characterized by two primary components. The first component is the amount of source illumination incident on the scene being viewed $i(x,y)$. The second component is the reflectance component of the objects on the scene $r(x,y)$. The image $f(x,y)$ is then defined as :

$$f(x,y) = i(x,y) * r(x,y) \quad (4)$$

In this model, the intensity of $i(x,y)$ changes slower than $r(x,y)$. Therefore, $i(x,y)$ is considered to have more low frequency components than $r(x,y)$. Using this fact, homomorphic filtering technique aims to reduce the significance of $i(x,y)$ by reducing the low frequency components of the image. This can be achieved by executing the filtering process in frequency domain. In order to process an image in frequency domain, the image needs first to be transformed from spatial domain to frequency domain. This can be done by using transformation functions, such as Fourier transform. However, before the transformation is taking place, logarithm function has been used to change the multiplication operation of $r(x,y)$ with $i(x,y)$ in Eq. 4 into addition operation. In general, homomorphic filtering can be implemented using five stages, as shown in fig. 1

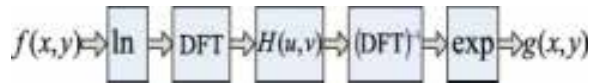


Fig. 1 Block Diagram for Homomorphic filtering

Metrics and results

A variety of images depicting low contrast, high contrast, features in shadows and features in highly saturated areas that represent real imaging situations and challenges for IR image applications like night vision, security cameras, fire fighting and automobile night vision have been selected. The following metrics have been chosen for the purpose of this investigation:

- Entropy
- Image Sharpness
- User Observations
- Mean square Error
- Structural Content
- Normalized Cross Correlation

Entropy

Entropy is defined as amount of information contained in a signal. Shannon was the first person to introduce entropy to quantify the information [17]. The entropy of the image can be evaluated as Eq. 5

$$E = \sum_{i=0}^{255} -p_i \log(p_i) \quad (5)$$

Where, p_i is the probability that an arbitrary pixel in the image having intensity ' i '. Assuming the number of pixels having intensity i is n_i and the image contains n pixels, $p_i = n_i/n$. It is obvious that when no change occurs in information content of images or both input images (initial and contrast enhanced image) are the same. Entropy can directly reflect the average information content of an image. The maximum value of entropy can be produced when each gray level of the whole range has the same frequency.

Image Sharpness

The Prewitt operator has been applied using Matlab was for detecting the sharpness of the output images compared with the input images. This is a discrete differentiation operator, computing an

approximation of the gradient of the image intensity function. The Prewitt operator value therefore shows how "abruptly" or "smoothly" the image changes at each point in an image. This metric helps in analyzing how blurry the output image gets while enhancing the contrast [18]. Since contrast enhancement is used to enhance the overall visual clarity of the image, if in the process the output image becomes blurred then the contrast would not be prominent and effective. This metric helps understand the overall visual quality of the output image after the enhancement techniques have been applied. The higher the value of sharpness the better the contrast enhancement technique has preserved sharpness.

The Prewitt operator is based on convolving the image with a small, separable, and integer valued two-dimensional filter [19]. Fig. 2 and fig. 3 show the kernel used for horizontal and vertical edge detection for the Prewitt operator.

-1	-1	-1
0	0	0
1	1	1

Fig. 2 Prewitt kernel for horizontal edge detection

-1	0	1
-1	0	1
-1	0	1

Fig. 3 Prewitt kernel for vertical edge detection

User Observation

A set of users were chosen to carry out this investigation. The users represented a variety of occupations from software and computer engineers to science and management. The users rated the images based on how well the objects in a particular image could be seen and the contrast and quality of the image. While making a decision the users were not informed about which image represented which technique of contrast enhancement. A set of 14 users gave their feedback and the rated the images on a scale of 1 to 5 where 1 represented the 'best output' according to the user [20].

Structural Content

It is one of the correlation-based measures. It means the closeness (relationship) between two images which can also be quantified in terms of correlation function [21]. This metric measures the similarity between two images. The large value of Structural Content (SC) means that the enhanced image is of poor quality. SC is defined as in Eq. 6 where

A: Reference image

B: Output enhanced image to be assessed

i: pixel row index

j: pixel column index

$$SC = \frac{\sum_{i=1}^m \sum_{j=1}^n (A_{ij})^2}{\sum_{i=1}^m \sum_{j=1}^n (B_{ij})^2} \quad (6)$$

Normalized Cross Correlation

Normalized cross correlation (NCC) has been a popular and easily implemented metric to evaluate the degree of similarity between two compared images [22]. The magnitude of resulting NCC between two compared images is highly responsive to the changes in environmental conditions such as lighting and position of sensed objects. NCC is defined as in Eq. 7

$$NCC = \frac{\sum_{i=1}^m \sum_{j=1}^n (A_{ij} * B_{ij})}{\sum_{i=1}^m \sum_{j=1}^n (A_{ij})^2} \quad (7)$$

Image Results

The test images have been categorized as original, dark and bright infrared images of the same scene. The test results along with the respective histograms are presented subsequently. Fig. 4(a) serves as a dark image of a person sitting on a chair with few details of a hidden object beneath his clothes. In the histogram equalization output as shown in fig. 4(e), the output image is brighter on

the left hand corners and thus do not provide more contrast in that region whereas for the homomorphic filter output, better contrast is obtained in the entire output image and also in the weapon area as in fig. 4(c). This technique also succeeded at bringing hidden objects and details.

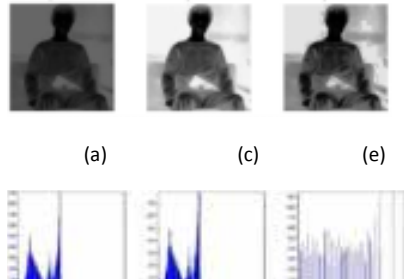


Fig. 4 Image Results of Image sample 1 (Chair): (a) Dark Image (b) Histogram of (a) (c) Homomorphic filtering applied (d) Histogram of (c) (e) Histogram equalization applied (f) Histogram of (e)

Fig. 5 is an original infrared image with a lot of details and objects that are enhanced after the implementation of the contrast enhancement techniques. For this test image homomorphic filtering provides a crisp output image without loss of details.

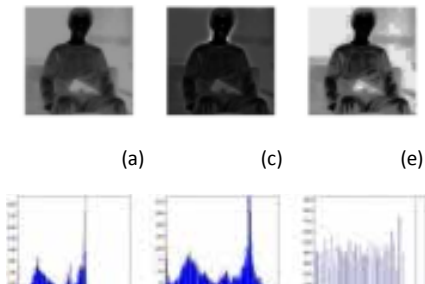


Fig. 5 Image Results of Image sample 1 (Chair): (a) Original Image (b) Histogram of (a) (c) Homomorphic filtering applied (d) Histogram of (c) (e) Histogram equalization applied (f) Histogram of (e)

Fig. 6 is a bright infrared image. The person and the hidden weapon are the only details in the image with the background being plain. The output of histogram equalization as shown in Fig. 6(e) has a white washed effect near the weapon area. In homomorphic filtering, the weapon can be seen prominently as shown in fig. 6(c).

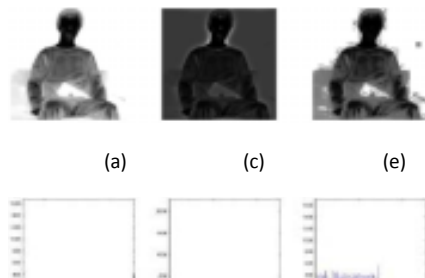


Fig. 6 Image Results of Image sample 1 (Chair): (a) Bright Image (b) Histogram of (a) (c) Homomorphic filtering applied (d) Histogram of (c) (e) Histogram equalization applied (f) Histogram of (e)

The experiment was also conducted on different set of images. Fig. 7(a) is a dark infrared image of an object hidden in an envelope. The result of applying homomorphic filter on the image and the respective histogram is as shown in fig. 7(c) and fig. 7(d). Fig. 7(e) and fig. 7(f) are the Histogram equalized outputs on the input images with its respective histograms.

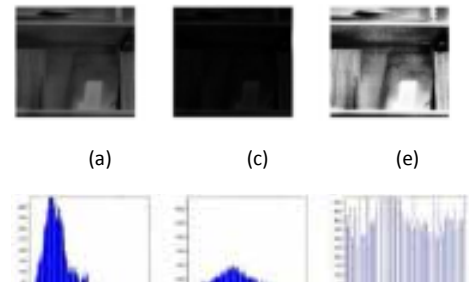


Fig. 7 Image Result of Image sample 2(Envelope) (a) Dark Image (b) Histogram of (a) (c) Homomorphic filtering applied (d) Histogram of (c) (e) Histogram equalization applied (f) Histogram of (e)

The drawback of histogram equalization on low contrast images is that even if it increases contrast of the image, it also increases noise in the enhanced image as shown in fig. 4 and fig. 7.

Fig. 8 (a) is the original infrared image. Fig. 8 (c) is the Homomorphic filtering output on the input image. Fig. 8 (e) is the Histogram equalized output on the input images with their respective histograms in fig. 8(b), fig. 8(d) and fig. 8(f).

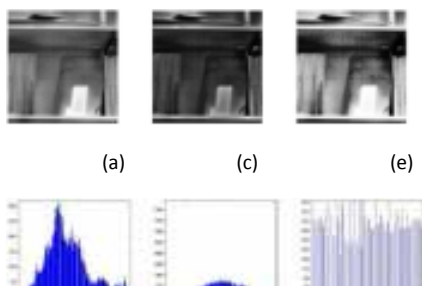


Fig. 8 Image Result of Image sample 2(Envelope) (a) Original Image (b) Histogram of (a) (c) Homomorphic filtering applied (d) Histogram of (c) (e) Histogram equalization applied (f) Histogram of (e)

Fig. 9 (a) is an example of a bright infrared image. Fig. 9 (c) and fig. 9(e) are Homomorphic filter and Histogram equalized outputs on the input images. Fig. 9 (d) and fig. 9(f) are the histograms of fig. 10(c) and fig. 10(e) respectively.

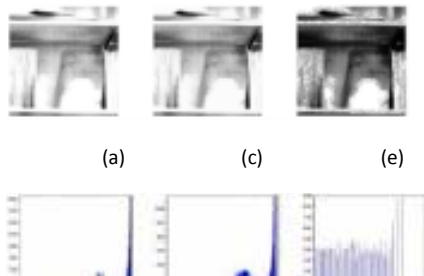


Fig. 9 Image Result of Image sample 3(Envelope) (a) Bright Image (b) Histogram of (a) (c) Homomorphic filtering applied (d) Histogram of (c) (e) Histogram equalization applied (f) Histogram of (e)

The entropy results of the histogram equalized output and homomorphic filtering output for the test images is as shown in Table I. It is observed that homomorphic filtering achieves more information content than the original and the histogram equalized images.

TABLE I. ENTROPY OF TEST IMAGES

		Original image	Histogram Equalization	Homomorphic filtering
Image sample 1 (Chair)	<i>Dark</i>	5.8071	5.1511	5.8918
	<i>Original</i>	6.2637	5.2091	7.4487
	<i>Bright</i>	5.4258	4.0067	4.3363
Image sample 2 (Envelope)	<i>Dark</i>	6.6202	5.8705	7.16
	<i>Original</i>	7.5692	5.9715	6.8887
	<i>Bright</i>	6.6074	5.1807	6.7345

Table II depicts the calculated sharpness of the histogram equalized output and homomorphic filtering output for the full test images. Homomorphic filtering provides better edge detection than histogram equalization since the sharpness values are higher in case of all sample images.

TABLE II. SHARPNESS OF TEST IMAGES

		Original image	Histogram Equalization	Homomorphic filtering
Image sample 1 (Chair)	<i>Dark</i>	23.0628	56.6976	22.6772
	<i>Original</i>	34.5771	56.5549	76.3614
	<i>Bright</i>	59.2233	67.1537	134.2507
Image sample 2 (Envelope)	<i>Dark</i>	36.8023	96.9863	203.1531
	<i>Original</i>	65.6682	95.2566	193.8182
	<i>Bright</i>	80.8859	116.7147	78.9767

The quality of an image is inversely proportional to the value of SC which means that if the value of structural content is high it indicates that the quality of image is poor. The quality of Homomorphic filtering output is better since the value of SC is low for maximum sample images of different exposures as observed from resultant data in Table III. Structural content of test images

TABLE III. STRUCTURAL CONTENT OF TEST IMAGES

		Histogram Equalization	Homomorphic filtering
Image sample 1 (Chair)	<i>Dark</i>	0.2538	0.3753
	<i>Original</i>	0.5625	0.3521
	<i>Bright</i>	1.2879	0.3329
Image sample 2 (Envelope)	<i>Dark</i>	0.1937	0.1239
	<i>Original</i>	0.6997	0.2909
	<i>Bright</i>	1.7967	0.3402

From the readings of Normalized cross correlation NCC as shown in Table IV, it is observed that the value of NCC for Histogram equalization output is lower as compared to Homomorphic filtering and therefore, the output of Homomorphic filtering is of better quality.

TABLE IV. NORMALIZED CROSS CORRELATION OF TEST IMAGES

		Histogram Equalization	Homomorphic filtering
Image sample 1 (Chair)	<i>Dark</i>	1.9619	1.5846
	<i>Original</i>	1.3216	1.6357
	<i>Bright</i>	0.8559	1.6863

Image sample 2 (Envelope)	<i>Dark</i>	2.2049	2.1657
	<i>Original</i>	1.1780	0.2909
	<i>Bright</i>	0.7120	0.3420

Based on an average of user observation outputs, homomorphic filtering was selected by users as providing the best results for contrast enhancement. Output images of homomorphic filtering were seen to have higher quality of contrast while not deleting information from the original test images but enhancing the details in the test images.

In general, the contrast and average brightness results obtained using homomorphic filter make it subjectively easier to pick out objects in the image.

Conclusion

The output image produced by Homomorphic filtering in all types of exposures was chosen by most users in terms of overall better contrast without providing a noisy image. Homomorphic filtering also provides a sharp and a crisp output to bring out details from the under and over exposed images making it suitable for surveillance application. The results of post processing which includes local or global contrast enhancement methods could be investigated in future based on the application.

Acknowledgment

The author thanks the editor and anonymous reviewers for their detailed review, valuable comments and constructive suggestions. The author thanks Dr. U. V. Bhosle, Principal, RGIT, Mumbai University for his helpful suggestions and also for providing the infrastructure to perform the experiment.

References

- [1] Ardeshir Goshtasby, A., "Fusion of multi-exposure images," in Image and Vision Computing, 23, 2005, pp. 611–618.
- [2] Devid Hall, James LLians, "Hand book of multisensor data fusion", CRC Press LLC, 2001.
- [3] Dana R. Rauscher, and Michael P. Hartnett, Concealed Weapon Detection Program, Decision-Science Applications, Inc, Dec 1998.

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- [4] Al-amri, Salem Saleh, N. V. Kalyankar, S. D. Khamitkar, "Linear and non-linear contrast enhancement image", *Journal of Computer Science* (2010) Volume: 10, Issue: 2, Pages: 139-143.
- [5] Kaur Manpreet, Jasdeep Kaur, Jappreet Kaur, "Survey of contrast enhancement techniques based on histogram equalization", *International Journal of Advanced Computer Science and Applications*, Vol.2, No. 7, 2011.
- [6] Eramian, Mark, David Mould, "Histogram equalization using neighborhood metrics", *Proceedings of the Second Canadian Conference on Computer and Robot Vision (CRV'05)*.
- [7] Menotti, David, Laurent Najman, Jacques Facon, and Arnaldo de A. Araujo. "Multi-histogram equalization methods for contrast enhancement and brightness preserving", *IEEE Transactions on Consumer Electronics*, Vol. 53, No. 3, August 2007, pp. 1186-1194.
- [8] C. Wang and Z. Ye, "Brightness preserving histogram equalization with maximum entropy: A variational perspective," *IEEE Transactions on Consumer Electronics*, 51(4):1326-1334, November 2005.
- [9] Delac, K., M. Grgic, T. Kos, "Sub-image homomorphic filtering technique for improving facial identification under difficult illumination conditions," *International Conference on Systems, Signals and Image processing (IWSSIP'06)*, September 21-23, 2006, Budapest, Hungary, pp 95-98.
- [10] Etemadnia, Hamideh, Mohammad Reza Alsharif, "Automatic image shadow identification using LPF in homomorphic processing system," *Proc. VIIth Digital Image Computing: Techniques and Applications*, Sun C., Talbot H., Ourselin S. and Adriaansen T. (Eds.), 10-12 Dec. 2003, Sydney, pp 429-438.
- [11] Bazeille, Stephane, Isabelle Quidu, Luc Jaulin, Jean-Phillipe Malkasse, "Automatic underwater image pre-processing", *CMM'06 – Characterisation Du Milieu Marin*, 16-19 October 2006.
- [12] Sujatha, C.M., K. Navinkumar, K.S. Arunlal, S.A. Hari Prasad, "Performance evaluation of homomorphic filtering, anisotropic filtering and autocontrast algorithm", *2009 International Conference on Advances in Computing, Control, and Telecommunication Technologies*, pp 27-29.
- [13] Li, Jianmei, Changhou Lu, Fengqin Zhang, Wenke Han, "Contrast enhancement for images of raised characters on region of interest", *Proceedings of the 8th World Congress on Intelligent Control and Automation*, July 6-9 2010, Jinan, China, pp 6258-6261.
- [14] Oppenheim, A., J. Tribolet, "Application of homomorphic filtering to seismic data processing", *Massachusetts Institute of Technology*.
- [15] Ekta M. Upadhyay, Dr. N. K. Rana, "Exposure fusion for concealed weapon detection", *IEEE Xplore*, in press.
- [16] Mathworks Product Documentation, 2011, The Mathworks, Inc. December 2011, <<http://www.mathworks.com/help/toolbox/images/ref/histeq.html>>
- [17] Herwig, J., & Pauli, J., "An information-theoretic approach to multi-exposure fusion via statistical filtering using local entropy", in *Proceedings of the 7th IASTED International Conference*, Vol. 678, No. 099, pp. 50.
- [18] Nuutinen, Mikko, Raisa Halonen, Tuomas Leisti, and Pirkko Oittinen, "Reduced-reference quality metrics for measuring the image quality of digitally printed natural images", In *Proc. SPIE*, vol. 7529, p. 75290I. 2010.
- [19] R.C. Gonzalez and R.E. Woods, *Digital Image Processing*, 3rd edition, Prentice Hall, Upper Saddle River, New Jersey, EUA, January 2008.
- [20] K.-Q. Huang, Z.-Y. Wu, and Q. Wang, "Image enhancement based on the statistics of visual representation", *Image and Vision Computing*, 23(1):51-57, 2005.
- [21] İsmail Avcibas, Nasir Memon, Bülent Sankur, "Steganalysis Using Image Quality Metrics." *Image Processing, IEEE Transactions on* 12 (2), 221-229, 2003.
- [22] Tsai, Du-Ming, and Chien-Ta Lin, "Fast normalized cross correlation for defect detection", *Pattern Recognition Letters* 24, no. 15 (2003): 2625-2631.
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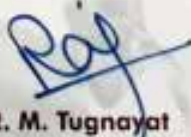
e-ISSN - 2321-4837



e-ISSN - 2376-5897

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**Proceeding for
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Enhanced Matching Integration In Image Rich Information Network

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Abstract: Internet commerce websites are having large amount of images which are accompanied by annotation, comments and other information forming heterogeneous image rich information network (HIN), it poses new challenges to query and search in such networks. Most existing work is on homogeneous networks. In reality, by following network schema, HIN can better model real-world systems, which are semi-structured and typed, following a network schema. In such, performing image retrieval, recommendation and measuring similarity is the key task. In image rich information network, Link, content based image similarities are considered as similarity measure to achieve high accuracy and recall rate. We propose HMok-SimRank algorithm for weighted HIN to compute link based similarity and content based image similarity is estimated from image content features. Moreover these measures combined to attain robust performance for network structure via Integrated Weighted Similarity Learning (IWSL). While performing image retrieval image mining, computer vision tasks as image segmentation, image categorization, tag annotation and collaborative filtering are considered. Distributive computing is investigated to achieve a steadiness on time with quality performance. So when user gives search, we able to generate both visually and semantically relevant and overall recommendation.

Index Terms- Link-Based-Similarity, Content-Based Image Similarity, Heterogeneous image rich information network.

I. INTRODUCTION

a) Purpose

Most of data or informational objects are interconnected or interact with each other, forming complex networks. But, current research networks are usually assumed to be homogeneous, where nodes are objects of the same entity type and links are relationships from the same relation type. However, most real world networks are heterogeneous, where nodes and relations are of different types. Since treating all the nodes as of the same type homogeneous information networks may miss important semantic information. And treating every node as of a distinct type may also lose valuable schema-level information. Thus, a typed, semi-structured heterogeneous network modeling may capture essential semantics of the real world. Typed, semi-structured heterogeneous information networks are ubiquitous. Heterogeneous information network in general captures much richer information than its homogeneous network. A homogeneous information network is usually obtained by projection from a heterogeneous information network, but with significant information loss.

Heterogeneous information networks, it poses new challenges to query and search in such networks intelligently and efficiently. Given the enormous size and complexity of a large network, a user is often only interested

in a small portion of the objects and links most relevant to the query. However, objects are connected and inter-dependent on each other, how to search effectively in a large network for a given user's query could be a challenge. Similarity search that returns the most similar objects to a queried object, will serve as a basic function for semantic search in heterogeneous networks.

b) Scope

Efficient and effective techniques for measuring similarity between objects are required by many important applications in different domains. Various similarity measures as content-based and the link-based are integrated via IWSL to achieve robust performance. Also the image segmentation, image categorization, tag annotation and collaborative filtering tasks are implemented on Heterogeneous image rich information network.

Such kind of similarity search may lead to useful applications, such as product search in e-commerce networks and patent search in patent networks. Search functions should be further enhanced and integrated with many other functions. Also, a recommendation system may take advantage of heterogeneous information networks that link among products, customers and their properties to make improved recommendations. Querying and semantic search

in heterogeneous information networks opens another interesting frontier on research related to mining networks. Traditional recommendation algorithms utilize only the interaction between users and items as described in a user-item rating matrix or interaction matrix.

II. RELATED WORK

Mostly data and objects in the real world are interconnected, which forms a complex, heterogeneous but often semi-structured information networks. Though, many database researchers suppose a database only as a data warehouse that supports storage and retrieval. An inter-related and multi-typed rich information network supports comprehensive data analysis. Nowadays many network researchers focus on homogeneous networks, but instead of this we can view semi-structured and interconnected datasets as heterogeneous, information-rich networks along with it study that how to reveal hidden knowledge in such networks. Conducting information retrieval in such image rich information networks is a very helpful but too difficult task, because there is enormous information such as image feature, text, user, group, and most significantly the network structure. In text-based retrieval, the likeness of the words in the context is estimated to return more relevant images. In image content-based retrieval, most methods as Google's VisualRank compute image similarity based on image content features. Hybrid approach combine text features and image content features together. Link based similarity measures have attracted the attention of many researchers and have been widely applied in recent years. However, most previous works mainly focus on introducing new link-based measures [2]. To perform image retrieval in image-rich information networks system called 'iRIN' was designed. To compute node similarity, MoK-SimRank algorithm is introduced by significantly improving the speed of SimRank. Link-based and content based similarities are integrated for learning with feature learning [9].

Various functions such as ranking, community detection, and link prediction for mining these networks are proposed and developed. In turn to mine these heterogeneous information networks directly, it is advised to explore the Meta structure of the information network, that is, the network schema [8]. In link-based similarity measurement techniques, how to make full use of the graph structure of objects is key to achieve high performance. The link-based similarity measures can be further divided into the *graph*-based and the *neighbor*-based. The graph-based methods take the global structure of graph into consideration. The neighbor-based methods share a simple intuition that "similar objects have similar neighbors." They focus on comparing local neighborhood structures of objects. Most commercial image search engines use textual similarity to return semantically relevant images and then use visual similarity to search for visually relevant images. Integration-based approaches use linear or nonlinear combination of the

textual and visual features. However, existing works cannot handle the link structure. In this, suggested that an image-rich information network forms similarities amongst same type of nodes and dissimilar types of nodes can be enhanced based on the mutual impact beneath the network structure. Also now-a-days in recommendation system there is problem of using co-viewed or co-bought information for recommendation is that only the top-*k* ranking list is available, but the details are commercial secret and are not publicly accessible. Without such proprietary information, it is difficult to combine sources from multiple e-commerce websites, such as Amazon, BestBuy, WalMart, and Target, to generate an overall recommendation [1].

III. PROBLEM DEFINITION

Information networks that can be extracted from many domains, different functions for mining these networks are proposed and developed, such as ranking, community detection, and link prediction. Mainly the current network studies are based on homogeneous networks, wherever nodes and links are considered from one single type. Actually by following a network schema, heterogeneous information networks can better model the real-world systems, which are typically semi-structured and typed. Real world data are interconnected forming complex heterogeneous information network. It poses new challenges to query and search in such networks.

In such heterogeneous image rich information network structure, performing image retrieval, recommendation and measuring similarity is the major problem. As there are various similarities measures have been proposed as content-based and the link-based. The content-based methods evaluate the similarity between two object's contents. These methods usually work well on traditional databases, but may perform poorly when objects' contents are of low quality, or even be inapplicable when the contents are unavailable. On the other hand, relationships among objects are widely used by link analysis techniques to extract knowledge. Currently, link structures are being widely used in many popular applications for similar object searching tasks. Direct use of link information solely based on human annotations may also lead to unsatisfying results if the annotation is wrong, too general, or incomplete. In addition, if the image does not link to any object in the information network, then only based on link information cannot work.

In Product Search with Recommendation System for E-Commerce, when users search and click on a product in a web browser, we can recommend both visually and semantically relevant products. Traditional recommendation algorithms utilize only the interaction between users and items as described in a user-item rating matrix or interaction matrix. Now-a-days co-viewed or co-bought information for recommendation is used, but the problem is that only the top-*k* ranking list is available, but the details are commercial

secret and are not publicly accessible. Without such proprietary information, it is difficult to combine sources from multiple e-commerce websites, such as Amazon, BestBuy, WalMart, and Target, to generate an overall recommendation. We believe this is one of the reasons why general product search engines, such as Google Product Search and Bing Shopping, currently do not have such recommendation functions.

IV. PROPOSED WORK

Given real-world data are interconnected, forming gigantic and complex HIN, it poses new challenges to query and search in such networks intelligently and efficiently. Given the enormous size and complexity of a large network, a user is often only interested in a small portion of the objects and links most relevant to the query. However, objects are connected and inter-dependent on each other, how to search effectively in a large network for a given user's query could be a challenge. Similarity search that returns the most similar objects to a queried object, will serve as a basic function for semantic search in heterogeneous networks. Various similarity measures generally classified into two basic approaches: the *content*-based and the *link*-based.

LINK-BASED SIMILARITY: To evaluate similarity in heterogeneous information network, which contains multiple types of node HMok- SimRank algorithm implemented to compute link based group and tag similarity.

CONTENT-BASED IMAGE SIMILARITY: Image similarity can be estimated from image content features such as color histogram, edge histogram, Color Correlogram, CEDD(Color and Edge Directivity Descriptor), GIST(Graphics and Intelligence based Script Technology), texture features, Gabor features, shape and SIFT(Scale-invariant feature transform).

INTEGRATION OF LINK AND CONTENT SIMILARITIES: Measures as link and content based similarities combined to attain robust performance for network structure via an algorithm Integrated Weighted Similarity Learning (IWSL).

IMAGE SEGMENTATION: K-means algorithm to over segment the images into a set of homogenous regions in order to consider every possible subtle details of the content of an image. The feature that we use to perform this initial segmentation is the color intensity value of every pixel. In RGB color model, each red (R), green (G) and blue (B) plane can be considered separately with their respective pixel intensity levels. In case of K-means implementation, we need to consider all three separate pixel magnitudes of each plane.

COLLABORATIVE FILTERING: In these multi-semantic entities similarity measurements in HIN represent the heterogeneity of the application domains and this technique is used to facilitate the recommendation process. In which a matrix factorization based recommendation framework to combine user ratings and various entity similarity matrices defined by meta-path based similarity functions using the information network. So we can build a matrix factorization based recommendation framework by considering user ratings and related HIN, where different types of information can be used to enhance the performance of the recommender system.

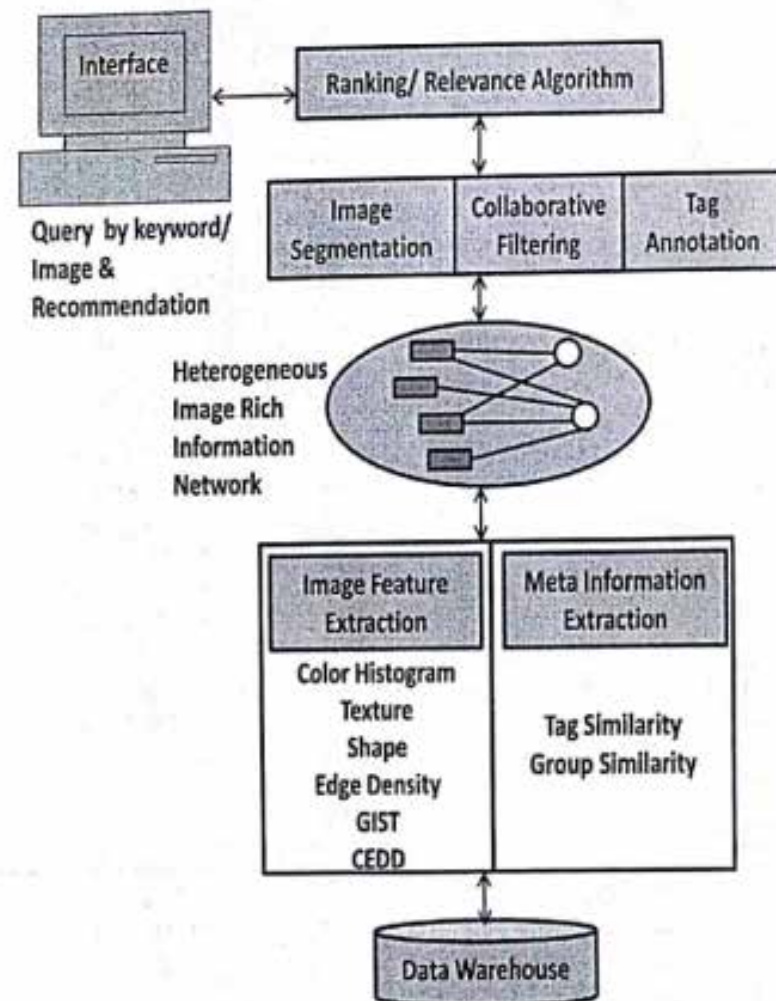


Figure1: Product Search and Recommendation System Architecture

In scope of HIN, recommendation method based on explicit rating data by taking advantage of different item similarity semantics in the network. Distributive computing extension will be investigated considering dynamic environment is also important. Firstly, performing a network clustering to partition the whole large network into small connected components as sub networks; then, run the proposed algorithm on each sub network; and third, when a new

image come, update the sub network which the new image belongs to.

The proposed system, a novel product recommendation system has been implemented for ecommerce to find both visually and semantically relevant products modeled in an image-rich information network. In this system architecture, the first layer contains the product data warehouse which includes product images and related product information. The second layer performs Meta information extraction in which link based tag similarity and group similarity computed and image feature extraction in which Image similarity can be estimated from image content features such as color histogram, edge histogram, Color Correlogram, CEDD, GIST, texture features, Gabor features, shape and SIFT. The third layer builds a weighted heterogeneous image-rich information network. The fourth layer performs image categorization and segmentation with the help of network structure. The fifth layer compares the similarity and next layer performs information network analysis to find relevant result for a query. Its user friendly interface is key part, which interacts with users and responds to their requests also collects feedback.

CONCLUSION

In image rich information network, Link, content based image similarities are considered as similitude which is very beneficial to achieve high accuracy with recall rate. Furthermore these measures collectively used to conquer robust performance for network structure by Integrated Weighted Similarity Learning for superlative result. However, a recommendation can take advantage of Heterogeneous image rich information networks that link among products, customers, and their properties with content based similarity to make improved recommendations. So that using this methodology recommendation accuracy can be further enhanced.

REFERENCES

- [1] Xin Jin, Jiebo Luo, Jie Yu, Gang Wang, Jiawei Han and Dhiraj Joshi, "Reinforced Similarity Integration in Image-Rich Information Networks", IEEE TRANSACTIONS ON KNOWLEDGE AND DATA ENGINEERING, VOL. 25, NO. 2, FEBRUARY 2013
- [2] Hongyan Liu, Jun He, Dan Zhu, Charles X. Ling and Xiaoyong Du, "Measuring Similarity Based on Link Information: A Comparative Study", IEEE TRANSACTIONS ON KNOWLEDGE AND DATA ENGINEERING, VOL. 25, NO. 12, DECEMBER 2013
- [3] Jiawei Han, Yizhou Sun, Xifeng Yan, Philip S. Yu, "Mining Knowledge from Data: An Information Network Analysis Approach", 2012 IEEE 28th International Conference on Data Engineering

[4] Fahim Irfan Alam, Muhammad Iqbal Hasan Chowdhury, Md. Reza Rabbani, Fateha Khanam Bappee, "An Optimized mage Segmentation Algorithm", 2013 IEEE.

[5] Amel Ksibi, Mouna Dammak, Anis Ben Ammar, Mahmoud Mejdoub and Chokri Ben Amar, "Flickr-based Semantic Context to refine Automatic Photo Annotation", 2012 IEEE.

[6] Mohammed Mahmudur Rahman, "Contextual Recommendation System", 2013 IEEE

[7] J. Tang, G.-J. Qi, H. Li and T.-S. Chua, "Image Annotation by Graph-Based Inference with Integrated Multiple/Single Instance Representations," IEEE Transactions on Multimedia, vol. 12, no. 2, pp. 131- 141, Feb. 2010.

[8] Yizhou Sun and Jiawei Han, "Meta-Path-Based Search and Mining in Heterogeneous Information Networks", TSINGHUA SCIENCE AND TECHNOLOGY ISSN11007-0214/101/101pp329-338 Volume 18, Number 4, August 2013

[9] Xin Jin, Jiebo Luo, Jie Yu, Gang Wang, Jiawei Han and Dhiraj Joshi, "iRIN: Image Retrieval in Image-Rich Information Networks," Proc. 19th International Conference World Wide Web (WWW '10), pp. 1261-1264, 2010.

[10] Xiao Yu, Xiang Ren, Quanquan Gu, Yizhou Sun, Jiawei Han, "Collaborative Filtering with Entity Similarity Regularization in Heterogeneous Information Networks", 2013

[11] Fahim Irfan Alam, Muhammad Iqbal Hasan Chowdhury, Md. Reza Rabbani, Fateha Khanam Bappee, "An Optimized mage Segmentation Algorithm", 2013 IEEE.





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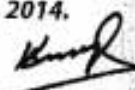
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Homomorphic filter based exposure fusion

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Abstract

Multi-exposure image fusion, deals with combining a given a set of images captured at different exposure levels to obtain an image where all areas are well-exposed and resultant fused image is more suitable for human and machine perception. In the proposed method we have applied Homomorphic filter to set of multi exposed visual and IR images so as to highlight the high frequency components and simultaneously normalize the brightness across an image and increase contrast. The image is then partitioned into uniform blocks and best block of each image is selected based on quality factor, entropy. The highest entropy blocks are then blended together using gradient-ascent algorithm to obtain best exposed fused image with maximum entropy and hence maximize information content.

Keywords: Image fusion, Homomorphic filter, image entropy, image blending, multi-exposure, visual image, IR image

1. Introduction

With currently available cameras and technologies, there may be situations, where no single image of a static scene or object may be uniformly exposed. Parts of the image can be underexposed, while others are overexposed at the same time. When irradiance across a scene varies greatly, there will always be over- or under-exposed areas in an image of the scene. Scene irradiance may vary because of non-uniform lighting, local surface reflectance, surface orientation, and shadows. An over- or under-exposed area carries less information than the same area when well-exposed. To capture details about an entire scene, it is necessary to capture images at multiple exposures. Therefore, by fusing multi-exposure images, dynamic range in an image can be reduced and uniformly exposed image is obtained with better information content [1].

A better looking image can be obtained because it has been found that objects depicted in an image of a scene tend to vary in detail depending on the exposure setting. It was found that objects in the background of an image appeared in greater detail in an underexposed image, while objects in the foreground showed more detail in an

overexposed image [2]. It is believed these inconsistencies resulted in non-uniformity in the exposure and tone associated with the various pixels making up different parts of the image. The goal of the present work is to produce a single image from images of a static scene taken at different exposures, which captures to some extent, the portions of each image providing the best exposure and tone characteristics.

An image is considered best-exposed within an area if it carries more information about the area than any other image. The information content of an image would increase if the high frequency components in an image are highlighted, therefore, we would be using homomorphic filter. This simultaneously normalizes the brightness across an image and increases contrast. Illumination and reflectance are not separable, but their approximate locations in the frequency domain may be located. The use of homomorphic filter will solve the problem of accuracy as the filter will enhance the information content in the image [3]. Further, the filtered images are partitioned into uniform blocks and for each block selects the image that contains the most information within that block. Information content will be measured using entropy [4, 5]. The selected images are then blended together using

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monotonically decreasing blending functions that are centered at the blocks and have a sum of 1 everywhere in the image domain.

A method proposed in [1] for fusing multi-exposure images of a static scene taken by a stationary camera into an image with maximum information content. An image is considered best-exposed within an area if it carries more information about the area than any other image. Information content will be measured using entropy. The method partition the image domain into uniform blocks and for each block selects the image that contains the most information within that block. The selected images are then blended together using monotonically decreasing blending functions that are centered at the blocks and have a sum of 1 everywhere in the image domain. From the experimental results it was found that the entropy of the fused image using proposed method was higher than other methods. The contrast in an image area in the output cannot be higher than the contrast in the best-exposed image. Contrast is a major concern in multi exposure images and so, to still improve the contrast we need to go in for inverse filtering. Another concern is the measure for optimization i.e. when we deal with multi sensor and multi exposure images other measures may be more appropriated than entropy.

In a similar study on exposure fusion, Mertens in [4] has proposed an image fusion for creating a high quality image from bracketed exposures by incorporating adjustable image measures, such as contrast, saturation and well exposedness. This process is guided by a set of quality measures, which we consolidate into a scalar-valued weight map. This is done in a multi resolution fashion to account for the brightness variation in the sequence. Experimental results show that the technique is able to preserve fine scale details in the fused image. It offers better contrast and also there was no problem of over saturation compared to other methods. It was also observed that result contained a spurious low frequency brightness change, which was not present in the original image set. It was also found that the result of well exposedness was less natural compared to other methods.

In a method proposed by Szeliski in [2], an average image was created from a set of multi-exposure images where intensity at a pixel in the average image was the average of intensities of the same pixel in the multi-exposure images. Next, the histogram of the average image was computed and through a histogram equalization process, intensities in the average image were mapped to new intensities in such a way that the average intensity of the image did not change. Histogram equalization is used to increase image contrast and compensate for the contrast lost during intensity averaging.

Concealed weapons detection in public places such as airport concourses, passenger train terminals, and shopping center entrances is one of the greatest challenges facing national security. Most of the current weapons detection systems, such as portable instruments and walk through detectors, have several drawbacks. Portable instruments endanger their users as they require close proximity to the person being searched, while walk through detectors

require crowds of people to be channeled to choke points, which cause large delays. Thus, there is an urgent need for a new concealed weapons detection system which detects weapons from a distance in a quick and efficient way. But at the same time when distance comes into picture then there is problem of focal length and exposure. This is the focus of our current efforts and we will deal with fusion of visual and IR images taking exposure into consideration.

The paper is organized as follows. A detailed explanation of the methodology that will be used is described in Section 2. Experimental results of the partial work are presented in Section 3. Finally, in Section 4 the concluding remarks are given.

2. Methodology

The proposed multi-exposure image fusion algorithm is illustrated in Fig. 1. The fusion algorithm consists of several steps which will be explained in detail in this section. The method can be broadly divided into three parts:

- A) Apply homomorphic filter
- B) Divide into blocks and find entropy
- C) Gradient ascent blending.

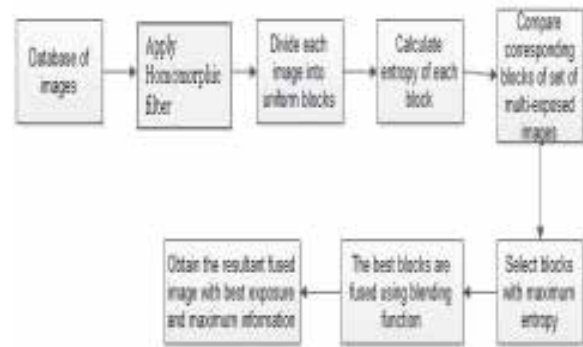


Fig. 1. Flow of proposed multi-exposure fusion

2.1. Homomorphic filtering

The information content of an image would increase if the high frequency components in an image are highlighted, therefore, we would be using homomorphic filter. It simultaneously normalizes the brightness across an image and increases contrast. Illumination and reflectance are not separable, but their approximate locations in the frequency domain may be located [6]. Since illumination and reflectance combine multiplicatively, the components are made additive by taking the logarithm of the image intensity, so that these multiplicative components of the image can be separated linearly in the frequency domain. Illumination variations can be thought of as a multiplicative noise, and can be reduced by filtering in the log domain. To make the illumination of an image more even, the high-frequency components are increased and low-frequency components are decreased, because the high-frequency components are assumed to represent mostly the

reflectance in the scene (the amount of light reflected off the object in the scene), whereas the low-frequency components are assumed to represent mostly the illumination in the scene. The use of homomorphic filter will solve the problem of accuracy as the filter will enhance the information content in the image [7]. The block diagram is as shown in fig. 2 and can be implemented using steps below:

- Take log of the original image so that the intensity of reflectance and illuminance becomes additive.
- Apply FFT (Fast Fourier transform) to bring the image to frequency domain.
- Apply the mask of homomorphic filter which highlights the high frequency components.
- Apply inverse FFT followed by inverse log to bring back the filtered image to spatial domain.

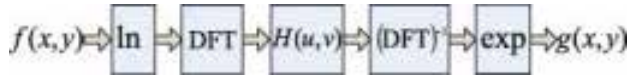


Fig. 2. Block diagram of Homomorphic filter

2.2. Divide into blocks and find entropy

2.2.1 Apply homomorphic filter

Take the set of given N images of a static scene obtained at different exposures using a stationary camera and with homomorphic filter applied to each. The process diagram for the method is illustrated in fig. 3.

2.2.2 Divide into blocks

To determine the image that is best exposed within a local neighbourhood, the images are divided into blocks of size $d \times d$. “d” will be one of the parameters of the method. Optimal block size could vary from region to region but the image blending process requires square blocks [8, 9]. Since entropy is to be computed for each block, to obtain a meaningful measure, block size should not be smaller than 16 pixels.

2.2.3 Entropy calculation

Calculate the entropy of each block. In a gray scale image, entropy is measured by

$$E_g = \sum_{i=0}^{255} -p_i \log(p_i) \quad (1)$$

Where p_i is the probability that an arbitrary pixel in the image having intensity ‘i’. Assuming the number of pixels having intensity i is n_i and the image contains n pixels, $p_i = n_i/n$.

2.2.4 Select the best entropy

The image that provides the highest entropy within the block is selected to represent that block in the output.

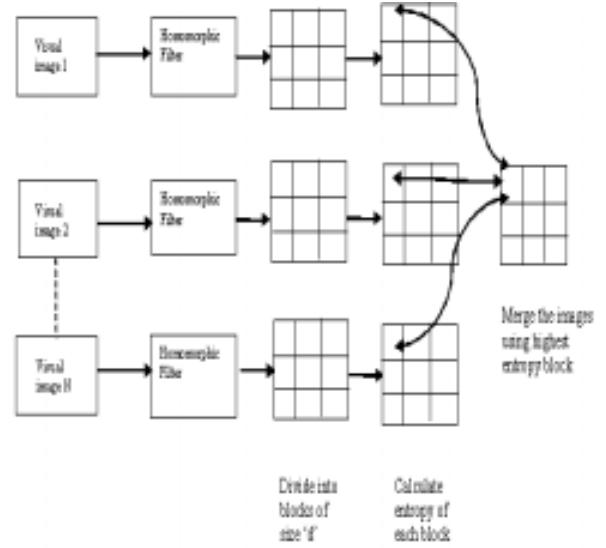


Fig. 3. Process diagram for the proposed method

2.3. Gradient ascent blending

If the entropy within each block is calculated for a set of input images and the blocks from the image that contains the highest entropy is cut out, and the blocks are put back together, image obtained will have sharp discontinuities across image blocks [10]. Although each block will be informative, the image



Fig. 4. Fusion of best blocks of image (a) and (b); results in discontinuous fused image (c).

To remove discontinuities across image blocks, instead of cutting and pasting the blocks to obtain an image, the images representing the blocks are smoothly blended together. A monotonically decreasing blending function is centred at each block in the selected image and image colours are multiplied with the corresponding blending function values. A blending function [1, 5] assigns the maximum weight to the pixel at the centre of a block and assigns weights to other pixels inversely proportional to their distances to the centre of the block. This can be done using **blending function** as follows:

- $G_{jk}(x, y)$ represents the value of a Gaussian of height 1 centered at the jk th block at (x, y)

$$G_{jk} = \frac{\exp(-((x-x_{jk})^2 + (y-y_{jk})^2))}{2\sigma^2} \quad (2)$$
- Rational Gaussian surfaces will be used to blend the image intensities. Rational Gaussian blending functions are defined by

$$W_{jk}(x,y) = \frac{G_{jk}(x,y)}{\sum_{m=1}^{nr} \sum_{n=1}^{nc} G_{mn}(x,y)} \quad (3)$$

- $W_{jk}(x, y)$ is the value of the blending function centered at the jk th block at location (x, y) , and $I_{jk}(x, y)$ is a vector representing the actual *Lab* color coordinates of the image representing block jk at location (x, y)

$$O(x,y) = \sum_{j=1}^{nr} \sum_{k=1}^{nc} W_{jk}(x,y) I_{jk}(x,y) \quad (4)$$

2.3.1 Algorithm BLEND

1. Set parameters d , Δ , and δ to some guesses.
2. Determine the entropy of block jk in each image using formula (1) for $j = 1 \dots n_r$ and $k = 1 \dots n_c$ and let the image having the highest entropy within block jk be I_{jk} .
3. Find the entropy of the image obtained by blending the images of the blocks selected in Step2.
4. Increment or decrement d and δ by Δ in the gradient-ascent direction and repeat Steps 2 and 3 until the highest entropy is reached. Let the d and δ producing the highest entropy be $d(max)$ and δmax , respectively.
5. Select the images identified in Step 2 when setting $d = d(max)$, and create a new image by blending the selected images with blending functions of width δmax .

Thus we obtain a uniformly exposed fused image with better information content (entropy) than the initial set of images.

3. Experimental Results

The proposed method was applied to a number of registered set of multi exposure visual images and multi exposure IR images. The results for multi exposure fusion of visual and IR images using homomorphic filter are as shown in fig. 5(a), fig. 6(a) and fig. 7(a) . Fig. 5(b), fig. 6(b) and fig. 7(b) illustrates the results for multi exposure fusion of visual and IR images without using homomorphic filter.

Table 1 depicts the entropy of fused image with and without homomorphic filter on different sets of visual and IR image.

Table 1 –Entropy of fused image

Resultant fused image	With homomorphic filter	Without homomorphic filter
Image set 1	7.6356	7.4926
Image set 2	7.5887	7.1696
Image set 3	7.3006	7.1241



Figure 5(a): Entropy of Image set 1 with filter



Figure 5(b): Entropy of Image set 1 without filter

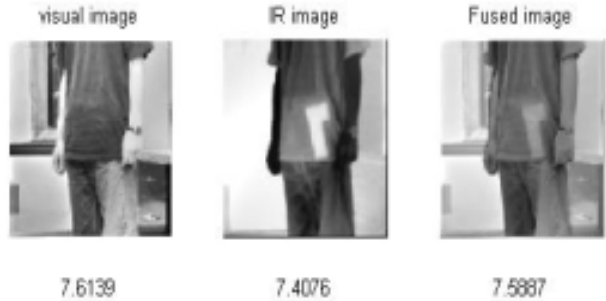


Figure 6(a): Entropy of Image set 2 with filter

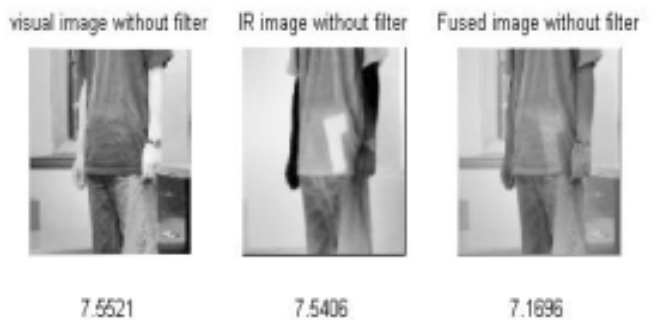


Figure 6(b): Entropy of Image set 2 without filter



Figure 7(a): Entropy of Image set 3 with filter

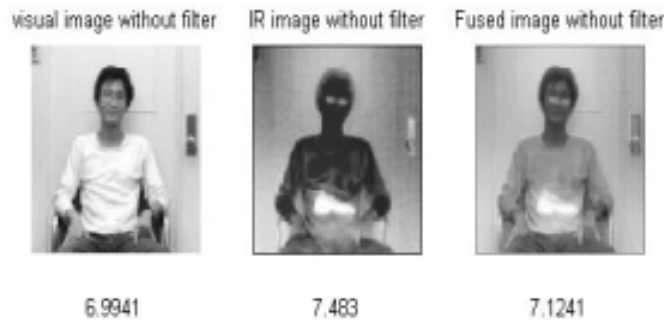


Figure 7(b): Entropy of Image set 3 without filter

On comparing the results of the proposed multi exposure fusion algorithms with and without homomorphic filter, we can clearly say that the overall information content (entropy) of the fused image with homomorphic filter is better than the image without the filter. Although in visual image the variation in resultant entropy of fused image, with and without filter, is minimal; the difference is huge for IR image set. Moreover, we notice that the object boundaries and features are better exposed in filtered images. This makes it suitable for applications in concealed weapon detection in airport and other public places security system [11].

4. Conclusion

In this paper, we proposed a new multi exposure image fusion method that applies homomorphic filter to images at

multiple exposure levels of a scene. This provides a fused image that is well-exposed everywhere and provides critical image information. The utility of the proposed method is demonstrated in the experiment tests. In this work, entropy was used as the measure for optimization when fusing the images. This novel approach was applied on large dataset of visual and IR images and the results were compared to multi exposure fusion algorithms with and without homomorphic filter. The major advantage of proposed algorithm is that it preserves scene highlights if the information within a highlighted area is quite high. Also it does not have a side effect and will not change the local contrast in the input. The use of Homomorphic filtering would improve the information content in the image which would help in providing the best exposed image.

References

- [1] Ardeshtir Goshtasby, A., "Fusion of multi-exposure images," in *Image and Vision Computing*, 23, 2005, pp. 611-618.
- [2] R. Szeliski "System and process for improving the uniformity of the exposure and tone of a digital image", U. S. Patent No. 6,687,400, Feb. 3, 2004.
- [3] Ekta M. Upadhyay, Dr. N. K. Rana, "A Novel Multifocus and Multi Exposure Approach for Concealed Weapon Detection," in *iJTEMAS*, Vol.I, Issue X, pp. 20-25, Dec 2012.
- [4] Tom Mertens, Jan Kautz, Frank Van Reeth, "Exposure Fusion," in *proceedings of Pacific Graphics*, Maui, Hawaii, 2007.
- [5] Goshtasby, "Image fusion: Advances in the state of the art" *Journal of Information Fusion*, Elsevier, Vol. 8, pp 114-118, 2007.
- [6] Douglas B. Williams and Vijay Madisetti (1999), *Digital signal processing handbook*, CRC Press, ISBN 0-8493-2135-2.
- [7] K. Delac, M. Grgic, T. Kos, "Sub-Image Homomorphic Filtering Technique for Improving Facial Identification under Difficult Illumination Conditions," *International Conference on Systems, Signals and Image Processing (IWSSIP'06)*, September 21-23, 2006. Budapest, Hungary.
- [8] Herwig, J., & Pauli, J., "An Information-Theoretic approach to Multi-Exposure Fusion via Statistical Filtering using Local Entropy," in *Proceedings of the 7th IASTED International Conference*, Vol. 678, No. 099, pp. 50.
- [9] Block, M., Schaubert, M., Wiesel, F., & Rojas, R., "Multi-Exposure Document Fusion Based on Edge-Intensities," in *Document Analysis and Recognition, 2009. ICDAR'09. 10th International Conference*, IEEE, pp. 136-140.
- [10] P. Burt, "A Gradient Pyramid Basis for Pattern- Selective Image Fusion," in *Proceedings of the Society for Information Display*, pp. 467-470, SPIE, 1992.
- [11] Z. Xue, R. S. Blum, and Y. Li, "Fusion of Visual and IR Images for Concealed Weapon Detection", *Information Fusion, Proc. of the Fifth International Conference*, Vol 2, pp 1198 - 1205, 2002.