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The aim is to help researchers and organizations, both large and small, to identify the opportunities that the changing landscape offers them, and exploit these to achieve success in the rapidly flattening scientific world.

As the editor my responsibilities will continue to be the advancement of the success of the Journal and its promotion and distribution in a manner that it becomes an integrated component of Scientific Community

IJACSA has drawn the best of talent from Industries and Institutions across the globe to ensure that we retain high standards. We are very grateful to all the authors who have submitted such high quality work to the Journal.

IJACSA expresses sincere appreciation to its reviewers for their efforts and dedication towards the Vision of transforming Scientific Research into a modern and accessible way of communication for the community.

The Papers have been kept limited in number, with an aim to provide best-of breed Research Papers and Discussions. The Paper Acceptance Rate for this issue is 32.3%. But I know that amongst the readers there is a good deal of intellectual thinking in the area that our journal focuses on, I, therefore respectfully ask that you consider preparing a submission for our Journal.

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Thank You for Sharing Wisdom!

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Table of Contents

The effect of Knowledge Characteristics in student's performances:
An Empirical case study

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Abstract: **Knowledge characteristics are the essential step in leveraging knowledge value in the university. Share Document, and contributes knowledge may not be useful without the context provided by experience. This paper focuses on the characteristics of knowledge in applied science private university and its effect on student's performance, which aim to focus in the nature knowledge and the quality of material. Questioner was designed and sent to MIS students in the applied sciences university in order to improve the context of the knowledge and facilitated the knowledge usage in order to improve the student knowledge level. The result lead recommends that the university should understand the knowledge characteristics and the potential techniques that support sharing knowledge. In addition the university should now which type of knowledge can by articulated or which knowledge can be taught to individuals, through training, practices or apprenticeship, in order to improve the student performance.**

Keywords-codify ability, Explicitness, Availability, Teach ability, student performance.

I. INTRODUCTION

. Choi and Lee [10] pointed to four knowledge characteristics based on explicit dimensions. These characteristics are deferent from industry to industry. The organizations should adopt with knowledge characteristics to a chief higher performance. Organizations tend to have a mixed between the knowledge characteristics and human performance. Fernandez[5] study knowledge flows within different industries. Knowledge flows through two major channels, the disembodied and embodied channels. The disembodied is where knowledge spreads through human mobility and research spill over; knowledge is tacit. The embodied is the process whereby knowledge is disseminated through the document and equipments; knowledge is explicit. This study adapted the embodied channel. Codifiability, availability, explicitness and teachability knowledge is an essential step in leveraging knowledge value in the university, and give permanence to knowledge. It represents or embeds knowledge in forms that can be shared, stored, combined, and manipulated in a variety of way [11].The problem is some of that knowledge has a human sense, other knowledge need a computer and machines.

This study describes the knowledge characteristics and explains its implications, in student performance epically that the university in the MIS department started to teach in theatrical forms, and technical ways, to transferring knowledge to student. In order to do this, it is necessary to identify knowledge characteristics; the four characteristics are used in this research described above (codify ability, explicitness and teach ability).

The model also helps to justify the four knowledge characteristics and it is effect on student performance, which can be used to improve a student's knowledge levels. The study going to answer the following questions:
-what are the knowledge characteristics?

- How availability, codify ability, explicitness and teach ability effect student performance? The study attempt to discuss by using questionnaire- based survey of student in applied science private universit in the following section, of study introduction, literature review, methodology -result, discussion and conclusion.

II. LITERATURE REVIEW

A. Tacit and explicit knowledge

People gain to create new knowledge from numerous activities. First, action-based learning that involves working on problems, and implementation of solutions. Second, systematic problem solving, which requires a mindset, disciplined in both reductionism and holistic thinking, attentive to details, and willing to push beyond the obvious to assess underlying causes. Third, learning from past experiences, is review a company's successes and failures, on order to take the way that will be of maximum benefit to the organization, as suggested by Morse [22]. Previously Nonaka and Konno [2]; and Seubert et al. [23] have classified KM into two primary states, namely tacit and explicit knowledge. These two states are discussed in the following.

B. Tacit knowledge

Tacit knowledge refers to the knowledge residing in the heads of people that is not codified. A person becomes aware of his or her tacit knowledge when faced with a situation or problem. This dynamic knowledge itself cannot be cataloged, although organizations can create catalogs better known as

directories or expert locators to label, and find people with mission-critical knowledge and experience [5]. However, tacit knowledge is resides in our minds and, cannot be easily shared or it is difficult to communicate with others, as defined by Seubert et al., [23];and Nonaka and Konno [2] add that tacit knowledge is deeply rooted in an individual's actions and experience, as well as in the ideals, values, or emotions he or she embraces. It has two dimensions: the first is the technical dimension, which encompasses the kind of informal personal skills or crafts often referred to as "know-how." The second is the cognitive dimension. It consists of beliefs, ideals, values, schemata, and mental models, which are deeply ingrained, in us and which we often take for granted. While it is difficult to articulate, this cognitive dimension of tacit knowledge shapes the way we perceive the world

C. Explicit knowledge

Only 20 percent of what an organization contains is explicit. Explicit knowledge is easier to document and share, contributes to efficiency, and easier to replicate. It comes in the form of books and documents, formulas, project reports, contracts, Process diagrams, lists of lessons learned, case studies, white papers, policy manuals, etc. [5].

Moreover, Wiig[18], Nonaka and Konno [2] and Seubert et al. [2] defined explicit knowledge as that which can be captured and expressed in words and numbers (i.e. quantitatively) and shared in the form of data by courses or books for self-reading, scientific formulae, specifications, manuals, and the like. This kind of knowledge can be readily transmitted between individuals formally and systematically.

However, Snowden [7] agrees with the above mentioned and he notes that, as its name suggests, it is easier to identify. It is reusable in a consistent and, repeatable manner. It may be stored as a written procedure in a manual or as a process in a computer system. The documented procedure of a lesson-learn workshop, the written-up comment of an economist examining a set of financial data, minutes of a meeting, a chain of e-mail correspondence, are all examples of explicit knowledge.

D. Knowledge Characteristics

Explicitness
Codifiability
Teachability
Knowledge Specificity

The organization's purpose can be fulfilled by adopting a wide variety explicit knowledge characteristic in student learning, such as virtual learning, the corporate university and self-directed learning [21].

E. Codifiability

The literature about knowledge codification, diffusion and application reveal some issues that need to be reviewed. Strategies that facilitate knowledge codification and diffusion are different[24]. The industry and the manager's perspectives toward his/her organization knowledge capability can determine this role. The industry difference is discussed under

knowledge management schools. A manager's perspective is discussed under the five knowledge enabler cycles. The four modes of knowledge conversion need to be specified in more detail when explaining knowledge flow in an organization. This gap is discussed within knowledge creation. Sharing knowledge is not direct implication of knowledge codification and diffusion. Knowledge can align long continuum explicitness, codifiability, teachability [5].

Seubert and Balaji [6] explore the organizational knowledge codification in their study. Codification is treated as a multidimensional construct. They focus on three different forms of codification. They can be aligned along a continuum of abstractness. Knowledge encoded in codes and figures are the most abstract form. Knowledge encoded in words and texts are less abstract form. Knowledge encoded in pictures and images are the least abstract form. They find that the effect of knowledge codification on organizational is moderated by a strategic context. Alavi et, al., [14] analyzed the variation of organizational capability to codify its knowledge based on two dimensions: Low-Volatility context and High-Volatility context within two industries; Product and Service-based industries. Low- Volatility context knowledge is less time-sensitive, and stored knowledge tends to be useful over along time span without updates. On the other hand, Knowledge in High-Volatility context is time sensitive. Stored knowledge needs to be refreshed continuously. Further, researchers define codification level in both Service and Product-based organizations in regards to Low-Volatility and High-Volatility contexts. The codification level is high in Service-based industries when Low-Volatility context. Whereas codification level is low in Service-based industry when High-Volatility context. In Product-based industry, codification is high when organizations are in a High-Volatility context [8]. The literature about knowledge codification, diffusion and application reveal some issues that need to be reviewed.

1-Strategies that facilitate knowledge codification and diffusion are different. The manager's perspectives toward his/her organization knowledge capability can determine this role.

2-The four modes of knowledge conversion need to be specified in more detail when explaining knowledge flow in an organization.

F. Knowledge Availability

The organization that has the ability to make knowledge available most effectively is more likely to survive than the organization that has less experience in making knowledge available (Argot et al, 2000). When knowledge is available there is better cooperation and communication throughout the organization, and the resulting financial performance and functioning of the organization improves (1999). Argot [17] warn that success in achieving knowledge availability is very difficult since most individuals are rejecting to share knowledge. However, Fernandez et al., [5] state that once knowledge is embedded into the work process the success of knowledge diffusion increases, as it will become a natural behaviors characteristic of the people.

There is an overall agreement that the primary role of an organization is not just acquiring and diffusing knowledge; it should be applied toward the production of goods and services and to affect the organization performance [15]. When knowledge is available to the whole organization, the focus is on the outcomes, such as productivity and profitability and high level of performance [16].

G. Knowledge Explicitness

There is a commonly held view that new knowledge always begins with an individual. For example, a smart investigator has an insight that leads to a new patent [13]. The explicitness support innovation, the individual or group that acts with organization knowledge can adds the necessary value in the organization, in order to support a commitment to innovation [19]. The necessary values that lead commitment to innovation and creation can be presented as two functions. Firstly, the human should talking, asking and triggering new questions and enquiries. Then encourage and help these people to transfer their ideas into something tangible.

Secondly, the explicitness knowledge helps to establish an enabling context for knowledge creation. Knowledge cannot be separate from its context. It is part of the physical, mental or virtual place where it was created. Where there are individuals in an organization who do not have the ability to articulate their knowledge in a formal way, the explicit knowledge should have the ability to convert to the tacit knowledge into the right context. This should connect with tacit knowledge in relating to an organization's culture. According to Szulanki [8], the ideal knowledge has a skill profile related to his or her ability to motivate skills, respect others, improve group dynamics and relationships; help the group to develop a charter of their tasks and responsibilities; develop a social network inside and outside the institution

H. Knowledge Teachability

Zander and Kogut [20] argue that instead of considering explicit and tacit knowledge, we should consider tow characteristics of knowledge –codifiability and teach ability. Teachability reflects the extent to which the knowledge can be taught to other people, through training, apprenticeship, and so on. Of course, some knowledge could be high in teachability [5]. As knowledge maturing is basically interconnection of individual learning process where knowledge is taught and learnt, an important criterion is its teachability. Whereas immature knowledge is hard to teach (even to experts), formal training allows by definition for wide-range dissemination [24].

I. Student performance

According to Choen [15], the performance of an organization is positively affected by the ability of organization to assimilate and apply knowledge. Knowledge assimilation can also refer to an absorption capacity. In the theories of learning some took a narrow focus on teachers and learners in classroom sittings, others included reference to the characteristics of knowledge and it is influence on education

systems and even on society in general. Knowledge affects student's performance when it is available.

According to Havnes [11], the direct relationship between the attribute of knowledge and student performance is not always valid. Furthermore, according to them, these attributes is a measure of student knowledge. From the previous study we can see the relationship between knowledge characteristics and student performance. Therefore, knowledge characteristics are most likely to support the relationship between organizational performance and absorptive capacity [12].

III. RESEARCH MODEL
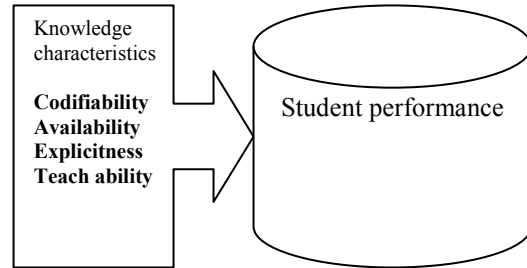
Figures 1
Source: Researcher

The research model depend in fours explicit knowledge characteristics from, Fernandez et al., [5]. They define the knowledge characteristic, namely populations of MIS student in applied sciences university. The researcher adapts the knowledge characteristics and develop questionnaire to investigate the relation between these characteristics and student performance from there points view.

A. Hypotheses

H1 - There is a significant positive effect between explicit knowledge characteristics and student performance in applied science university

H2 - There is a significant positive effect between codifiability and student performance in applied science university

H3- There is a significant positive effect between availability and student performance in applied science university

H4- There is a significant positive effect between explicitness and student performance in applied science university.

H5- There s a significant positive effect between teachability and student performance in applied Science University.

B. Research design

The term research design refers to the overall strategy of the research. Thus, the research design should advise us on how the sample will be drawn, what groups or

Research design is concerned with making our problems accessible by directing our research in away that generates precise answers to precise question. There are two approaches that the research methodology can be derived from these two

approaches can be classified into two main categories quantitative methodology, and qualitative methodology [9].

Sekaran [9] argues that variables and relationships are the central idea in quantitative research. This is the key objective in this research. Moreover, quantitative methods are very useful in explaining causality requires the establishment of relationships between variable, and linking them to a certain theory. The benefits of quantitative methods provide tools for measuring concepts, planning design stages, and for dealing with sampling issues, Therefore, quantitative approach are cost effective, and speed in data collection , the ease of analysis, apposite for testing hypotheses, and determining relationships between variables, and establishing the reliability of data [3].

Qualitative methods focus on generating hypotheses in order to illustrate, and explain the phenomenon in its context ,the benefits of the approach become visible by enabling researchers to examine change processes over time, and more in depth and offer rich, and distinctive insights. The criticism of the approach, arising from the fact that it the resource-intensive; analysis, and the interpretation of data is often complex and it requires distinctive skills, lack of well-formulated hypotheses [3]Considering the benefits, and the drawbacks of the two methodologies. In addition to the study limitations, which are discussed below .The researcher adopted the quantitative approach due to the following reasons.

1. Resource Limitation (time, and cost of the study)
2. The issues of validity and, reliability are often seriously questioned because of the nature of the data.
3. The need to satisfy the research objectives in terms of factor analysis, testing hypotheses.

C. Data collection methods

Collecting data and information resources
The data and the information will be gathered from two resources:

D. Primary resources

Individuals focus groups, and a panel of respondents set up by the researcher whose opinions may be sought on specific issues from time to time are examples of primary data sources [9].Data can also be culled from administrating questionnaire. Questionnaires are an efficient data collection mechanism when the researcher knows exactly what is required and how to measure the variable of interest [3].In this study the questionnaires send to populations of MIS student in applied sciences university.

E. Secondary resources:

Data can also be obtained from secondary sources , as for example company records or archives, industry analysis offered the media Web site, the internet and so on [9].Using the scientific (Books, articles, etc…) concerned with the study.

F. Questionnaire design

The questionnaire development process was guided by the following practices:
Initial design, is development of the survey instrument.
Pre-testing, is enhancement through panel of expert's opinion.

G. Initial design and development of the survey instrument

Many criteria should be considered when designing a questionnaire survey[9].On the choice of wording, questionnaire design, and layout were adopted .Items in questionnaire were designed to being simple ,clear , short ,technical, accurate ,bias free, and at an appropriate reading level [9][3] were taken into account when designing the questionnaire, such as started with a brief description on how to answer the questionnaire .An initial draft of questionnaire was developed based on an extensive literature review, and existing measures .

H. Data analysis procedure

The analysis will be conducted in two stages: instrument validation and hypotheses testing. Statistical techniques will mainly be employed in order to examine the hypotheses. The means and percentages were used to examine the knowledge characteristics as independent variables on student performance in applied science university.

I. Sample size determination

Based on the work of the determination of sample size took into account the following:
-What alpha level could be used in the formula?
-What is the acceptable margin of error in the formula?
The dependants are explicitness, codifiability, teachability, and availability. The student's performance is the independent variables play a major role in this research. Absorptive capacities are all based on the five point Likert scales [3].

J. Decisions related to population and sample selections

The unit of the analysis in this study is the MIS student in the applied sciences university 400 Questionnaires were sent to 400 populations of MIS student in applied sciences university. Were 378 returned, 7 Questionnaires were ignored because it has missed? The overall response rate for this study is 85 %. The response rate actually used is 82 %. This is regarded as relatively high, since the respondents are managers supposed to be too busy to answer questionnaires. Because the achieved responding

Sample was 371, the standard error in the analysis will be207250 = 1, 12 However, it is found that sample is sufficient to represent the regression analysis conducted.

K. Operationalisation and measurement strategy of the model variables

The measures of model variables in this were operatinalise using statistical procedures starting with internal consistency test , establishing constructs reliability, statistical procedures are common among many researchers, such as [1]; [3].

1- Internal consistency to assess the reliability of the scale using Combach's alpha.

2- Developing a structural model based on the composite measures to linking the hypothesized model's constructs.

3- The means and percentages of each item in the questionnaire were determining the knowledge characteristics on the student performance.

L. Internal reliability

The internal consistency measures (Combach's Alpha) are obtained in order to assess the reliability of the measurement instruments. The following table shows the Combach's Alpha value for each scale. It is clear that Cronbach, s alpha is valid, acceptable statistically and managerially because (α) values are greater than accepted percent 0.60.

Table 1 Reliability analysis

No	Variables	Cronbach's alpha(α)
1	Codifiability	0.86
2	availability	0.84
3	explicitness	0.75
4	teachability	0.74
5	Students' performance	0.83

IV. RESULTS

The questionnaires contained twenty -five statements divided into five dimensions the first dimension consisted three statement that were related to codifiability, the second consisted of eight statements related to the availability, the third consisted of five Statement related to the knowledge explicitness and, sixth statement related to knowledge teach ability finally four statement related to student performance.

Table2 Knowledge Codifiability

N	Item	mean	percentages
1	Represents a knowledge in numbers and codes	2.5	50%
2	Represents a knowledge in words and text	3.0	60%
3	Represents a knowledge in pictures and images	3.40	80.4%

Table 2 shows that 60% of the student's belief that the university represents the knowledge in a word and text.80.4% of the research sample think that the knowledge represents in picture and image. In the other hand 50% belief that knowledge represent in a codes.

Table3 Knowledge Availability

N	Item	Mean	Percentages
1	Knowledge helps the students to know their duties and tasks		
2	Knowledge helps the students to know how to act in different situation	2.2	44%
3	Knowledge helps the students to recognize the gap between their expected and their actual performance	1.8	34%
4	Knowledge helps the students to close the gap and learn from mistakes	1.68	32.6%
5	Knowledge helps students to realize the impact on their performance.	4	80%
6	Knowledge helps to set infrastructure to the topics.	4.25	85%
8	Knowledge helps to assess and reviewed proposed new assignments	4	80%

Table 3 shows that 85% of the research sample agree the university knowledge helps the students to accomplish their duties, and to set infrastructure to the topics. In the other hand Learn from mistakes, and recognizing the gap between the expected and actual performance have the lowest percentage.

Table 4 Knowledge Explicitness

N	Item	Mean	Percentages
1	Knowledge that is obtained is captured and/or documented.	4.49	79.9%
2	Prof is captured and/or documented past knowledge	4.5	90%
3	Students are encouraged to get on assignment on how to capture/document what they are learning	3.93	78.7%
4	There is an incentive to document relevant technology and economic issues	2.33	46.7%
5	Students are able to acquire knowledge using the latest technology	3.37	67.6%

The result of table 4 shows that 90%of students belief that captured past knowledge. The lowest levels were to the technology and economic issues.

Table 5 knowledge Teach ability

N0.	Item	Mean	Percentages
1	Uses knowledge to improve student's performance	3.7	63%
2	Makes knowledge accessible to students quickly	3.4	69%
3	Takes and assignment **t**ransfer and helps in create new knowledge	3.5	30%
4	Takes and assignment transfer and helps in create new knowledge	4.05	81%
5	Quickly applies knowledge to computer application	2.95	59.1%
6	we use case study to learn how to solving problems and to support student knowledge	3.33	66.7%

The result of the table 5 show that question number 4 has the highest level it equal 81% percentages. The lowest percentages equal 59.1% was to applied knowledge application

Table 6 Students' performance

N0.	Item	Mean	Percentages
1	The new way of capture knowledge Students are more successful	3.25	65%
2	Knowledge in the university make Student have great marks	2.64	42.68%
3	Knowledge in the university make Students have a faster improved rate	3.26	65.2%
4	Knowledge in the university make Students are more innovative	3.25	65%

The results of table 6 show that the students agree that the new form of Knowledge helps them to success and to faster improvement rate.

Table 7 Summary of research hypotheses

Hypothesis	Beta	t-value
H1 The relationships between student the KC and Student performance	.198	3.176
H2 The relationships between student the KC and performance	.284	5.066
H3 Knowledge Availability and Student performance	.391	7.265
H4 Knowledge Explicitness and Student performance	.373	7.056
H5 Knowledge Explicitness and Student performance	.125	2.176

Based on the results in table (7) which relate to hypotheses testing we can find a positive and significant effect at function level ($\alpha \leq 0.01$), which supports hypothesis between the independent variable and the dependent variable which supports hypothesis (Ha1.Ha2, Ha3, Ha4, Ha5

V. DISCUSSION

The result shows that there is high homogenous responses of statistical sample at statistical function (α=0.0 l). Throughout this survey it was found that knowledge characteristics are important to the student performance. Codifiability knowledge effect student performance but not all types of knowledge can be codifying some kind of knowledge can be articulated, represent the tasks and the way of doing that knowledge. In addition explicitness has the greater effect on student performance because in Jordan they focus in classifying explicit knowledge more than tacit, in general [8] argue that explicit and tacit knowledge kinds of knowledge at the tow end of a continuum. Explicit knowledge high in explicitness and tacit knowledge low. In other hand Knowledge teachability has second stage; some knowledge could be high in teach ability, however many assignments given to student and case study. In the other hand some knowledge could be low teachability like fix problem in computer, adding the advance technology, or documented the new issues. According to knowledge availability what we have seen that there is allot of focus in explicit knowledge and low attention for tacit knowledge because there's a shorter in application that support the activity regard to solve problem or to learn from mistakes, the researcher justifying that because of the university did not reviewing the tools and software that useful for storing and sharing explicit and tacit knowledge. Finally Students' performance, most of student agreed that there performance in middle level not in a high level .The researcher justifying that because of computer-mediated possibilities limitation, some of these limitation related to the acquisition, storing and, transferring knowledge. The researcher argues that student's knowledge still needs supportive tools.

VI. CONCLUSION

In this study the researcher introduced a new model for thinking about the knowledge characteristics and its effects in student's performance. The researcher argue that the university should identifying the knowledge characteristics because these characteristics help to fix student problems related to classifying, documenting, and acquiring knowledge . Knowledge characteristics facilitate the process of storing and sharing knowledge. The primary role of a university is not just acquiring and diffusing knowledge; but to applied the knowledge in away effect the student performance. The researcher remains to more understand to knowledge characteristics and the potential techniques that support reflects the extent of which knowledge can be articulated or which knowledge can be taught to other individuals, through training, practices or apprenticeship

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A New Personalized Recommendation Technique Based on the Modified TOPSIS Method

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Abstract — **Personalized recommendation service helping users to target the interesting information from the excessive information set has been widely concerned. In this paper, we firstly propose a new method named Modified TOPSIS Method utilizing the Improved Gray Correlation Analysis Method. Then, we present a new personalized recommendation technique based on the Modified TOPSIS Method. Finally, the verification method utilizing Spearman's Rank Correlation Coefficient demonstrates that our new personalized recommendation technique is efficient.**

Keywords - Personalized Recommendation Technique; Improved Gray Correlation Analysis; Modified TOPSIS Method

I. Introduction

In such an Information Age, it appeals to be increasingly difficult for individuals to discover the useful information from the overwhelming amount of information available. Personalized recommendation services have been considered as a feasible solution to target proper information adapted to users' preferences and a lot of research efforts have been focused on developing highly reliable personalized recommendation techniques.

In general, there are mainly three types of personalized recommendation system, content-based filtering systems, collaborative filtering systems and data mining systems. Content-based recommendation is the development of collaborative filtering systems. It doesn't need the assessment opinions from the users, which is too subjective and may limited by the insufficiency of users' assessment information. Based the choices the users made before, it can calculate the similarity among users, and then put forward recommendation.

Base on the content-based filtering systems, our new personalized recommendation technique firstly requires users to choose the indices satisfying the customized needs of users. In the second place, after gathering the data sets related to the selected indices, the ranking result calculated by the Modified TOPSIS Method will be eventually presented to users.

II. Background

A. The Original TOPSIS Method

The Original TOPSIS (Technique for Order Preference by Similarity to an Ideal Solution) Method is a ranking method based on the principle that the chosen alternative should be as close to the ideal solution, rather than the negative-ideal solution, as possible.

In recent years, as a comprehensive and objective decision analysis method in multi-attribute decision-making problem, the Original TOPSIS Method [1]-[4] has been widely applied in evaluating the performance of indicator-based model, which has no restriction of sample size and data distribution pattern.

Unfortunately, it's undeniable that the selected indices always have some certain relationships with the model that we have structured. Additionally, the change of each index may lead to the internal change of the interactions between indices. All defects mentioned above may contribute to the deviation, which negatively affects the effectiveness of information recommendation.

Nevertheless, the Original TOPSIS Method is failed to take the weights of indices into account. Consequently, the evaluation results calculated by the Original TOPSIS Method are essentially accord with the physical circumstances.

B. The Original Gray Correlation Analysis

In an attempt to reflect the actual impact of each index, some researchers decide to weight. Thus, many methods mainly categorized as subjective and objective have been proposed or subsequently improved. However, those existing weighting methods are still open to question for the reason that the subjective weighting method largely influenced by various subjective factors, like the experience and the research field of experts, will lead to a biased result with ease, whereas the objective weighting method utilizing quantitative technique in Math and Statistics requires a large numbers of data following a normal distribution, which is, of course, difficult in collection, calculation and application.

In order to solve the aforementioned problems, the weighting method utilizing the Gray Correlation Analysis [5]-[6] has been presented.

In the recent years, the Gray Correlation Analysis Method has been widely used in the fields of geology, ecology, economic and so forth. It is an effective method to examine the relationship between statistic data by judging the

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interrelationship between the two indices based on the extent of their links.

Nevertheless, the Gray Correlation Analysis Method chiefly relies on the traditional technique of relating degree proposed by Julong Deng (1986) has been proven to the problematic. For instance, firstly, the calculated correlation coefficients don't satisfy the properties of uniqueness, symmetry and comparability. Secondly, different resolution ratios result in different correlations. Thirdly, it can merely reflect positive correlation rather than negative correlation. At last, the resolution ratio is generally set as 0.5, which will lead to $r > 0.3333$, therefore, fail to reflect the real situations.

III. THE IMPROVED GRAY CORRELATION ANALYSIS

To resolve the problem of the Original Gray Correlation Analysis mentioned previously, in this section, we introduce but slightly improve the Computation Model of Gray Correlation Degree proposed by Wang Jianqiang (2000) [7].

Denote the selected n indices of indicator-based model by $I_1 \sim I_n$ respectively.

Step 1: Set sequences $X_1 \sim X_n$ according to $I_1 \sim I_n$ respectively at different points $t_1 \sim t_m$, with the raw data of indicator-based model.

What is slightly different from the Computation Model of Gray Correlation Degree is that when calculate the weights, the indices should be adjusted according to the evaluation system they are applied in. If the evaluation system requires higher-better indices, the lower-better ones $X_j (j \in J^-)$ should be turned into higher-better by their own reciprocal value, $\tilde{X}_j = \dfrac{1}{X_j}$. Finally calculate the weights of $\tilde{X}_j$.

$$\left\{ \tilde{X}_j \mid \tilde{X}_j = X_j, j \in J^+; \tilde{X}_j = \frac{1}{X_j}, j \in J^- \right\} \quad (1)$$

Where the set J^+ means the indices are higher better, and the set J^- means the indices are lower better.

$$X_j = \left\{ x_j(t_1), x_j(t_2), \cdots, x_j(t_m) \right\}, j = 1, 2, \cdots, n \quad (2)$$

Step 2: Calculate D_i

$$D_j = \sum_{i=2}^{m} \left| x_j(t_i) - x_j(t_{i-1}) \right|, j = 1, 2, \cdots, n \quad (3)$$

Step 3: Calculate the increment sequence.

$$\Delta y_j(t_i) = x_j(t_i) - x_j(t_{i-1}),$$
$$j = 1, 2, \cdots n, i = 2, 3, \cdots m \quad (4)$$

Step 4: Calculate the correlation coefficient $\xi_{kj}(t_i)$ and correlation R_j, and then rank the correlation.

The correlation coefficient formula between indices i and j is as follows:

$$\xi_{kj}(t_i) = \frac{1}{\left(1 + \left\| \left| \dfrac{\Delta y_k(t_i)}{D_k} \right| - \left| \dfrac{\Delta y_j(t_i)}{D_j} \right| \right\| \right) \left(1 + \left| \dfrac{\min(D_k, D_j)}{\max(D_k, D_j)} \right| \right)} \quad (5)$$

$$k \in [1, n], j \in [1, n], i \in [1, m]$$

And the correlation formula is as follows:

$$R_j = \frac{1}{n} \sum_{k=1}^{n} \xi_{kj}, \; j \in [1, n] \quad (6)$$

Therefore, we can conclude the ranked correlation sequence according the value of R_j.

Step 5: Normalize the correlation by the formula as follows:

$$\alpha_j = \frac{R_j}{\sum_{j=1}^{n} R_j} \times 100\% , \; j \in [1, n] \quad (7)$$

Thus, we can conclude the difference between the impacts of each index.

From the analysis above, we can conclude that the weights of indices utilizing the Improved Gray Correlation Analysis obtain the following properties:

- *Symmetry, that is $\xi_{kj} = \xi_{jk}$*. The Correlation Coefficient Table utilizing the Improved Gray Correlation Analysis is symmetric, however, is asymmetric if utilizing the Original Gray Correlation Analysis.

- *Uniqueness*. We can obtain a unique set of weights of indices.

- *Coincidence*. It means that the correlation between two sequences with a smaller slope of curve must be larger than that with a sharper slope of curve.

IV. THE MODIFIED TOPSIS METHOD

In the previous section, we suggested that the Original TOPSIS Method should take the weights of indices into account, so that the actual impact of each index could be precisely identified. Therefore, in this paper, we improve the Original TOPSIS Method utilizing the aforementioned Improved Gray Correlation Analysis.

We introduce weight of each index calculated by the Improved Gray Correlation Analysis to the Original TOPSIS Method for improvement.

$$D_i^+ = \sqrt{\sum_{j=1}^{n} \alpha_j (Z_{ij} - Z^+)^2}, \; i \in [1, m] \quad (8)$$

$$D_i^- = \sqrt{\sum_{j=1}^{n} \alpha_j (Z_{ij} - Z^-)^2}, \; i \in [1, m] \quad (9)$$

Where, α_j denotes the weight of each index calculated by Gray Correlation Analysis.

By eliminating the mistakes caused by indices which are essentially measured by the same factors, it is useful to improve the evaluation system of indicator-based model.

Compared with the Original TOPSIS Method, the Modified TOPSIS Method is more objective. It is able to avoid the mistakes caused by the indices which are essentially measured by the same factors, without which they would wrongly magnify the impacts growing in the same direction on the evaluation system.

V. THE NEW PERSONALIZED RECOMMENDATION TECHNIQUE UTILIZING THE MODIFIED TOPSIS METHOD

Step 1: Establish a decision matrix $\left(\tilde{X}_{ij} \right)_{m \times n}$, which is a higher-better matrix.

$$\tilde{X}_{ij} = \begin{cases} X_j(t_i), j \in J^+ \\ \dfrac{1}{X_j(t_i)}, j \in J^- \end{cases} \quad (10)$$

Where the set J^+ means the indices are higher better, and the set J^- means the indices are lower better.

Step 2: Normalize the higher-better matrix.

The normalized value Z_{ij} is calculated as

$$Z_{ij} = \frac{\tilde{X}_{ij}}{\sqrt{\sum_{i=1}^{m} (\tilde{X}_{ij})^2}}, \; i \in [1, m]; j \in [1, n] \quad (11)$$

Then calculate Z^+ and Z^- respectively

$$Z_j^+ = \max_i (Z_{ij}), \; Z_j^- = \min_i (Z_{ij}) \quad (12)$$

$$Z^+ = (Z_1^+, Z_2^+, ..., Z_n^+) \; Z^- = (Z_1^-, Z_2^-, ..., Z_n^-), \quad (13)$$
$$i \in [1, m]; j \in [1, n]$$

Step 3: Calculate the dispersion of Z^+ and Z^-.

$$D_i^+ = \sqrt{\sum_{j=1}^{n} \alpha_j (Z_{ij} - Z^+)^2}, i \in [1, m]$$

$$D_i^- = \sqrt{\sum_{j=1}^{n} \alpha_j (Z_{ij} - Z^-)^2}, \; i \in [1, m]$$

Step 4: Calculate C_i and rank it in descending order.

$$C_i = \frac{D_i^-}{D_i^+ + D_i^-} \;\;, i \in [1, m] \quad (14)$$

Where the index value of C_i is between 0 and 1. The larger the index value is, the better the performance is.

VI. NUMERICAL EXAMPLE

In this section, as an illustration, we apply our new personalized recommendation technique in hospital beds arrangement, which is a common thorny problem in the healthcare industry. The verification is based on the data of the performance of hospital beds arrangement, which is from the Question B for undergraduate of 2009 China Undergraduate Mathematical Contest in Modeling.

A. The Application in Hospital Beds Arrangement

According to the 2008 China Health Statistics Yearbook published by Ministry of Health of P.R China, we select five following indices, which are currently widely used in the medical industry.

[8] I_1: Weekly Standardized Bed Utilization Rate

$= \dfrac{\text{The Actual Value of Weekly Standardized Bed Utilization Rate}}{\text{The Standard Value of Weekly Standardized Bed Utilization Rate}}$

[9] I_2: Weekly Standardized Bed Turnover Ratio

$= \dfrac{\text{The Actual Value of Weekly Standardized Bed Turnover Ratio}}{\text{The Standard Value of Weekly Standardized Bed Turnover Ratio}}$

I_3: Average Days of Stay of Weekly Recoverd Patients

$= \dfrac{\text{The Total Stay Days of Weekly Recoverd Patients}}{\text{The Sum of Weekly Recoverd Patients}}$

[10] I_4: Average Days of Waiting of Weekly Patients

$= \dfrac{\text{Days of Waiting of Weekly Patients}}{\text{The Sum of Weekly Patients}}$

I_5: The Rate of CD Type $= \dfrac{\text{The Sum of Acute Patients}}{\text{The Sum of Patients}}$

Step 1: Calculate the weights of indices utilizing Gray Correlation Analysis.

First, we get the correlation coefficient table, which satisfies symmetry and coincidence. (See Table 1.)

Secondly, calculate the weights of indices utilizing Gray Correlation Analysis. (See Table 2.)

α_2 has the largest influence to the indicator-based model, followed by α_1 α_5 α_3, the last comes α_4 .

Step 2: Structure the higher-better matrix. (See Table 3.)

In Table 2., the raw data of lower-better indicators are changed to higher-better ones.

Step 3: Nondimensionalize the higher-better matrix.

Step 4: Determine Z^+ and Z^-.

According to the matrix calculated in Step 3, we can get Z^+ and Z^- as follows.

$$Z^+ = (1.0240 \quad 0.0285 \quad 0.1667 \quad 0.7916 \quad 0.8571)$$

$$Z^- = (0.0853 \quad 0.0004 \quad 0.0916 \quad 0.0827 \quad 0)$$

Step 5: Calculate the dispersion of Z+ and Z- and make a rank of C_i. (See Table 4.)

Table 4. illustrates that the 1st week ranks first among these weeks, followed by the 9th week, and meanwhile the second week ranks last.

B. The Verification Utilizing Spearman's Rank Correlation Coefficient

In order to verify our Modified TOPSIS Method, we introduce the Spearman's Rank Correlation Coefficient to compare the two evaluating systems based on the Original TOPSIS Method and the Modified TOPSIS Method respectively. The Spearman's Rank Correlation Coefficient [11] is introduced to assess how well the relationship between the two methods can be described utilizing a monotonic function by testing whether the observed value of ρ is significantly different from one.

Step 1: Compute the dispersion of Z+ and Z- using the Original TOPSIS Method and make a rank of C_i. (See Table 5.)

Step 2: Calculate the Spearman's Rank Correlation Coefficient.

$$\rho = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2(y_i - \bar{y})^2}} \quad \in [0,1] \qquad$$

$$x_i = (C_i)_{Modified\ TOPSIS\ Method}, \quad \bar{x} = \frac{1}{n}\sum_{i=1}^{n}x_i; \qquad (15)$$

$$y_i = (C_i)_{Original\ TOPSIS\ Method}, \quad \bar{y} = \frac{1}{n}\sum_{i=1}^{n}y_i$$

Step 3: Analysis.

Table 4. illustrates that by the means of Modified TOPSIS Method, the first week ranks first among these weeks, followed by the ninth week, which is different from the rank in Table 5.

The Spearman's Rank Correlation Coefficient we get is 0.9753, which means our Modified TOPSIS Method is slightly different from the Original TOPSIS Method. However, since more factors are considered in Modified TOPSIS Method, it is safe to draw the conclusion that our Modified TOPSIS Method is improved.

VII. CONCLUSION

This paper proposes a new personalized recommendation technique utilizing the Modified TOPSIS Method. Firstly, the indices satisfying the customized needs of users should be obtained. In the second place, the weights of indices will be calculated by the Improved Gray Correlation Analysis. At last, the sorted information calculated by the Modified TOPSIS Method will be eventually presented to users.

Compared with the other personalized recommendation techniques, our technique interacts with users directly. Besides, the recommend information meets the personalized needs of users, precisely and timely.

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Table 1. Correlation Coefficient

	α_1	α_2	α_3	α_4	α_5
α_1	1	1.918548	1.71555	0.963194	1.124417
α_2	1.918548	1	1.034636	1.218497	1.869969
α_3	1.71555	1.034636	1	1.100687	1.69721
α_4	0.963194	1.218497	1.100687	1	0.872475
α_5	1.124417	1.869969	1.69721	0.872475	1

Table 2. Weights of indices

α_1	α_2	α_3	α_4	α_5
20.9854%	21.9843%	20.4434%	16.0936%	20.4933%

Table 3. Higher-better Matrix

0.0853	0.0004	0.16667	0.088689	0.8571
0.4267	0.0022	0.15152	0.084084	0.0986
0.8818	0.0088	0.14388	0.10032	0.2037
1.024	0.0285	0.10586	0.088236	0.1129
0.7111	0.0219	0.1002	0.086495	0.0833
0.8818	0.0272	0.094368	0.082739	0.1273
0.7822	0.0241	0.095986	0.092846	0.3333
0.8818	0.0272	0.09158	0.13964	0.3333
0.4125	0.0127	0.098977	0.79164	0

Table 4. Result of Modified TOPSIS Method

Week	First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth	Ninth
D_j^+	0.099815	0.14289	0.1094	0.11401	0.12272	0.11452	0.088724	0.080621	0.091446
D_j^-	0.07658	0.0064175	0.022135	0.044583	0.023329	0.037253	0.03859	0.046931	0.064591
C_i	0.43414	0.04298	0.16828	0.28111	0.15973	0.24545	0.30311	0.36794	0.41395
Ranking	1	9	7	5	8	6	4	3	2

Table 5. Result of Original TOPSIS Method

Week	First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth	Ninth
D_j^+	0.5525	0.7660	0.6030	0.6321	0.6743	0.6357	0.5074	0.4584	0.4428
D_j^-	0.3737	0.0310	0.1058	0.2074	0.1082	0.1730	0.1814	0.2207	0.3903

C_i	0.4035	0.0389	0.1493	0.2471	0.1383	0.2139	0.2634	0.3249	0.4685
Ranking	2	9	7	5	8	6	4	3	1

Detection and Measurement of magnetic data for short length wireless communication using FT-IR

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Abstract: **Infrared (IR) radiation is a type of electromagnetic radiation. Infrared "light" has a longer wavelength than visible light. Red light has a longer wavelength than other colors of light, and infrared has even longer waves than red does; so infrared is sort of "redder-than-red" light or "beyond red" light. Infrared radiation lies between visible light and radio waves on the electromagnetic spectrum. In this paper, the infrared radiation is used for detecting the magnetic data for high speedy short range wireless communication. But infrared radiation may use in various way. This paper contains the performance of the FT-IR technique that is for multiplexing the transmissions of different users are viewed at the same time.**

Keywords: FT; FT-IR; Spectrum; prism.

I. Introduction

The **Fourier transform** (often shortened **FT**) is an operation that transforms one function into another. In such applications as signal processing, the domain of the original function is called the *time domain*. In shortly FT can convert a function from one domain to another with no loss of information. And the infrared is the

$$f(x) = a_0 + \sum_{n=1}^{\infty} \left(a_n \cos\frac{n\pi x}{L} + b_n \sin\frac{n\pi x}{L} \right)$$

Fig: Equation for Fourier transforms

And the infrared is the portion of the electromagnetic spectrum with wavelengths ranging from longer than visible radiation, starting around 0.7 μm to 1000 μm [3], to wavelengths shorter than those in the microwave. Satellite instruments typically measure infrared radiation between wavelengths of about 3 μm and 20 μm.

The Fourier transform is also used in other kinds of spectroscopy, e.g. infrared (FT-IR). In signal is acquired in the time domain and Fourier-transformed to a Lorentzian line-shape in the frequency domain. The Fourier transform is also used in magnetic resonance imaging (MRI)[4]. In figure: 1 shows that Fourier transform (compared with Prism) can convert one signal to various signals.
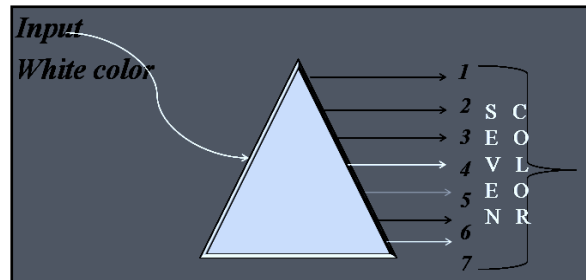
Fig. 1:- Prism, compared with Fourier Transform

An infrared spectrum represents a fingerprint [2][ii] of a sample with combination peaks which correspond to the frequencies of vibrations between the bonds of the atoms making up the material.

Fig. 2:- Radiate the Infrared from atom

Because each different material is a unique combination of atoms, two compounds produce the exact same infrared spectrum as shown in figure: 2. Therefore In every material can show up a difference identity for the use of infrared spectroscopy.

II. CHARACTERISTICS OF FOURIER TRANSFORM INFRARED(FT-IR)

FT-IR stands for **F**ourier **T**ransform **I**nfra**R**ed. IR radiation is passed through a sample. Some of the infrared radiation is absorbed by the sample and some of it is passed through the transmitter...
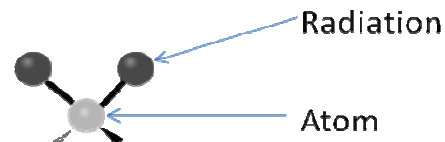FT-IR provides [1]:

A. It can identify unknown materials.
B. It can determine the quality or consistency of a sample.
C. It can determine the amount of components in a mixture.
D. It can increase speed, collect a scan every second
E. It is a non-negative technique
F. It provides a precise measurement method which requires no external calibration
G. It can increase sensitivity – one second scans can be co-added together to ratio out random noise.
H. It has greater optical throughput.
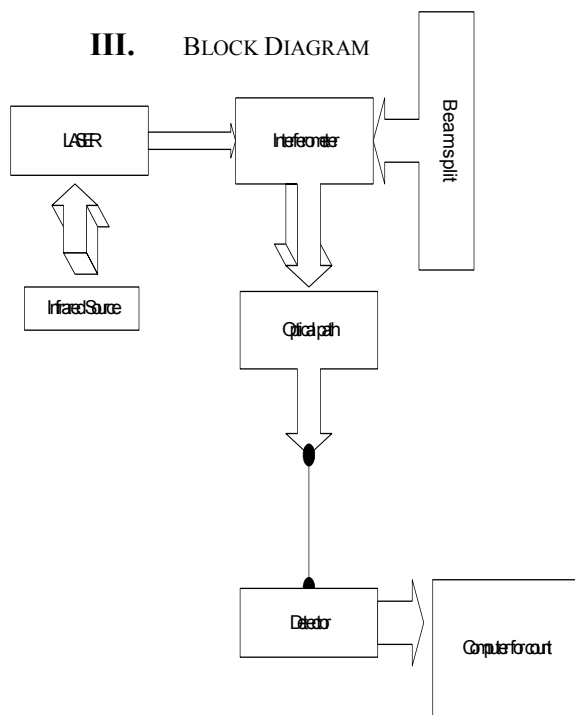I. It is mechanically simple with only one moving part.

III. BLOCK DIAGRAM

Fig. 3:- General working block diagram

IV. DESCRIPTION

At first when the source of infrared with the combination of LASER called INFRALAS, the beam light will reflect the path through the Mirror up to detector. We should know about the Infrared Spectroscopy. When the main door of any other way is designed with the detector sample (infralas), the INFRALAS will be capture in every second data. When some INFRALAS magnet passing through the way of door, then the detector of beam will captured the magnet and send it to the computer for collecting the data for future use. We have to send the noise detector with the optical path for reducing the noise for getting our required output to save the computer. Say, we have saved more and more data against one person. So we have to calculate the 1st and last input data. When we save those data to the computer then we can find out our attending rate in every day in any organization. So we can also find out the total rate of attendance in every one without manual received data..

V. THE SAMPLE ANALYSIS PROCESS:

The total processes for gathering the experiences on the techniques for sample handling and basic understanding using FT-IR spectrum.

A. The Source: Infrared energy is emitted from a radiant black-body source. This beam passes through a space which controls the amount of energy presented to the sample. The infrared energy is added with LASER light for strong use of data...Because of the infrared signal is a weak signal.[1]

B. The Interferometer: The beam enters the interferometer. The resulting interferogram signal then exits the interferometer.

C. The Sample: The beam enters the sample compartment where it is transmitted through or reflected off of the surface of the sample, depending on the type of analysis being expert. This is where specific frequencies of energy, which are uniquely characteristic of the sample, are absorbed.[2][i]

D. The Detector: The beam finally passes to the detector for final measurement. The detectors used are specially designed to measure the special interferogram signal.[1]

E. The Computer: The measured signal is digitized and sent to the computer where the Fourier Transformation takes place. The final infrared spectrum is then presented to the user for interpretation and any further manipulation.
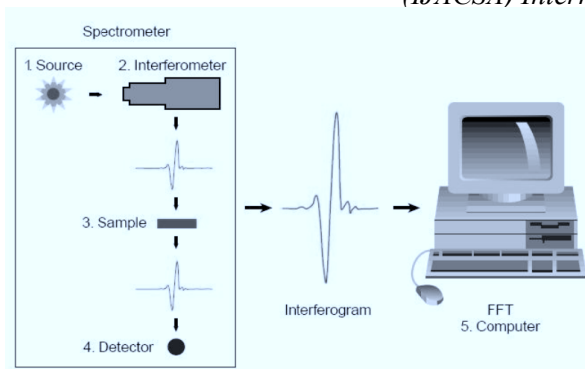
Fig. 4:- Diagram for processing control

Because there needs to be a relative scale for the absorption intensity, a background spectrum must also be measured. This is normally a measurement with no sample in the beam. This can be compared to the measurement with the sample in the beam to determine the "percent transmittance."

This technique results in a spectrum which has all of the instrumental characteristics removed.

Thus, all spectral features which are present are strictly due to the sample
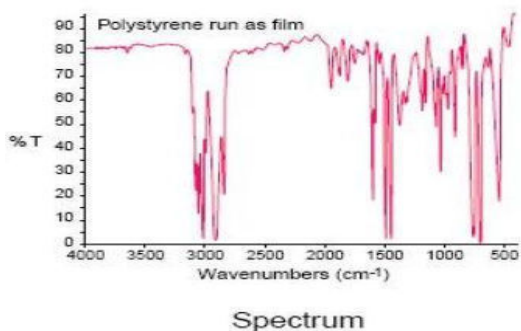

Fig. 5:- Wave shape for total stored data

VI.   CONCLUSION

For getting the output i.e., stored data, we have to face some problem for the sunlight. The infrared is not effective in the day light. So Infrared didn't send pure data for noise. So we have to use it in dark place i.e., indoor setup. For using indoor setup some of the major importances of FT-IR over the whole technique are speed, because all of the frequencies are measured simultaneously. The detectors employed are much more sensitive; the optical throughput is much higher which results in much lower noise levels. In FT-IR the moving mirror in the interferometer is the only continuously moving part in the instrument. Thus, there is very little possibility of mechanical breakdown. So we can say that the way to setup the infrared laser in the door detector is easy to calculate and measured the required input...

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A Novel and Efficient countermeasure against Power Analysis Attacks using Elliptic Curve Cryptography

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Abstract- **Recently, there is a leakage in the communication channel information by the cryptographic processors. It is the major chore to overcome the pouring out or spreading out of the secure data. In this paper, a new level of security analysis model is constructed in power analysis using Elliptic Curve Cryptography. And so many side channel attacks and their countermeasures are explained undeniably. An algorithm design based on power analysis is also described and it makes our countermeasure more secure against simple power analysis, differential power analysis and other attacks. The theoretical analysis based on these result has been shown and it represents how the algorithm design should fluctuate from the facade side channel attacks.**

Keywords-component Simple Power Analysis, Differential Power Analysis, Security Analysis Model, Algorithm design, Side Channel Attacks

I.   INTRODUCTION

Data are poured out by the cryptographic processors, as power consumption, electromagnetic emission and during the computing time of an encryption/decryption operation. These information leakages are known as side channel information. Side channel attacks are based on these side channel information.

In customary, cryptographic attacks are based on the cipher text, by choosing the accurate key for capturing the plain text, but now a days side channel attacks are focused in a different manner such as VLSI based on implementation of the cryptographic algorithm.

This paper gives a brief introduction about the side channel attacks and their countermeasures. Then, as the base of proposed basic security analysis model, the levels of analysis attacks are compared to security levels. Finally a brief case study of power analysis attacks and a special design based on countermeasure are explained clearly.

II.   ATTACKS

Normally attacks can be categorized as passive and active attacks. Based on the observation of side channel information the two attacks can be explained as follows. The passive attacks are used to gain the information on the particular event and receive all the information including key values and the power consumption of the key events. Active attacks make many changes and create an abnormal behavior and erroneous computation on results while tracing out the information from the particular event.

A.Fault Attacks

Fault attacks and agitate on electronic devices have been examined since 1970's in an aerospace industry. The first embedded cryptographic implementation has been finalized in 1997, when D.Boneh, R.Demillo and R.Lipton [18] published the first theoretical attacks. This attack is called bellcore attack. After the first theoretical attack, lenstra wrote new and short notes [23] to listen and know about the attacks.

The note has been supported to develop an improved version of the attacks. According to computation error, the bellcore researchers showed how to recover the secret prime factors p and q of modulo n from two different signatures for the single message. Again Lenstra showed only one fault signature is required where the message is also known. I.Biham and A. Shamir [6] were developed the first Different Fault Analysis (DFA) on symmetric algorithm applies to DES in 1997. These types of attacks are basic things to identify and design the products secure and at the same time it is essential to find the analysis based on these attacks.
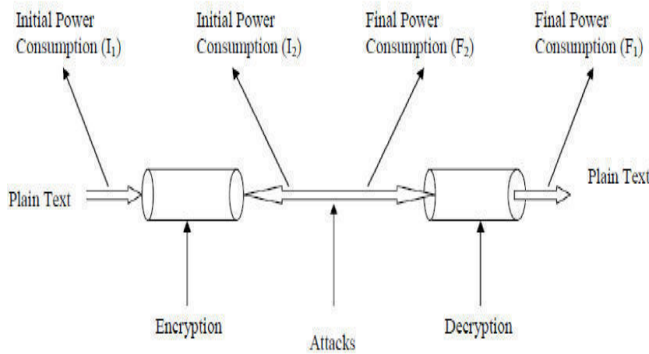
III.   ROLE OF POWER ANALYSIS

Figure 1. Role of Power Analysis

IV.   SIDE CHANNEL ATTACKS

The detection of an encryption key is mainly based on side channel signal; the signal -to-noise ratio (SNR) may significantly influence the key guess accuracy [7]. While some of the early side channel attacks targeted the hardware implementation, it also targets software implementation equally, if not more vulnerable. Early side channel attack techniques are based on analyzing the chip's functional characteristic for retrieving information. The side channel information is used to analyses the leakage of unintended information from an unprotected device while implementing the cryptographic algorithms.

V.   COUNTERMEASURES

Two general countermeasures are obfuscation and tamper-proofing. Obfuscation technique is used to conceal the meaning of certain computation by making it obscure and harder to understand .Code obfuscation [14, 21, and 22] has been proposed previously as a technique to limit side channel information leakage.

A. Nature of Obfuscation

It propose an algorithm consisting of so many line coding, each and every instructions coding can be executive depending on their input values [14]. The side channel information hack the instruction coding and fetch an unrelated coding to the particular hacked part .To solution for this problem is to create the code in which the different path of the execution path over different execution cycles takes different amount of time. This solution is used to avoid the fake instruction codes. Some of the techniques can be classified as follows.

1). Independent Data Performance

Each and every data is being proceeded independently to calculate the amount of time for performing the operation.

2). Blinding

This technique is stirred from blind signature [23]. It is the best method to prevent the electromagnetic side channel

attacks.

B.Tamper –Proofing

This technique is used to cover the data from the side channel attack. The main obstruct factor of building sensor nodes in tamper proof bodies is its cost. It is used to avoid the environmental factor attack, by increasing the overall performance of the data [1].The side channel attacks can be classified as Power analysis attack, electromagnetic attack, timing attack, fault analysis attack and traffic analysis attack [19].

VI.   POWER ANALYSIS ATTACKS

Power analysis attacks are inspired from side channel attacks. It is an implementation attack, depending on the physical aspects such as mathematical implementation and hardware implementation [2]. Normally the power analysis techniques try to solve the power based problems in different views, such as hardware design and interaction between instructions set process architecture. Kocher has been [3] introduced the concepts of power attacks in the examples of SPA and DPA

A. Simple Power Analysis Attack

It is a key technique to measure a single value to gain the secret key information of the device. It scans each and every cryptographic execution [15, 16]. Especially, it calculates or trace out the individual encryption/decryption operation's power consumption. Even if an algorithm is protected against SPA, it may be vulnerable to DPA.DPA is similar to SPA, but it consists of so many analysis techniques.

B. Differential Power Analysis Attack

DPA attacks can be classified as two modules namely data collection and statistical analysis phase.

1). Data Collection

Discrete power signals are the basis for a DPA attacks. The signal $P_{i,j}$ is the execution encryption algorithm for N different random input M_i The index i corresponds to the execution number of the algorithm and the index j to the execution time. [7]

2). Statistical Data Analysis

A key dependent partition function D is chosen for analyzing the statistical data. The function D is chosen such that it represents a specific bit x of an intermediate value of the algorithm which is directly dependent on a part of the message Ms and on a part of the secret key Kb. [7] x = D (Ms, Kb)

VII.   NOISE ANALYSIS ATTACK

The DPA attack is used to reduce the noise performance [10], but it is important to investigate other strategies leading to further reduction in the amount of noise. Noise can be classified as External, Internal, and Quantization.

A. External & Internal

External is generated by external source. Intrinsic is due to the random movement of charge carrier within conductions.

B. Quantization

Due to quantization the analog to digital conversion is used to sample the power analysis. The result presented in this paper confirms that power analysis attacks can be quite powerful and need to be addressed.

VIII.   FAULT ANALYSIS ATTACKS

An error occurs when a cryptographic device is in progress, this type of attack is called fault analysis attack. Errors are produced due to non-malicious agents such as hardware failures, software bugs and the external noise.

A malicious process, which has access to the physical device in reverse to Non- Malicious Agents. Non-malicious agents and the fault analysis attacks don't create any significant work. A malicious process is a process in which any data before computation will be verified thoroughly and errors are detected using error control techniques in internal memory [4, 5]. These types of precaution are used to avoid the fault analysis attacks.

A. EC Digital Signature Generation

Let p be a prime (or) a power of two and let E be an elliptic curve defined over Fp[20].Let A be a pint on E having prime order q.Such that the discrete logarithm problem in (A) is in infeasible.

Let P= {0,1} * A=Zq* X Zq*
And define k={(p,q,E,A,m,B); B=mA}

Where 0≤m≤ q-1, the values p,a,E,A and B are the public key and m is the private key for k=(p,a,E,A,m,B) and a random number k,1≤ k≤q-1 ,define
Sig k(x,k)=(r,s)
KA=(u,v)
R=u mod q
s=k-1 (SHA-1(x)+mr)mod q

Before entering the parameter, it is necessary to verify each and every signature generation parameters. For example p, a, E, A, m, B and the input parameter and input message are verified before entering through the computation. These types of precautions are used to avoid the fault analysis attacks[24].

IX.   ELECTROMAGNETIC ATTACKS

This type of attack is purely based on hardware generated emissions especially emission from modules of cryptographic algorithms. Electromagnetic attacks are more powerful than power analysis attacks. Similar to power analysis the electromagnetic attacks can be classified as Simple Electromagnetic Analysis (SEMA) and Differential Electromagnetic Analysis (DEMA).To trounce electromagnetic attacks is to use masking methods [11, 13]. Masking method is a scheme, which is an intermediate variable .It doesn't support dependent access of secret keys. The countermeasures are implemented by preventing or complicating the power analysis attacks. With tamper resistant body it can be achieved in so many ways.

A. Embedded the module in chip

These types of techniques built the modules in chip which increases the noise to the power consumption. This countermeasure is easily implemented but it is not efficient. It adds the manufacture cost of the device.

B. Obfuscation

Is a good solution to prevent SPA, but is susceptible to DPA

X.   TRAFFIC ANALYSIS ATTACK

Traffic analysis is purely based on network topological information. Hub plays a major role to activate the traffic analysis attack [17]. Hub is used to gather information and pre process them before relaying. This makes aggregator nodes an attractive target of side channel attacks. To identify the valid node through the high probability of occurrence during computation activates at a node.

XI.   TIMING ATTACK

This attack incorporates the variance in execution time at different levels in cryptosystem .It utilize the slow processors [18]. The slow processors will enhance even small difference in computation time over different levels. The countermeasures for the timing attacks, is to use more clock cycles for each and every execution independent level and doesn't affect the execution time.

XII.   POWER ANALYSIS ATTACKS- A CASE STUDY

A. Elliptic Curve Scalar Multiplication

An elliptic curve is a set of points P which denotes the solution for the cubic equation over a field [11]. These fields are called as finite fields. The finite fields can be classified as prime finite field and binary finite field.

In Elliptic Curve Cryptography, the secret key d is engaged in the scalar multiplication operation, where scalar multiplication is comprehend completely by recurring addition of the same point. If d is a positive integer and P is a point on an elliptic curve, the scalar multiplication dP is the result of adding d copies of P [12, 13]

$$dP = P+P+\ldots+P \underbrace{\qquad}_{d}$$

There are two implementations of scalar multiplication algorithm, namely Binary Method [14] shown in algorithm 1 and Montgomery method [9] shown in Algorithm 2. Scalar Multiplication (Binary Method)

Algorithm 1:
Input d= (dn-1………d0) (dn-1=1)
Q ←P
For i from n-2 to 0 to…
　　Q←2Q
If di=1 then Q←Q+P
Return (Q)
Out put dP

Scalar Multiplication (Montgomery Method)

Algorithm 2
Input d=(dn-1………d0) (dn-1=1)
Q([0] ← P.Q[1] ←2P
For i= n-2 to 0…..
Q[1-di] ←Q[0]+Q[1]
Q[di] ←2Q[di]
Return (Q[0])
Output dP

The scalar multiplication implementation contains both point addition and point doubling. The key d determines the procedure for doubling and addition operation. [9]

1). Binary Method

　　If key bit = 0, then it accepts and activates the point doubling operation If key bit = 1, then it accepts and activates the point addition operation

2).Montgomery Method

　　This method doesn't consider the key bit sizes [16]. Whatever the key size may be both the point doubling and point addition are executed. By measuring the power consumption during the ECC operation, the attackers can retrieve the secret key.

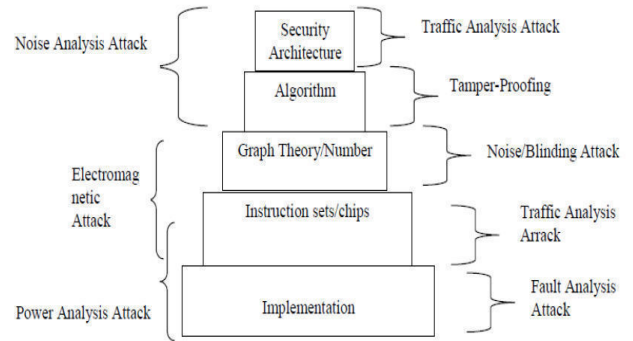## XIII.　BASIC SECURITY ANALYSIS MODEL

Figure 2.Basic Security Analysis Model

XIV.　CONCLUSION

　　In this paper, we have shown a new level of security analysis model and explained a case study for power analysis attacks based on algorithm design. The paper proposed a countermeasure for ECC against simple power analysis attacks, with balanced operation procedure for point doubling and addition during a scalar multiplication implementation. And this paper also suggests, what are the countermeasures are used to solve the design based power analysis attacks. The further study of the algorithm design and the side channel attack information will help to improve the level of security to implement hardware based designs.

ACKNOWLEDGEMENT

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Dynamic Path Restoration for New Call Blocking Versus Handoff Call Blocking In Hetrogeneous Network Using Buffers for QoS

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Abstract- **An Ad hoc network is a collection of wireless mobile nodes dynamically forming a temporary network without the use of any existing heterogeneous network infrastructure or centralized administration. Routing protocols used inside ad hoc networks must be prepared to automatically adjust to an environment that can vary between the extremes of high mobility with low band width, and low mobility with high bandwidth The tremendous growth of wireless networks demands the need to meet different multimedia (such as voice audio, video, data, etc) applications available over the network. This application demand and allocation could lead to congestion if the network has to maintain such high resources for the quality of service (QoS) requirements of the applications. In this paper, a new Protocol is proposed for wireless mobile heterogeneous networks are based on the use of. path information, traffic and bandwidth resource information at each node, for allocation of route path and Handoff problem. The proposed protocol uses two buffers one for new call and another buffer is use for   handoff calls if there is no channel available instead of dropping (rejecting) them it store in the buffer and when ever the channel is free it allocate for communication The protocol improved the performance of the network especially by the effect of the dynamic threshold of buffer size of new call buffer and handoff call buffer In the link failure situation we provide another path for the communication by applying a Restoration Mechanism for the survivability of link and improved the QoS of mobile network .**

Keywords: Handoff call, New call buffer, Congestion, Heterogeneous network, Quality of Service (QoS),

I.   INTRODUCTION

An ad hoc network is a collection of wireless mobile nodes dynamically forming a temporary network without the use of any existing network infrastructure or centralized administration. Ad-hoc networks are self-configuring and self-maintaining networks that allow dispensing of fixed infrastructures. The network relies on nodes cooperation for providing packet routing. Ad-hoc network technology presents a great potential in application domains where infrastructure deployment is expensive or not possible, like battlefield environments transportation or ambient intelligence scenarios [1][2][3]. Cornerstones of ad hoc networks are routing

protocols. These protocols are specifically designed to promote dissemination of routing information among network nodes. The goal is to allow the creation of communication links between any two network nodes and responsible for enabling network communications. While exchanging information, the nodes may continue to move from one place to another, so the network must be prepared to adapt continually [4][5][6]. The network infrastructure component such as repeaters, base-stations will frequently be either undesirable or not directly reachable, the nodes must be prepared to organize themselves into a network and establish routes among themselves without any outside support. In the simplest cases, the nodes may be able to communicate directly with each other.[7][8]. Future wireless networks will provide ubiquitous communication services to a large number of mobile users [9][10][11][12]. The design of such networks is based on a cellular architecture that allows efficient use of the limited available spectrum[13][14][15].

Cellular technology is designed to provide communication between two moving units, or between one mobile unit to one stationary unit. A service provider must be able to locate and track a caller, assign a channel to the caller, and transfer the channel to the call, and transfer channel from one base station to another base station as the caller moves out of cell range. Each base station is controlled by a mobile switching centre .The mobile switching centre coordinate communication between all the base station and the central office. The central office is a computerized centre that is responsible for connecting calls, recording calls information, and billing etc.

The cellular architecture consists of a backbone network with fixed base stations interconnected through a fixed network, and of mobile units that communicate with the base stations via wireless links. The geographic area within which mobile units can communicate with a particular base station is referred to a cell. Neighboring cells overlap with each other, thus ensuring continuity of communications when the users move from one cell to another. The mobile units communicate with each other, as well as with other networks, through the base stations and backbone network. A set of channels (frequencies) is allocated to each base station. Neighboring

cells have to use different channels in order to avoid intolerable interferences (we do not consider CDMA networks). Many dynamic channel allocation algorithms have been proposed [16][17][18]. These algorithms may improve the performances of the cellular networks. However the channel allocation is usually done in a static way. When a mobile user wants to communicate with another user or a base station, it must first obtain a channel from one of the base stations that hears it   if a channel is available, it is granted to the user. In the case that all the channels are busy, the new call is blocked. This kind of blocking is known as new call blocking and it refers to blocking of new calls .The procedure of moving from one cell to another, while a call is in progress, is called handoff. While performing hand off, the mobile user unit requests the base station of the cell that it moves into a new cell and will allocate it a channel. If no channel is available in the new cell, the handoff call is blocked. This kind of blocking is called handoff blocking and it refers to blocking of ongoing calls due to the mobility of the users.[19][20].

The Quality of Service (QoS) in cellular networks is mainly determined by these two quantities. The first determines the fraction of new calls that are blocked, while the second is closely related to the fraction of admitted calls that terminate prematurely due to dropout. A strong network backbone is needed to support high quality of service (QoS) without fully coordinated channel and network access is achievable. The wireless channel must be kept free from reaching the congestion point, since it will cause an overall channel quality to degrade and more loss rates to rise, leads to buffer drops and increased delays. Call admission control and network resource allocation are the key issues to determine the condition for accepting or rejecting a new call and handoff call based on the availability of sufficient network resources to guarantee the QoS parameters without affecting the existing calls. Call Admission Control basically deals with the acceptance and rejection of the incoming connection requests at the nearby Base Station Instead of blocking the calls immediately we proposed to use two buffers one for New calls and another for Handoff calls at each base station. The call requests are stored in the buffers until a specified time expires or the channel is made available to the call. Buffer Threshold deal with channel allocation. The Buffer Threshold depends on the rate at which the traffic enters the network. Giving higher priority to the handoff calls so as to keep the quality of service of handoff call .The Handoff calls will be provided with the channel first than the new calls. There may be a Link Failure In such situation we can provide another path for the communication to take place by applying a Restoration Mechanism for the survivability and connectivity of the channel for the communication. Here creating a new path from the node (Cell) after which the link is failure as virtual source and create a new path to the destination from this virtual source. This is called as Dynamic Path Restoration .Routing in Mobile Ad hoc Networks

The proposed model captures the differences between new call blocking and handoff blocking. Considering the

movements of users along an *arbitrary* topology of cells. Under appropriate statistical assumptions, the system can be modeled as a multi-dimensional continuous-time Markov chain. However, there are two asymptotic regimes, one for very slow mobile users and another for very fast mobile users. The proposed protocol also deals with the issue of reliable multicast to reduce the maintenance overhead increase the path stability, reducing the congestion in mobile ad-hoc network and efficient use of bandwidth.

The rest of the paper is organized as follows. The problem statement is given in section 2 .The proposed model and algorithm to solve the problem is given in section 3. The comparative results are discussed in section 4 Finally, conclusions and future work are discussed in Section 5 and 6 respectively.

II. PROBLEM STATEMENT

Cellular technology is designed to provide communication between two moving units, called as mobile units or between one mobile unit to one stationary unit called as land unit. The service provider must be able to locate and track a caller, assign a channel to the call, and transfer the channel to the call, and transfer channel from base station to another base station as the caller moves out of range. Each base station is controlled by a mobile switching centre .The mobile switching coordinate communication between all the base station and the central office. The central office is a computerized centre that is responsible for connecting calls, recording calls information When a call is started by a user first it goes to base station and assigned a   channel by base station to this call if available if not it will be rejected. Here starts a problem to maintain and manage the path and bandwidth allocation in term of channel. In cellular networks, blocking occurs when a base station has no free channel to allocate to a mobile user. There are two kinds of blocking, the first is called new call blocking and refers to blocking of new calls, the second is called handoff blocking and refers to blocking of ongoing calls due to the mobility of the users .The explicit analytic expressions for the two kinds of blocking probabilities in two asymptotic regimes, one for very slow mobile users and another for very fast mobile users, and show the fundamental differences between these blocking probabilities. An approximation is introduced in order to capture the system behavior for moderate mobility.

The approximation is based on the idea of isolating a set of cells and having a simplifying assumption regarding the handoff traffic into this set of cells, while keeping the exact behavior of the traffic between cells in the set. It is shown that a group of three cells is enough to capture the difference between the blocking probabilities of handoff call attempts and new call attempts. [8] A new scheme for the call handoff problem in mobile cellular networks is introduced for Efficiently solving the handoff problem is important for guaranteeing quality of service to already admitted calls in the network. The scheme is based on a new approach called channel carrying when a mobile user moves from one cell to another, under certain mobility conditions, the user is allowed

to carry its current channel information into the new cell. It proposes a new channel assignment scheme to ensure that this movement of channels will not lead to any extra co-channel interference or channel locking. The mobility of channels relies entirely on localized information, and no global coordination is required. Therefore, the scheme is simple and easy to implement it.[6]

The hybrid channel carrying scheme that allows to maximize performance under various constraints. The increasing demand for mobile services has generated worldwide interest in wireless communication networks. Coupled with this interest comes the consumer expectation that the wireless systems provide comparable quality of service to their wired counterparts. Studies have shown that one of the most important user concerns is that service is not be cut off during an ongoing call. It addresses this concern by proposing a new scheme to achieve efficient call handoffs in wireless cellular networks. The use of cellular systems has been a very popular means of enhancing the capacity of wireless communication networks. In such a system, the service area is divided into cells, and channels are reused among those cells. Here, a channel is referred to as the unit of wireless spectrum needed to serve a single user. For example, in a time-division multiplex /frequency-division multiplex access system, a time-slot, or carrier frequency can be considered as a channel. Channels that are used in one cell cannot be used in other cells that are closer than the minimum reuse distance. Handoff occurs when a mobile subscriber moves from one cell to another. A handoff call may be blocked if there is no free channel in the new cell. Since blocking a handoff call is less desirable than blocking a new call, septic schemes have been developed to prioritize handoff calls. Two prioritization schemes have been commonly studied in the literature are as follows.

1) Channel Reservation Scheme: A number of channels are reserved solely for the use of handoff, allowing both handoff and new calls to compete for the remaining channels Specifically, in each cell a threshold is set, and if the number of channels currently being used in the cell is below that threshold, both new and handoff calls are accepted. However, if the number of channels being used exceeds this threshold, an incoming new call is blocked and only handoff calls are admitted.

2) Queuing Scheme: A handoff requests are queued and may later be admitted into the network in case a channel frees up.

The above two schemes can also be integrated together to improve the handoff blocking probability and the overall channel utilization. The scheme propose in this paper is also readily integrated with the queuing schemes. The method for treating the handoff problem stems from the following simple idea. A user requesting a handoff always occupies a channel in its current cell. Therefore, if the channel could be carried into the new cell, the handoff request would not be blocked. When we say a channel is "carried" into a new cell, we mean that the mobile user continues to use this channel, but now communicates with the new base-station as the new cell.

Whenever a link failure occurs It deals with backup path restoration to continue the communication in the fixed part of the network. This scheme tries to automatically maintain the link for better QoS. The path restoration can be done in to following two ways   Static restoration and Dynamic restoration.

The Static restoration deals with allocation of the backup path at the time of the allocation of the channel to the call. If the link currently being used fails the backup path is utilized for communication to continue. The major problem with static scheme is that each communication uses an extra channels and this lead to poor throughput of the network.

To over come this wastage of the channel the Dynamic restoration is used .This deals with dynamic restoration of the link if the link failure occurs. Thus it avoid the double channel allocation at the time of the channel allocation for the call.

A. CALL ADMISSION CONTROL POLICY

There are several research work has been done based on call admission control and buffer management for different traffic classes in wireless networks. There are following policy that takes only local information in the admission decision process, and therefore will have a high call dropping probability. To reduce the call dropping probability, few CAC algorithms are considered having neighboring cells information However, these Algorithms only support users with fixed bandwidth requirements. Employed the concept of prioritization of handoff calls over new calls by using buffering technique since it is desirable to complete an ongoing call rather than accepting a new one .Developed a class-based admission policy that satisfies the QoS requirements for each traffic class by allocating adequate resources to each type. The Call Admission Control schemes in [21] and single buffer management were designed for the purpose of congestion control in the mobile network, little or no work has been carried out on their combined effects as a resource manager.[22] Hence, it does not explore all the possible benefits a well designed CAC scheme has to offer. Therefore, it would be worthwhile and beneficial to explore how different CAC schemes manage to improve the network utilization, and how well they can be combined with buffer. This could permit direct comparison and allow for the determination of the best scheme as well as presenting how buffer could provide even greater results.

B. HANDOFF CALL CONTROL POLICY

The Call Admission Control techniques Proposed uses only single buffer for handoff calls but for new calls there is no buffer [23][24][25]. This means that if no channel is available for the new call request it will be rejected without waiting for the channel to be allocated. In accordance the handoff call would be allocate channel if the channel is available otherwise it will be buffered. The channel to these handoff calls will be allocate at any time only if the following condition occurs.

- User completes the call
- The user moves to the another cell before the call is completed

It required to check all the time for all the calls (both new and handoff calls) that total channel available to is not less than the channel requirement of the incoming call requests.

The proposed scheme consider about new call blocking problem when a new call is introduced by base station it will be check for availability of channel if it is there then allocate it otherwise put into a buffer. This implementation provide a quality of service guarantee to both new and handoff calls and at the same time improve the performance of the network .If a link failure occurs in the network path, while a call is in progress, then the call gets terminated. This leads to low Quality of Service Restoration Mechanism is proposed for the survivability and connectivity of the channel for the communication. Here creating a new path from the node (Cell) after which the link is failure as virtual source and create a new path to the destination from this virtual source. This is called as Dynamic Path Restoration .Routing in Mobile Ad hoc Networks[26][27][28]

III.   3 PROPOSED MODEL OF HETEROGENEOUS NETWORK

The heterogeneous mobile Network has with available bandwidth B at each base station and number of mobile nodes be n and distance between heterogeneous Base station nodes is D and load at each Base station node be L.
The following figure shows the wireless network of five Heterogeneous Base Station nodes
B= Total Available nodes Bandwidth
n_i=Nodes Name (Base Station)
Q_i=Length of queue at Base Station node n_i
M_i=Total number of Mobile users at node n_i (Base Station).

Fig 1
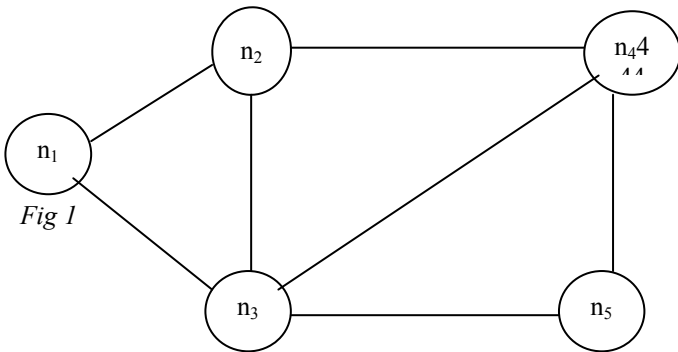
So in order to select path from n_1 to n_5
1. P_1:n_1-n_2-n_4–n_5, or
2. P_2:n_1-n_3-n_5, or
3. P_3:n_1-n_2-n_3-n_4-n_5, or
4. P_4:n_1-n_2-n_3-n_5, or
5. P_5:n_1-n_3-n_4-n_5, or
6. P_6:n_1-n_2-n_4-n_3–n_5

A.   BASE STATION PATH SELECTION CHARACTERISTIC

1. Distance of selected path is minimum or optimum.
2. Load in selected path is minimum or optimum and load at intermediate node is less than threshold of B.
3. Queue length at intermediate nodes of the path is minimum or optimal.

Distance is based on the number of hop counts .Queue Length is known to all the nodes, while transferring the queue length, the maximum of all queue length at intermediate nodes in path is stored only. As a node can transfer only one packet at time, thus the queue length can be used to estimate the available bandwidth, as we are not considering multiplexing of data at the nodes. Thus, the position of paths in bandwidth list will be similar to the position of path in queue length list.

B.   CONTROL PACKET DETAILS
The control packet has the following sections.

1)   CONSTRUCTION OF ROUTING TABLE

Whenever a mobile node enters in a wireless network it would broadcast a notification packet with fields as shown in fig. – 2

Node No.	Distance	Queue length	Flag (00)

Fig. – 2   Notification packet

Initially the distance field value is initialized to 1 and queue length is initialized to 0 and node number is calculated from the IP address and subnet mask. Arithmetic to calculate the node number is to apply AND operation on complement of subnet mask and IP address. Flag field is a 2-bit field and its set to 00 for notification packet. The receiving node, would match node no. of the received packet from their table, if it don't have this node no. registered in its table, it would add a row. An example of table construction is shown in Fig. – 3

2)   CONSTRUCTION OF PATH
Now when a nodes get a packet to transmit to some other node then it calculate the node number of the destination node, if it has entry of this node in its routing table then it would simply send packet to it otherwise it would broadcast the route request(RREQ) packet(Fig. – 4) with unique sequence no., its node no. as the sender and route source node no. the flag is set as 01 for RREQ. The node receiving RREQ would then check its table for destination node, if it has entry then it sends the route reply packet (RREP) (Fig. – 5) packet with its sequence no. as that of RREQ packet, it's node number in the path field, distance increased by one from the value in its routing table in the distance field, it's queue length in the queue length field

and flag as 10 to the sender node number of RREQ packet, and then multicast the RREQ packet with changed sequence no and its node no. as sender node no. to all the nodes in its routing table except of sender node no. and destination node no and save this information of original sequence no., modified sequence no. sender node no. and route source node no. in its memory. Even if the node receiving RREQ does not have the entry of destination node in its routing table then also it would multicast it to other node, in its table, except for sender node, route source node number and destination node no in the same manner as described before.
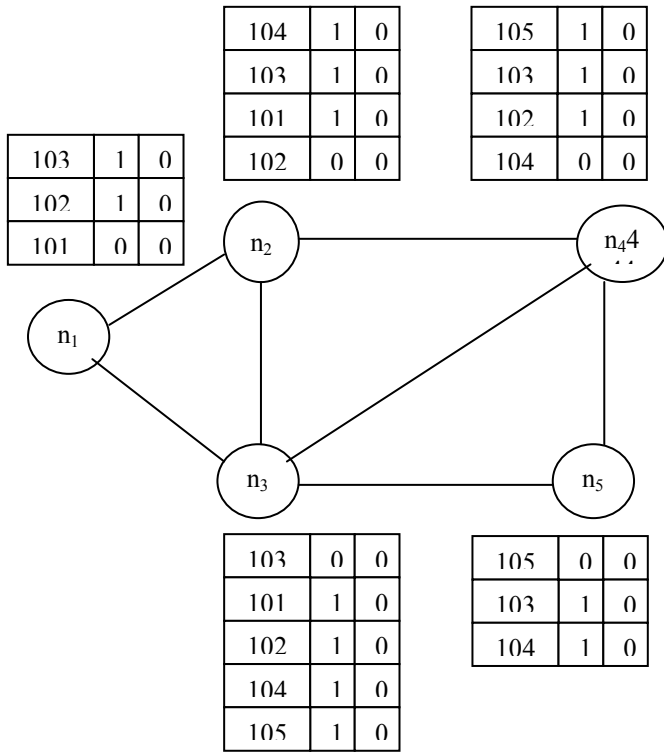
Sequence No.	Sender Node No.	Route Source Node No.	Destination Node No.	Flag (01)

Fig. – 4 Route Request Packet (RREQ)

Sequence No.	Path data	Route Source Node No.	Destination Node No.	Distance	Queue Length	Flag (10)

Fig. – 5 Route Reply Packet (RREP)

Path data	Destination Node No.	Route Source Node No.	Data	Flag (11)

Fig. – 6   Message Packet

Fig. – 3 Construction of Routing Table
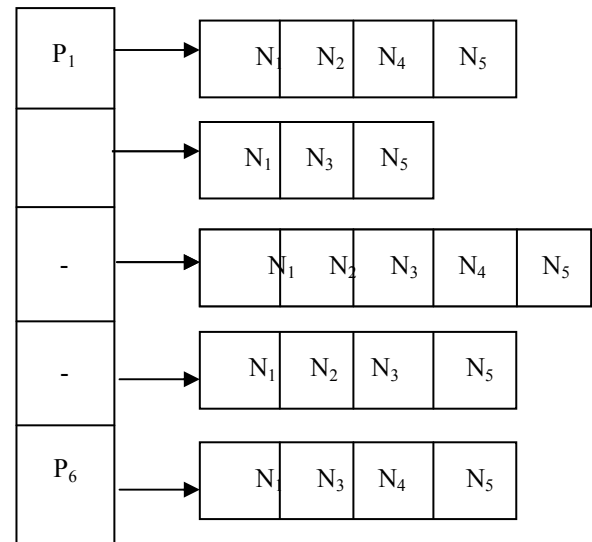
Fig. – 7 Path list at the Route Source Node

The node receiving route reply packet checks to see if it itself is route source node number. If it is not the route source node no. then it would match the sequence no. and route source node no. in its memory to retrieve the original sequence no. and sender node no. and it sends the route   reply packet to the sender node no. with sequence no. as retrieved   sequence no. and append its own node no. to the path data field and queue field value is set either to value of queue length field of received RREP packet or the its queue length value from the routing table depending upon whichever is maximum

The route source node on receiving any of the, RREP packet will save it in its path list as shown in Fig. – 7

3)   ALGORITHM FOR MAINTENANCE OF ROUTES

Input : Routing Table: RTable [] [], MessagePacket :M[],

Destination Node No. : D_node , Boolean variable Flag=0

1. Start
2. Len=Length[M]
3. If ((M [Len – 2] = = 1) AND (M [Len – 1] = = 1))/*Message packet received*/
4. For I = 0 to Length [RTable]

5.   If (RTable [i] [0] = = D_node)

6.   Transmit M to D_node

7.   Flag = 1

8.   Break

9.   End If

10. End For

11. If (! Flag)

12.   Broadcast RREQ packet with field values as   Seq (Sequence NO.) = System generated no.
        S_No.(Sender node_no.) = self node no.
       Rs No. (Route Source Node no.) = Self Node
         D_no. (Destination Node No.) = D_node
                F (Flag) = 0 1

13. End If

14. If ((M [Len – 2] = = 0) AND (M [Len – 1] = = 1)))/*Route request packet received*/

15. For I = 0 to Length [RTable]

16.   If (RTable [i] [0] = = D_node)

17. Send RREP to S_No. with Field   values
         Seq (Sequence No) = RREQ.Seq
         Pd (Path Data) = stack implementation (with self node no on top)
         Rs No. (Route Source Node no.) = RREQ.Rs No.
          D_no. (Destination Node No.) = RREQ . DNo.
           D (Distance) = RTable [i] [1] +1
           Q_Len (Queue Length) = RTable [i] [2]
                F (Flag) = 1 0

18.   Flag = 1

19.   Break

20.   End If

21. End For

22. If (! Flag)

23. Multicast RREQ packet to all except for sender node no , route source node no and destination node no with field values
        Seq (Sequence NO.) = System generated no.
        S_No.(Sender node_no.) = self node no.
       Rs No. (Route Source Node no.) = Self Node
         D_no. (Destination Node No.) = D_node
                F (Flag) = 0 1

24. Make an entry in system database with field values
     New_Seq = Seq in step 23
     Old_Seq = RREQ.Seq
     RS_No. = RREQ.RS_No.
     D_No. = RREQ.D>No.
     Sender = RREQ.SNo.

25. End If

26. If ((M [Len – 2] = = 1) AND (M [Len – 1] = = 0)) /*Route reply packet received*/

27. If (RREP.RS_No. = = Node_No.)

28. Add Path data of RREP to the path Linked List at the node.

29.   Else

30. Insert its node no. in path data of RREP

31. If (RREP.Q_Len < RTable[0][2])

32. RREP.Q_Len=RTable[0][2]

33. End If

34. Retrieve sender node no. and Sequence number from database by RREP.Seq, RREP.S_no.

35. RREP.Seq=Sequence no. of step 33

36. Send RREP to sender node of sep 33

37. End If

38. End If

39. Stop.

4)   *ALGORITHM FOR SELECTION OF   PATH*

Consider all the following paths condition

i)   Arrange all the possible paths in ascending order of queue length, load and distance, considering only paths which has load lower than   threshold.

ii)   Take the sum of position of the path in the three lists and finally select the path with lowest sum.

iii)   In case if minimum sum of position in the three lists calculated in step (ii) is more than once then the following preference order is used to break the tie for selecting an optimal path.

Queue Length > Load > Distance of path

The queue length (Bandwidth Concept) of each node in the fig-1 is as follows

$Q_1=10$, $Q_2=12$, $Q_3=15$, $Q_4=9$, $Q_5=5$

Thus the queue length and distance of paths are shown in table-1 as details of Paths.

Distance	Path	Queue Length
3	$P_1:n_1-n_2-n_4\_n_5$	10
2	$P_2:n_1-n_3-n_5$	15
4	$P_3:n_1-n_2\_n_3\_n_4\_$	15
3	$P_4:n_1-n_2-n_3-n_5$	15
3	P5:n1-n3-n4-n5	15
4	P6:n1-n2-n4-n3-n5	15

Table 1

Arranging the paths in ascending order with respect to Distance, load and queue length as follows in the table with their position

Position	Distance	Load	Queue Length
1	P2	P1	P1
2	P1	P2	P2
3	P4	P3	P3
4	P3	P4	P4
5	P5	P5	P5
6	P6	P6	P6

Table 2

The sum of position of path in the three lists (distance, load and queue length)

For p_1: (2+1+1) =4
For p_2: (1+2+2) =5
For p_3: (4+3+3) =10
For p_4: (3+4+4) =11
For p_5: (5+5+5) =15
For p_6: (6+6+6) =18

From above calculation it is clear that the sum of position of path P_1 in the three lists is minimum hence path P_1 is selected.

C. DESIGN SPACE AND PROPOSED ALGORITHM FOR HANDOFF/NEW CALL

The proposed scheme considers a multiple class of calls (multimedia system) that differ in their QoS requirements and traffic parameters, allowing for call transitions among classes. The model is structured over users moving along an arbitrary topology of cells. Each cell has the same number of channels, due to the fact that wireless network resources are limited, which give service to classes of call request that is assumed to be generated according to a Poisson distribution with an exponential call holding time, during call establishment, a call is assumed to declare its priority. The call processing entities of the system are the processing elements of the Base station, different Base Station Controller are able to identify the call type at any moment. The available resources are maximum number of channels in a cell and the buffer size that is used to queue handoff call in case no channel is available. The buffer size could be adjusted depending on the input traffic rate. The proposed model is as follows .It is clear from the figure -8 that there are two buffers one for the handoff calls and other for the new calls. If channel is not available then the calls will be buffered into their corresponding buffers and as soon as the channel is available it is allocated to the calls .The calls buffered in to the buffers are allowed to wait for a specified period of time after which it will be time the channel is made available to the calls then it will get the channel allocated.[29]

We use the proposed algorithm to get shortest path for communication to occur with minimum delay. The following system performance parameters are used for congestion control.

1. New call blocking probability,
2. Handoff blocking probability,
3. Call holding time , and
4. Buffer size.

To get effective deployment of congestion controlled a relationship among these parameters is established. A threshold value is used to deal with channel allocation to the new and handoff calls. This threshold depends on the traffic in the network
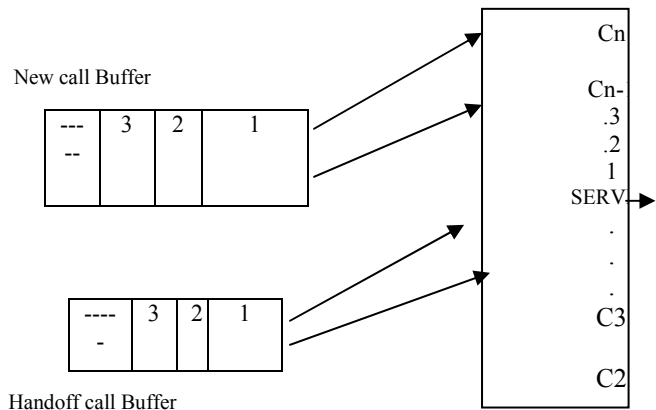

Fig-8

For example generally a customer waits in a queue with other customers awaiting service, but it is possible for the seller to provide higher priority to certain, presumably higher spending customers. Computational resources could be done in the same manner. Handoff call would be buffered if no free channel is available rather than rejecting them. This would be allocated to channel any time either user completes the call / the user moves to another cell before the call is completed. We are using a new call buffer and handoff buffer for providing a better QoS and for better channel utilization. The new call is allowed to wait accordingly its dwell time .As soon as the dwell time expires the call is rejected. However, the handoff will be allocated channel first depends on the priority attached to it. The policy makes us determine whether delay sensitive handoff should be buffered, or allowed to be initiated again based on its dwelling time. The algorithm is as follows

ALGORITHM FOR NEW CALL / HANDOFF CALL

If (incoming request is new call or handoff call) then
If (there is a free channel) then
      Allocate the free channel
      /* Channel allocation to all the calls either it is new call or handoff call, if channel is available*/
Else
If (handoff call or newcall) then
If (handoffcall) then
        put in handoff_ buffer
         /*buffering   the handoff calls*/

```
Endif
If(newcall) then
        put in newcall_buffer
        /*buffering          the          new          calls*/
Endif
Endif
If (there is free channel again and newcall_priority<threshold)
then
        allocate        the        free        channel        to
        handoff call
        /*channel allocation to handoff calls*/
        Increment newcall_priority
Else if(there is free channel  and newcall_priority>= threshold)
then
        Allocate the free channel to new call
        /*channel allocation to new calls*/
Else
        Ignore request
Endif
Endif
        Ignore request
Endif
End.
```

D.   DYNAMIC LINK   RESTORATION   TECHNIQUE

Dealing with link failure in the cell of the network we proposed the Dynamic Link Restoration technique. This technique is restoring the link failure dynamically during the call is in progress. Link restoration establishes a new route only between the end nodes of the failed link while still using the rest of the links in the old path. The Dynamic link restoration technique dynamically restores the failed link and provides the transparent protection to the end nodes of the failed link. In this way the link is going to be dynamically maintained without the knowledge of the users that is all this process is done transparent to the users. While link restoration there might be the situation that no channel is available in the neighborhood of the node after which the link has failed or the node before which the link has failed. In such situation the call will get terminated. But the probability of occurrence such condition is very less. [30]

IV.   SIMULATION RESULTS

In our simulation, a flat heterogeneous network is assumed as clusters. For unicast, before a mobile user node sends a unicast packet, it sets RTS (Request-to- Send) flags of its neighbors and the intended receiver sets CTS (Clear-to-Send) flags of its neighbors. Nodes whose RTS or CTS flag is set cannot transmit data, except the sender. When the sender finishes sending the data, RTS/CTS flags are cleared by the nodes which originally set those flags. Similar scheme is used in multicasting .The node wants to send a multicast packet sets RTS flags of its neighbors, and each intended receiver sets CTS flags of its neighbors. The broadcast uses flooding,

technique and only RTS flags are set by the sending node, and CTS flags are not set by any node. Therefore, in broadcast, collision may occur. However, collisions are ignored in our simulation. The simulated network area is a N x N meter square, and M mobile nodes are roaming randomly in all directions at a predefined speed in this area. Each Base station node has two finite buffers, and new call and handoff call packets are lost when buffer overflow occurs. New call and Handoff call control packets have higher priority over data packets in our simulations1. Propagation delay is assumed to be negligible, and it is assumed that packets always arrive without any bit error. Extensive simulation results obtained by varying several network parameters and workload configuration. The values of the network parameters used in simulations are those specified in the IEEE 802.11. In this scenario we evaluate the performance improvement in terms of throughput ie. call completed in a densely populated network. Specifically, we consider a network of 5 to 40 Base Stations with 20 to 80 mobile user at each base station nodes with an increasing number of neighbors from 5 to 40 Base Station. Each node has a traffic flow with infinite demands towards one of its neighbors. In Fig. 9 to Fig. 16. We show the some of throughput of all traffic flows, with available Channels Bandwidth.
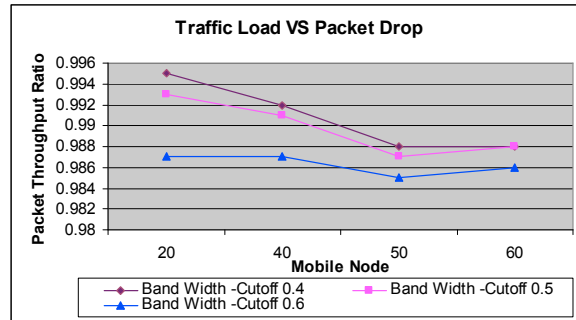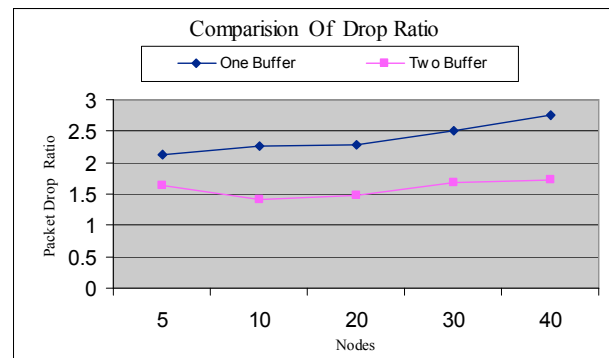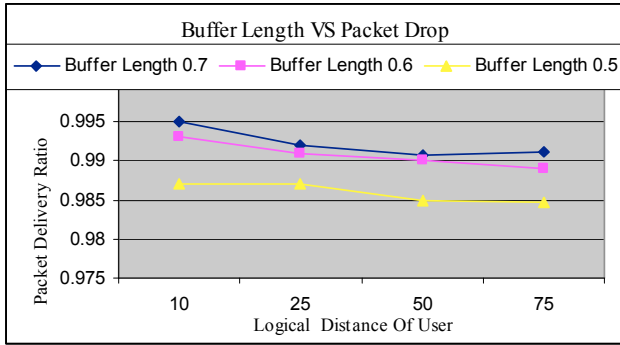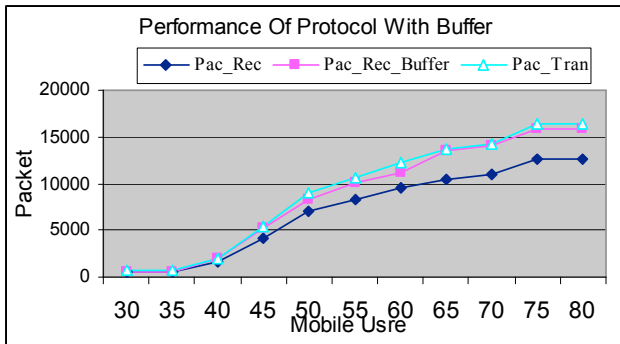

Fig-9

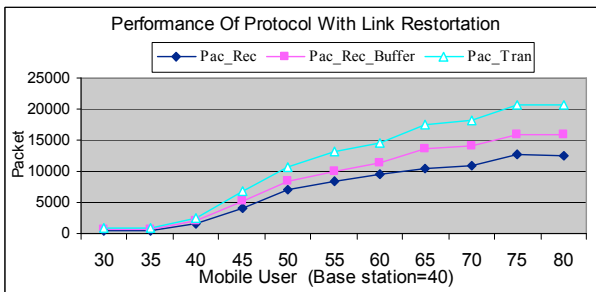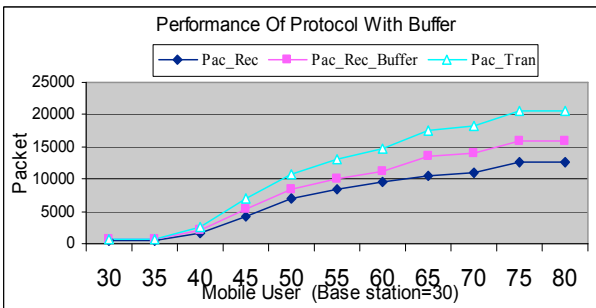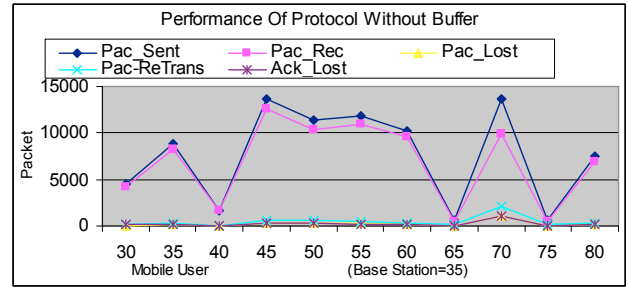
Fig-10

Fig-11

Fig-12

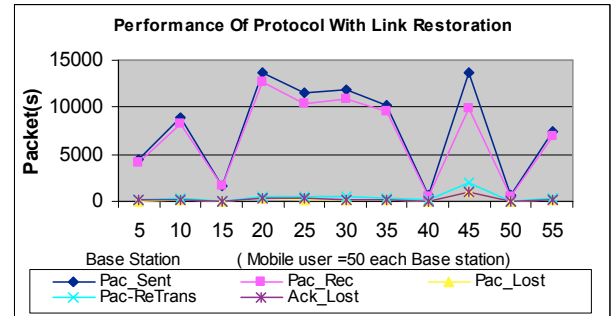Fig-13

Fig-14

Fig-15

Fig-16

V. CONCLUSION

The proposed Protocol for wireless mobile heterogeneous networks for measuring the performance of call admission control for new call blocking, handoff call blocking, call holding time and buffer size are improved. It mostly selects the optimal path for transmission of packets from source to destination in heterogeneous networks. The Protocol reduce handoff call blocking probability and new call blocking probabilities by using two buffers, one for new call and another buffer is use for handoff calls if there is no channel available instead of dropping it store in the buffer and when the channel is free it allocate for communication The effect of the dynamic threshold of buffer size of new call buffer and handoff call buffer and dynamic link restoration technique is improved the performance of the heterogeneous networks.

VI. FUTURE SCOPE

In future there can be further evaluation of our scheme by using more realistic mobility of nodes in the simulation. We believe the advantage of providing traffic information will be significant in those environments.

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PATTERN BASED SUBSPACE CLUSTERING: A REVIEW

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Abstract- **The task of biclustering or subspace clustering is a data mining technique that allows simultaneous clustering of rows and columns of a matrix. Though the definition of similarity varies from one biclustering model to another, in most of these models the concept of similarity is often based on such metrics as Manhattan distance, Euclidean distance or other L_p distances. In other words, similar objects must have close values in at least a set of dimensions. Pattern-based clustering is important in many applications, such as DNA micro-array data analysis, automatic recommendation systems and target marketing systems. However, pattern-based clustering in large databases is challenging. On the one hand, there can be a huge number of clusters and many of them can be redundant and thus makes the pattern-based clustering ineffective. On the other hand, the previous proposed methods may not be efficient or scalable in mining large databases. The objective of this paper is to perform a comparative study of all subspace clustering algorithms in terms of efficiency, accuracy and time complexity.**

Keywords: *Subspace clustering; Biclustering; p-cluster; z-cluster*

I. INTRODUCTION

Some recent researches [7] indicate that pattern based clustering is useful in many applications. In general, given a set of data objects, a subset of objects form a pattern based clusters if these objects follow a similar pattern in a subset of dimensions. Comparing to the conventional clustering, pattern-based clustering is a more general model and has two distinct features. On the one hand, it does not require a globally defined similarity measure. Different clusters can follow different patterns on different subsets of dimensions.

On the other hand, the clusters are not necessary exclusive. That is, an object can appear in more than one cluster. The generality and flexibility of pattern-based clustering may provide interesting and important insights in some applications where conventional clustering methods may meet difficulties. Much active research has been devoted to various issues in clustering, such as scalability, the curse of high-dimensionality, etc. However, clustering in high dimensional spaces is often problematic. Theoretical

results [1] have questioned the meaning of closest matching in high dimensional spaces. Recent research work [2, 3] has focused on discovering clusters embedded in subspaces of a high dimensional data set. This problem is known as subspace clustering. In this paper, we explore a more general type of subspace clustering which uses pattern similarity to measure the distance between two objects.
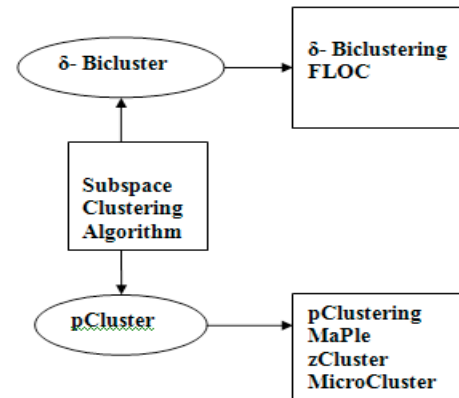
Figure 1: Subspace Clustering Methods

A. GOAL OF PAPER

In this paper we present a comparative study of all the subspace clustering algorithms present along with the method of how these algorithms are described. Our aim is just to chalk out the better subspace clustering algorithm in terms of accuracy, efficiency and time consumed.

B. PAPER LAYOUT

Section I gives the introductory concepts of subspace clustering, Section II, we present the abstracted view of the entire subspace clustering algorithm. We have also made a comparative discussion regarding the issues in each algorithm and to depict which is better. Section III gives the conclusion and the future work.

II. ALGORITHMS

Most clustering models, including those used in subspace clustering, define similarity among different objects by distances over either all or only a subset of the dimensions. Some well-known distance functions include Euclidean distance, Manhattan distance, and cosine distance. However, distance functions are not always adequate in capturing correlations among the objects. In fact, strong correlations may still exist among a set of objects, even if they are far apart from each other as measured by the distance functions. Some well-known subspace clustering algorithms are based on the main categories of approximate answers and complete answers.

A. δ -BICLUSTERING

In case of pattern based clustering major of grouping in objects shows similar patterns. Here we are considering the attribute values for which we have to go through the detailed features of objects. Hence the result we obtain is more accurate. In case of a data matrix clustering can be in the direction of a row or column. Simultaneous clustering of row and column of a matrix is called bi-clustering. Bi-clustering algorithms generate bi-clusters which is nothing but the similar behavior of a subset of rows across a subset of columns and vice versa. If some objects are similar in several dimensions (a subspace), they will be clustered together in that subspace. This is very useful, especially for clustering in a high dimensional space where often only some dimensions are meaningful for some subsets of objects.

Cheng et al. introduced the bi-cluster concept [3] as a measure of the coherence of the genes and conditions in a sub matrix of a DNA array. A sub matrix A_{IJ} is called a δ bi-cluster if $H(I, J)$ for some. Let X is the set of genes and Y the set of conditions. Let $I \subseteq X$ and $J \subseteq Y$ be subset of genes and conditions, respectively. The pair (I, J) specifies a sub matrix A_{IJ}. $H(I, J)$ is the mean squared residue score. Mean squared residue is the variance of the set of all elements in the bi-cluster plus mean row variance and the mean column variance.

$$H(I, J) = \frac{1}{|I||J|} \sum_{i \in I, j \in J} (d_{ij} - d_{iJ} - d_{Ij} + d_{IJ})^2$$

Where

d_{ij} = data value at row i and column j

d_{iJ} = mean of the ith row in the sub matrix

d_{Ij} = mean of the jth row in the sub matrix

d_{IJ} = mean of all elements in the sub matrix

A sub matrix A_{IJ} is called a δ-bi-cluster if $H(I, J) \leq \delta$ (where δ > 0 is user defined some threshold value)

Yang et al. [5] proposed a move-based algorithm to find biclusters more efficiently. It starts from a random set of seeds (initial clusters) and iteratively improves the clustering quality. It avoids the cluster overlapping problem as multiple clusters are found simultaneously. However, it still has the outlier problem, and it requires the number of clusters as an input parameter.

There are several limitations of this work like the means squared residue used in [4, 5] is an averaged measurement of the coherence for a set of objects. But the most undesirable property is that a sub matrix of a δ bi-cluster is not necessarily a δ bi-cluster which creates a lot of difficulty in designing efficient algorithms.

If we set δ=2, the bi-cluster shown in Figure 2, contains an obvious outlier but it still has a fairly small mean squared residue (4.238).If we get rid of such outliers by reducing the δ threshold, it will exclude many bi-clusters which do exhibit similar patterns.
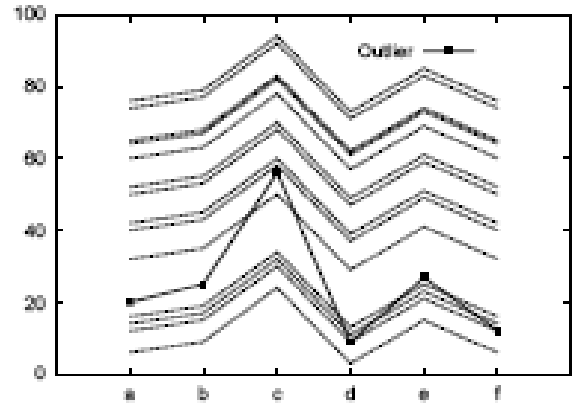

Figure 2: Data set with Residue 4.238

The below figure 3 shows mean square residue can not exclude outliers in a δ- bi-cluster.
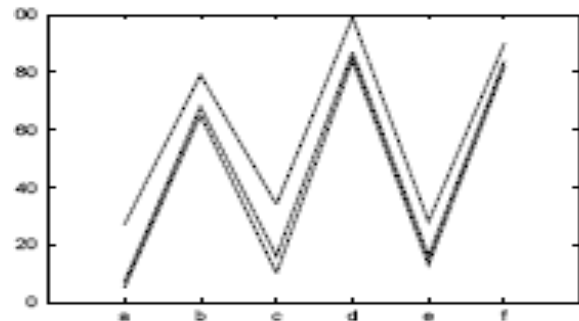

Figure 3: Data set with Residue 5.722

B. p-CLUSTERING

Unlike the bi-clustering algorithm and the δ-clusters algorithm the pCluster algorithm simultaneously detects

multiple clusters that satisfy the user-specified δ threshold. Under the pCluster model it has been proposed that, two objects are similar if they exhibit a coherent pattern (patterns that are related) on a subset of dimensions. Moreover, since the pCluster algorithm provides the complete answer, they will not miss any qualified subspace clusters, while random algorithms, e.g., the biclustering algorithm and the δ-clusters algorithm provide only an approximate answer.

Wang et al. proposed a clustering model, namely the pCluster, to capture not only the closeness of objects, but also the similarity of the patterns exhibited by the objects. We are generally interested in objects that exhibit a coherent pattern on a subset of attributes of *A*.

Let *D* be a set of objects, A be a set of attributes in D, (*O*, *T*) be a sub matrix where $O \subseteq D$ and $T \subseteq A$. If $x, y \in O$ and $a, b \in T$, then pScore of the 2×2 matrix is:

$$pScore\left(\begin{bmatrix} d_{xa} & d_{xb} \\ d_{ya} & d_{yb} \end{bmatrix}\right) = \left|(d_{xa} - d_{xb}) - (d_{ya} - d_{yb})\right|$$

Again ,if pScore of the 2×2 matrix $\leq \delta$ for some $\delta \geq 0$ is said to form δ-p-Cluster. Where as, in a bi-cluster model a sub matrix of a δ-bi-cluster is not necessarily a δ – bi-cluster. However one important property of pCluster is anti – monotonicity which says that if (*O*, *T*) be a δ-pCluster then any of its sub matrix, (*O'*, *T'*) is also a δ-pCluster. Hence, from the definition we can infer that pCluster is symmetric. However, since a pCluster requires that every 2 objects and every 2 attributes conform to the inequality, it models clusters that are more homogeneous.

Basically, p-Cluster algorithms are a little bit slow but are very efficient and accurate for clinical purpose etc. It also mines the cluster simultaneously. The bi-cluster algorithm, on the other hand, finds clusters one by one, and the discovery of one cluster might obstruct the discovery of other clusters. This is time consuming and the cluster they find depend on the order of their search. Also, the pCluster model gives us many opportunities of pruning, that is, it enables us to remove many objects and columns in a candidate cluster before it is merged with other clusters to form clusters in higher dimensions.

The entire p-Cluster algorithm is achieved in three steps. They are mainly:

a) *Pair-Wise Clustering:* Based on the maximal dimension set Principle we find the largest (column) clusters for every two objects, and the largest (object) clusters for every two columns. Clusters that span a larger number of columns (objects) are usually of more interest, and finding larger clusters interest also enables us to avoid generating clusters which are part of other clusters.

b) *Pruning Unfruitful Pair-Wise Clusters*: Not every column (object) cluster found in pair wise clustering will occur in the final p-Clusters. To reduce the combinatorial cost in clustering, we remove as many pair-wise clusters as early as possible by using the Pruning Principle.

c) *Forming δ- p-Cluster:* In this step, we combine pruned pair-wise clusters to form p-Clusters.

C. z-CLUSTERING

Yoon et al[9] proposed the z-Cluster algorithm based on the pCluster model that exploits the zero-suppressed binary decision diagrams (ZBDDs) data structure to cope with the computational challenges. The ZBDDs have been used widely in other domains, namely, the computer-aided design of very large-scale integration (VLSI) digital circuits, and can be useful in solving many practical instances of intractable problems. The zCluster algorithm exploits this property of ZBDDs, and can find all the subspace clusters that satisfy specific input conditions without exhaustive enumeration. In order to generate MDSs, zCluster uses an approach similar to that used in the pCluster algorithm. The zCluster algorithm differs in the remaining steps after constructing the prefix tree used in pCluster. The zCluster algorithm efficiently utilizes ZBDDs [9] in the remaining steps. This ZBDD-based representation is crucial to keeping the entire algorithm computationally manageable set of condition-pair MDSs can be regarded as a set of combinations and represented compactly by the ZBDDs. Therefore, the symbolic representation using ZBDDs is more compact than the traditional data structures for sets. Moreover, the manipulation of condition-pair MDSs, such as union and intersection, is implicitly performed on ZBDDs, thus resulting in high efficiency.

Although the pCluster algorithm [6] and the zCluster algorithm [8] provide the complete answer, they contain some time-consuming steps. First, the pCluster algorithm and the zCluster algorithm equally use the clusters containing only two genes or two conditions to construct larger clusters having more genes and conditions, which are called gene-pair and condition-pair MDSs. However, this step of measuring the difference of each gene-pair on the conditions of a DNA microarray is really time consuming, since the number of genes in the real life microarray is usually very large. Thus, the time complexity of constructing the gene-pair MDSs is much higher than the time complexity of constructing the condition-pair MDSs in those previous proposed clustering algorithms. Also, the pCluster algorithm [5] proposes a prefix tree structure using the depth-first algorithm to mine the final subspace clusters. The zCluster algorithm [10] contains the similar step of mining. However, this step is the bottleneck of the mining. For each node, the pCluster algorithm has to examine the possible combinations of genes on the conditions registered in the path. The algorithm distributes the gene information

in each node to other nodes which represent subsets of the condition set along the path of this node. This distributing operation is the major cause that the pCluster algorithm may not be efficient or scalable for large databases.

D. MaPle

MaPle enumerates all the maximal pClusters systematically. It guarantees both the completeness and the non-redundancy of the search, i.e., every maximal pCluster will be found, and each combination of attributes and objects will be tested at most once. For each subset of attributes D, MaPle finds the maximal subsets of objects R such that (R,D) is δ- pCluster. If (R,D) is not a sub-cluster of another pCluster (R' ,D) such that R⊆R', then (R, D) is a maximal δ- pCluster. There can be a huge number of combinations of attributes. MaPle progressively refines the search step by step. Moreover, MaPle also prunes searches that are unpromising to find maximal pClusters. It detects the attributes and objects that can be used to assemble a larger pCluster from the current pCluster. If MaPle finds that the current subsets of attributes and objects as well as all possible attributes and objects together turn out to be a sub cluster of a pCluster having been found before, then the recursive searches rooted at the current node are pruned, since it cannot lead to a maximal pCluster.

Comparing to p-Clustering, MaPle has several advantages. First, in one of the step of p-Clustering, for each node in the prefix tree, the combinations of the objects registered in the node will be explored to find pClusters. This can be expensive if there are many objects in a node. In MaPle, the information of pClusters is inherited from the "parent node" in the depth-first search and the possible combinations of objects can be reduced substantially. Moreover, once a subset of attributes D is determined hopeless for pClusters, the searches of any superset of D will be pruned. Second, MaPle prunes non-maximal pClusters. Many unpromising searches can be pruned in their early stages. Third, new pruning techniques are adopted in the computing and pruning MDSs. That also speeds up the mining.

E. FLOC

The FLOC method also follows the δ-bi-cluster model. Its move-based algorithm, FLOC [6] which can efficiently and accurately approximate the _k δ clusters with the lowest average residue. The FLOC algorithm starts from a set of seeds (initial clusters) and carries out an iterative process to improve the overall quality of the clustering. At each iteration, each row and column is moved among clusters to produce a better clustering in terms of a lower average residue [7]. The best clustering obtained during each iteration will serve as the initial clustering for the next iteration. The algorithm terminates when the current iteration fails to improve the overall clustering quality.

III. CONCLUSION

Out of all the algorithms, pCluster Model captures the closeness of objects and pattern similarity among the objects in subsets of dimensions. It is found that it discovers all the qualified pClusters. The depth-first clustering algorithm avoids generating clusters which are part of other clusters. This is more efficient than other current algorithms. It is resilient to outliers. Our future work would be to hybridize pCluster model with any soft computing technique.

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Real-time Facial Emotion Detection using Support Vector Machines

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Abstract—There have been continuous researches in the field of emotion detection through faces of biological species in the last few decades. This was further fuelled by the rise of artificial intelligence which has added a new paradigm to its ongoing research. This paper discusses the role of one of the artificial intelligence techniques, Support vector machines for efficient emotion detection. This study comprised of experiments conducted on Java platform by using libsvm. The coordinates of vital points of a face have been used for training the SVM network which finally led to proper identification of various emotions appearing on a human face.

Keywords- **Emotion-Detection;Facial-expressions; libsvm; Support Vector Machines; Facial action coding system(FACS)**

I. Introduction

Human face is one of the most important source for knowing a person's behavior, personality and cognitive state. They are the perfect keys to unlock an individual's identity. Various researchers have tried to define emotion as a person's reflection. Keith Oatley and Jennifer M. Jenkins [1] said about the definition of the emotion as following:

1)An emotion is usually caused by a person consciously or unconsciously evaluating an event as relevant to a concern (a goal) that is important; the emotion is felt as positive when a concern is advanced and negative when a concern is impeded. 2) The core of an emotion is readiness to act and the prompting of plans; an emotion gives priority for one or a few kinds of action to which it gives a sense of urgency – so it can interrupt, or compete with, alternative mental processes or actions. Different types of readiness create different outline relation-ships with other. An emotion is usually experienced as a distinctive type of mental state, sometimes accompanied or followed by bodily changes, expressions, actions. Knowing about other's emotion greatly affects our interpersonal communication providing important communicative cues such as our level of interest, our desire to take a speaking turn and continuous feedback signaling understanding of the information conveyed [3]. Facial expression constitutes 55 percent of the effect of a communicated message [9] and is hence a major modality in human communication. The literature of expression analysis system classifies emotions

through two main schemas. Ekman [2] proposed the first, which is also the most widely used schema. This schema says that are six 'basic' emotions, namely anger, disgust, fear, joy, sorrow and surprise, from which more complex combinations can be constructed and which are easily identified (by humans) in facial expressions. FACS, Facial action coding system is the other one, which is more accurate and precise but complex [4]. Here every expression is coded as a combination of 44 facial movements called 'action units'. It is followed by decomposition of every expression into individual action units by FACS experts. [5]. An automatic FACS system is still a distant dream. Because of this limitation most of the emotion detection system uses the first schema of basic emotions.

In this study we have also used the first schema for facial emotion detection that uses an artificial intelligence technique, support vector machines. SVMs view the classification problem as a quadratic optimization problem. This technique has successfully been applied to standard classification tasks, such as text classification [6, 7] and medical diagnosis [8]. The user manually marks the most vital points on the face of an image which acts as an input the SVM's for its training. After training, once we apply an image as an input, it efficiently recognizes the underlying emotion. The remainder of this paper is organized as follows: next section gives an overview of the SVM's and its role as an emotion detection tool, which will be followed by discussion of libsvm. Then we outline the overall design of our approach to emotion detection. And finally we conclude with future work and conclusion.

II. Overview

The overall project can be divided into four major components a)Importing an image and processing it so as to provide it as an input to SVM b) Incorporating SVM into the application c) Train SVM d) Present the results of the classification output by the SVM in a meaningful manner to the user.

While for the first two issues we have used LIBSVM toolkit, the latter two are application specific. The description of LIBSVM tool would be discussed in coming section
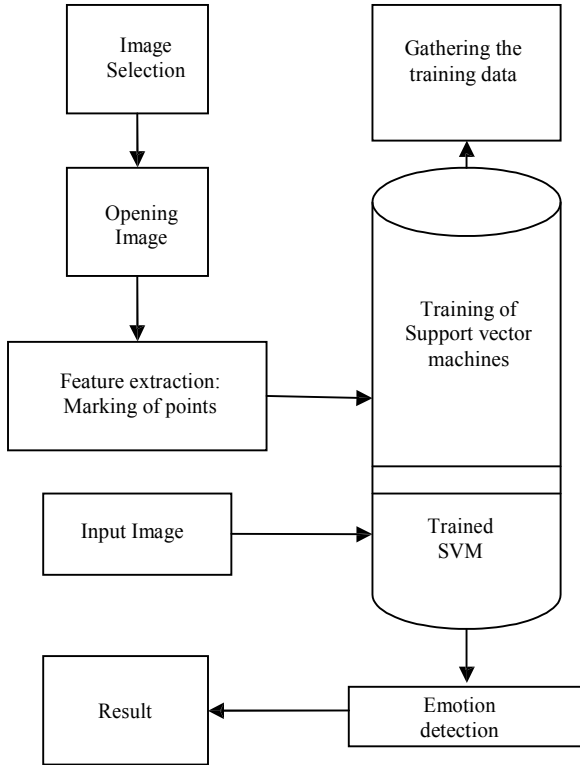
Figure 1.   Emotion detection using SVM

For detecting emotion of images Pantic & Rothkrantz [10] defined three core problems- a) Face detection in an image or image sequence, b) Facial expression data extraction and c) Facial expression classification. For still images, it is assumed that the images are of faces. This solves the face detection problem. If the images have other body parts included, then we may crop the face from the image. Facial expression data extraction can be achieved by making an application work in a manner similar to that of FaceTracker[5]. Here we take the image of a face and ask the user to mark 22 features of face. User needs to manually mark these features and then the coordinates of these features are stored for further analysis. Data extraction is done by SVM while for classifying expression we have used Ekman approach, which states that there are six 'basic' emotions, namely anger, disgust, fear, joy, sorrow and surprise, from which more complex combinations can be constructed.

III. LIBSVM

Implementing SVM can be a tedious job; thankfully there are freely available softwares whose goal is to help users to easily use SVM as a tool. LIBSVM is integrated software for support vector classification, (C-SVC, nu-SVC), regression (epsilon-SVR, nu-SVR) and distribution estimation (one-class SVM). It supports multi-class classification. LIBSVM provides a simple interface where users can easily link it with their own programs. The current release (Version 2.85, November 2007) of LIBSVM is available. The package

includes the source code of the library in C++ and Java, and a simple program for scaling training data.

IV. Support Vector Machines

During the training phase of machine learning algorithms, a model from the received input is build. And finally it provides a hypothesis function that can be used to predict result for the further input data. There has been a great increase in the use of SVM's for high performance pattern classification.

V. Simulation results

In this section we demonstrate the working of the proposed facial emotion detection tool for two basic emotions which can be further extended to other 6 basic emotions. This tool has been constructed on the java platform using various predefined functions of java Swing. The tool starts with the below given applet:

Figure 2.   Start-applet of the Emotion detection using SVM tool

This applet provides the following options to users: New Class, Load, Train, Predict, Clear and Save with their corresponding meanings. 'New Class' means loading a new emotion for training the SVM as shown below

This same is repeated for the different classes available for the above mentioned six emotions (anger, disgust, fear, sorrow and surprise).
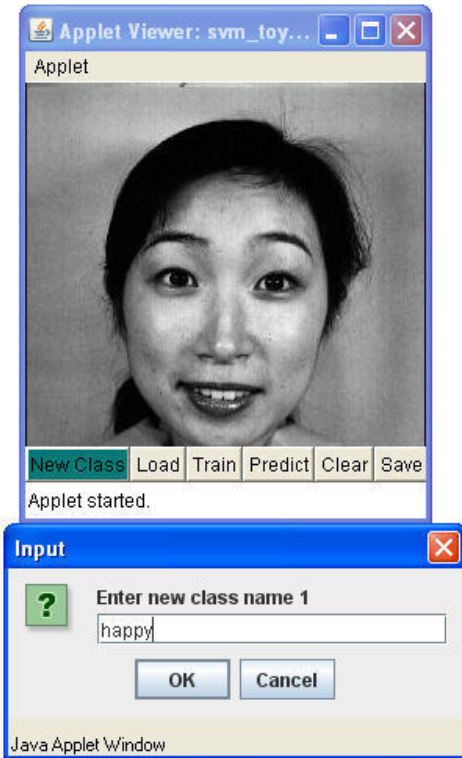

Figure 3.   Test image for the Facial Expression of a 'Happy' face(JAFFE Database[11])

This is followed by manual marking of the various vital points on the face with the tool.
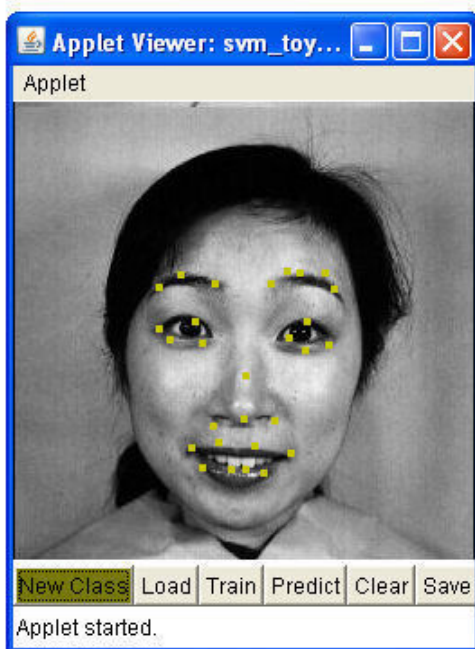

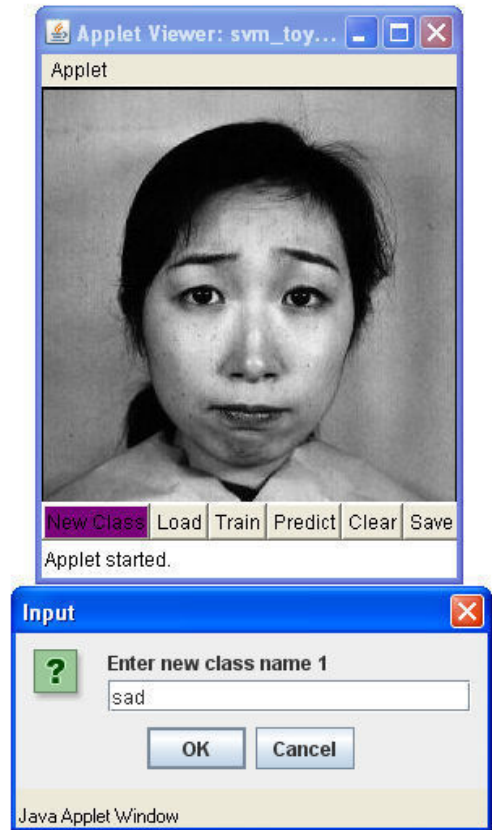Figure 4.   Vital co-ordinates marked on a 'Happy' face[11]

Figure 5.   Test image for the Facial Expression of a 'Sad' face(JAFFE Database[11])
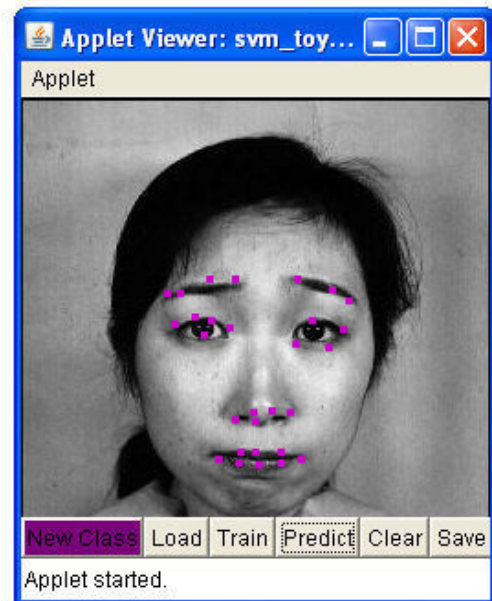

Figure 6.   Vital co-ordibates marked on a 'Sad' face[11]

After this the SVM is trained by pressing the 'Train' button of the applet. This process leads to the formation of hyper planes as shown in figure.
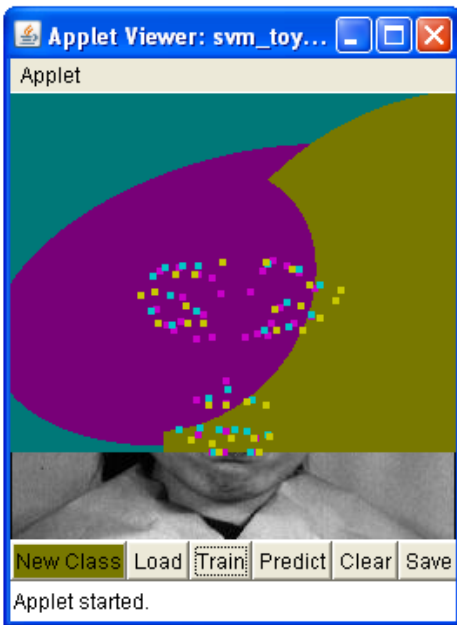

Figure 7.   Formation of hyper-planes when the SVM is 'Trained'[11]

Once it gets trained, our network is ready for emotion detection. Now as soon as we gave an image as an input and pressed the 'Predict' button, it gave the correct prediction about the emotion of the image.

The experiment carried out by us in the initial phases. Further tests are being carried out to find the accuracy of our proposed emotion detection tool.

VI. Conclusion

We have presented some progressing experiments for classifying emotional facial gestures using still images. We have used SVM classifiers. Its test results have proved to be acceptable. We have worked on our image database by manually extracting the prominent facial features from the image and henceforth training the SVM's for classification of each emotion. Since the direct transition between certain states of the face may happen rather rarely, thus information retrieved from more than one immediately succeeding frames of video sequences can increase on the accuracy. It will be the next step in our research work.

VII. Future Work

The possible extensions that can be made to the application are that it can be made to work with a greater number of and more complex emotion categories. Could for instance train the SVM with 'happy, sad, angry, and surprised' and then query it with a new sample belonging to one of these four categories (multi-class classification). This is more difficult than binary classification. Moreover there is also room for experimenting with different versions of Support Vector Machines. There are various optimizations of the basic SVM, suited for different applications. Evaluating and comparing the performance of different versions can be tried. Moreover, analysis results produced here can be made compatible with emotion animation modeling, so that it will be simple enough to include or combine the developed system into Human Computer Interaction applications, where a user can interact with an emotionally responding e-buddy or virtual character. It is expected that the results can further be worked upon by incorporating the inputs from a 2D image data into a full-fledged 3D model of the face.

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On-line Rotation Invariant Estimation and Recognition

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Abstract— Rotation invariant estimation is an important and computationally difficult process in the real-time human computer interaction. Our new methodologies propose here for on-line image rotation angle estimation, correction and feature extractions based on line integrals. We reveal that a set of projection data of line integrals from single (fan-arc and fan-beam) or multi point sources (Radon transform) are employed for orientation estimation. After estimating orientation, image angle variations are altered to its principal direction. We further combine Boltzmann machine and k-mean clustering to obtain parameter optimized Gabor filters, which are used to extract non-redundant compact set of features for classification. The proposed method of fan-line, fan-arc and Radon transform are compared for real-time image orientation detection. Accuracy of classification is evaluated with the classifiers viz., back propagation, Hamming neural network, Euclidean-norm distance, and k-nearest neighbors. Experiment on a database of 535 images consisting of license plate and iris images. The viability of suggested algorithms has been tested with different classifiers. Thus, this paper proposes an efficient rotation invariant recognition for on-line images recognition.

Keywords- Feature extraction; Line integrals; Orientation-detection; Optimized Gabor filters; Rotation-invariant recognition; Radon transform.

I. INTRODUCTION

In computer vision applications invariant recognition is an important process for on-line recognition of objects with different orientations. However due to its complexities of different factors the research in this area is confined. Let us discuss some of the problems in the real-time estimations, for example, due to factors such as variation in capturing angle or scanning the documents, the same classes of patterns are falsely recognized as the other classes of patterns. In addition, they produce more false positives in the recognition for the same types of samples. Moreover, in the document analysis, users have to scan the document for the recognition; they have to store the image of a book or check at an exact orientation in spite of its placement in the scanner. In addition, license plate recognition [1][2][3] requires rotation correction because of various factors such as road conditions (up/down/turning) changes in angle of imaging, variation in illuminations, (e.g., daytime, twilight and raining) place of capturing (e.g., diverse

background) and position of license plate present in the vehicles (e.g. below or above of the radiator cover). In order to improve the performance, an automatic recognition system needs a technique, which extracts the same kind of features for the identical patterns from diverging angle of capturing. We describe a technique to estimate the rotation angle of the image using single or multi point projection such as fan-line (FL), fan-arc (FA) or Radon (RD) transform. Normally, projection data of single and multi sources are used for reconstructing distorted images [4]. But in this paper, we utilize the standard deviation of projection data of diverging angle of the images to calculate the maximum peak of the rotation. This is treated as an angle of orientation for the real-time image. Then, images have been corrected to its principal direction at   by using bi-cubic interpolation. In the feature extraction, redundant responses of Gabor filter will be collected together and clustered into a set of filters. This approach gives better response in the application domain with a compact set of features rather than the responses of filter bank approach. We optimize four parameters of Gabor filters according to its responses, which are based on the Boltzmann machine and k-mean clustering. The extracted features are trained and tested by the classifiers.

In the current literature, some techniques have been suggested for estimating rotation angle of the captured images. In [5], the binary patterns were defined for circular symmetric neighborhood sets to project the orientation of texture. Local binary patterns, gray-level and auto-correlation features were used to estimate orientation of the texture patterns. It projected the angles that are locally invariant to rotation [6]. In [7], texture rotation-invariant achieved by autoregressive models used several circles neighborhood points to project the rotation angle of the object. In [8], image rotation was detected by Bayesian learning framework. It used spatial color moments as the features for classification. This small codebook was extracted from a learning vector quantization. A hidden Markov model and multichannel sub-band were used for estimating rotation angles of gray level images [9]. A fusion of Radon transform and Fourier transform has been performed for digital watermarking, which is invariant to the rotation, scale and translation [10]. A parallel algorithm for fast Radon transform and its inverse were proposed by Mitra et al [11].

Radon transform was employed for estimating angle of rotated texture by Kourosh et al [12]. Image object recognition based Radon transform was proposed by Jun Zhang et al. [13], the results of this method were robust in rotation, scale and translation invariant of image object. In the context of inclined license plates, license characters were also extracted in distorted manner. Thus, a hypothesis was formed according to the rotation alignments of the plates. Therefore, various inclined templates for different kinds of angles (from $-50°$ to $+50°$) were preserved for making rotation invariant character recognition [14]. We propose a technique for orientation detection, which is based on projection features of fan-beam, and Radon transforms. Parameter optimized Gabor filters are used to extract features from the rotation invariance image.

The remainder of the paper is organized as follows: Section II emphasizes on rotation estimation and correction of the objects using single and multi point sources. Extraction and classification of rotation invariant object by using parameter optimized Gabor filter and common classifiers are discussed in section III. Experimental results of the proposed algorithm on applying to the real-time vehicles' number plate images and check images are illustrated in section IV. Concluding remarks of this paper are given in the section V.

II. ROTATION-INVARIANCE USING LINE INTEGRALS

A vector is a quantity including both magnitude and direction, such as force, velocity, displacement and acceleration. In vector algebra, two vectors A and B are equal, if two vectors have the same direction and magnitude regardless of the position of their initial points (A=B). The ordinary integrals of vectors can be defined by

$$R(u) = R_1(u)i + R_2(u)j \, , \tag{1}$$

where $R_1(u), R_2(u)$ are specified intervals and u is a single scalar variables. Eq. (2) represents an indefinite integral of R(u).

$$\int R(u)du = i\int R_1(u)du + j\int R_2(u)du \, . \tag{2}$$

Let $r(u) = x(u)i + y(u)j$ where r(u) is the position vector of (x,y) and defines a curve C joining points P_1 and P_2, where $u = u_1$ and $u = u_2$, respectively [14]. Assume that C is balanced of a finite number of curves. For each of its curve position, vector R(u) has a continuous derivative. Let $F(x,y) = F_1 i + F_2 j$ be a vector function defined for the position. It is continuous along C. Line integral of F along C from P_1 to P_2 is defined as

$$\int_{p_1}^{p_2} F \bullet dr = \int_C F \bullet dr = \int_C F_1 dx + F_2 dy \tag{3}$$

In 2D plane, a force can be defined by a vector whose magnitude is strength of the force and direction is the path in which the force is pushed. Fig. 1 shows that force is from left to right, an object moves under the control of force and its motion is represented by the vector (S). However, force is not constant one, at different points the force may peak in different directions with strength. In accordance with these basic studies, a projection of a 2D function f(x,y) is a set of line integrals, from which data can be produced by radiating from single and multiple sources. These two sources are employed to estimate the rotation angle of the objects.
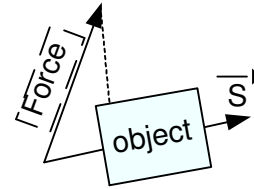

Fig. 1 Representation of force and motion in line integrals.

A 2D rotation is applied to an object by repositioning it along a circular path. A rotation angle (θ) and pivot point about which the object to be rotated are specified for generating rotation. In counterclockwise, positive angle values are used for rotation about the pivot point and in contrast clockwise rotation requires negative angle values. The rotation transformation is also described as a rotation about an axis that is perpendicular to the xy plane and passes through the pivot point. The rotation transformation equations are determined from position (x_1, y_1) to position (x_2, y_2) through an angle (B) relative to the coordinate origin. The original displacement of the point from the x-axis is (A). This is illustrated in Fig.2.
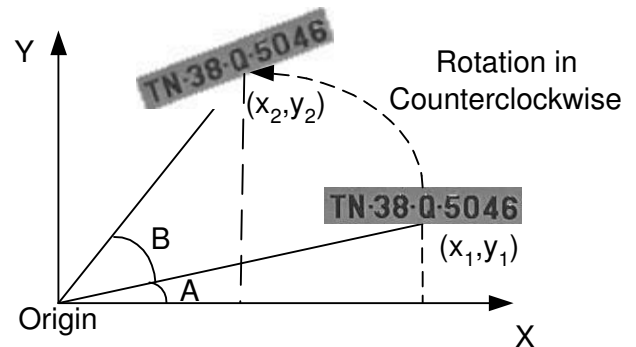

Fig. 2 Rotation of LP in counterclockwise with double angles (A, B).

The rotation can be obtained as

$$\sin(A) = y_1 / r \, ,$$

$$\sin(A + B) = y_2 / r \, ,$$

$$\cos(A + B) = x_2 / r \text{ and } \cos(A) = x_1 / r \, , \tag{4}$$

$$y_2 = x_1 \sin(B) + y_1 \cos(B) \, , \tag{5}$$

$$x_2 = x_1 \cos(B) - y_1 \sin(B) \, , \tag{6}$$

With the basics of rotation transformation and line integrals, we can introduce new ray sampling coordinates x' and y' and Jacobian (J) is described as

$$J = \left| \frac{\partial(x',y')}{\partial(x,y)} \right| = \frac{\partial x'}{\partial x} \cdot \frac{\partial y'}{\partial y} - \frac{\partial y'}{\partial y} \cdot \frac{\partial x'}{\partial y}. \qquad (7)$$

The fan beam projection with Radon's integral is defined as

$$f_b(r,\phi) = \frac{1}{4\pi^2} \int_0^{2\pi} \int_{-\infty}^{\infty} (-1/(d - r\cos(\theta - \phi))) J(x',y') dx' dy', \qquad (8)$$

where $f_b(r,\phi)$ is the density at the point with polar coordinates (r,ϕ) in the region, while $(d - r\cos(\theta - \phi))$ is the perpendicular distance between the ray and this point.

A. Fan Beam Arc and Line

In this phase, projection of an image can be computed along any angle (θ). It computes the line integrals along paths that radiate from a single source. To represent an image, it performs multiple projections of the image from different angles by rotating the source around the centre of the image. Fig. 3 shows a single point source at a specified angle. This is a fan beam projection and computes the projection data as sinogram. A sinogram is an x-ray procedure that is done with contrast media to visualize any abnormal opening such as sinus in the body of the image. In the fan-beam calculation, the centre of rotation is the centre of the image and defined as

$$\lfloor size(f(x,y) + 1)/2 \rfloor, \qquad (9)$$

where size(.) returns size of the rotated image f(x,y) and its lower precision value is taken for centre of rotation calculation. D is the distance in pixels from the single source point to the centre of rotation. It must be large enough to ensure that the single source point is outside the image at entire rotation angles, which is ranged from $0°$ to $359°$. The distance (D) should be larger than half the image diagonal dimension. This is described as

$$D = \sqrt{width(f(x,y))^2 + height(f(x,y))^2}. \qquad (10)$$

After applying the fan beam projection the resultant data contains row and column of sinogram from the image f(x,y). The row data contains the number of sensor points by calculating how many beams are needed to wrap the entire image for any rotation angle. The number of column of fan data is determined by incrementing the fan rotation. It may be one degree and fan data can have 360 columns. In order to estimate the angle sensor either line-based sensor or an arc-based sensor can be used. The estimations of these two sensors are analyzed. Fan beam can be controlled by various parameters such as rotation increment, sensor geometry and sensor spacing. The rotation increment has a positive real scalar, measured in degrees, sensor geometry defines either line sensors or arc sensors and sensor spacing is used to define the spacing of the fan beam projections. If sensor geometry is

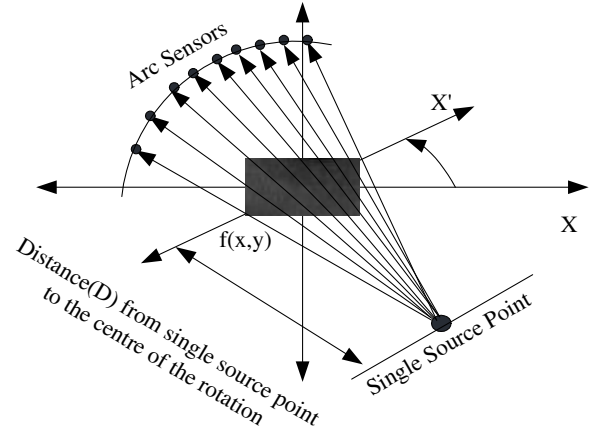'arc' then sensor spacing has the angular spacing in degrees else linear spacing in pixel.

Fig. 3 Rotation estimation of segmented iris image by using arc-based sensors.

The algorithm of single source projection to estimate the angle of rotated image is as follows:

Step 1: The input image is rotated to a specific angle such as 90° in counterclockwise. Rotation of the image is performed using bi-cubic interpolation method.

Step 2: Specify the parameters such as distance parameter (D), rotation increment, sensor geometry and sensor spacing. In the experimentation, the rotation angles equally change from $0°$ to $359°$, D=274.8545, rotation increment = 0.1 and sensor spacing = 0.25. These values produced robust results in the estimation. The parameters of sensor geometry have not provided different estimation in all aspects. But due to sampling and numeric approximations, angle estimation may slightly be varied.

Step 3: After performing fan beam projection, fan beam projection data have been extracted from the image. In the experimentation, 92*259-size image was given and resultant fan projection data size were 1113*180. It means that fan projection provides 1113 sensors and $180°$ rotation angles. The number of sensors is determined by the fan sensor spacing. However, these size variations depend on the size of the segmented ROI of the acquired image.

Step 4: The standard deviation of fan projection data is computed to estimate the local maximum deviation of sensor data. This data set is used to calculate the maximum rotation angle of the given image that is taken as an estimated angle of the rotated image.

Step 5: The estimated angle (Φ) is used to correct the rotated image to its principal direction, which is carried out by bi-cubic interpolation method, i.e., if Φ is positive and less than 90° then clockwise correction is -($\Phi + 90°$) otherwise if Φ is negative and greater than 90° then clockwise correction is -($\Phi - 90°$).

Fig. 4 shows the step of estimation process. It illustrates the plot for estimating maximum standard deviation of 9° for the input of LP image. It also shows that prediction of angle after 90° is 99° which inferences rotation angle can also be estimated in every 90° rotation in projection of the image from single source point.
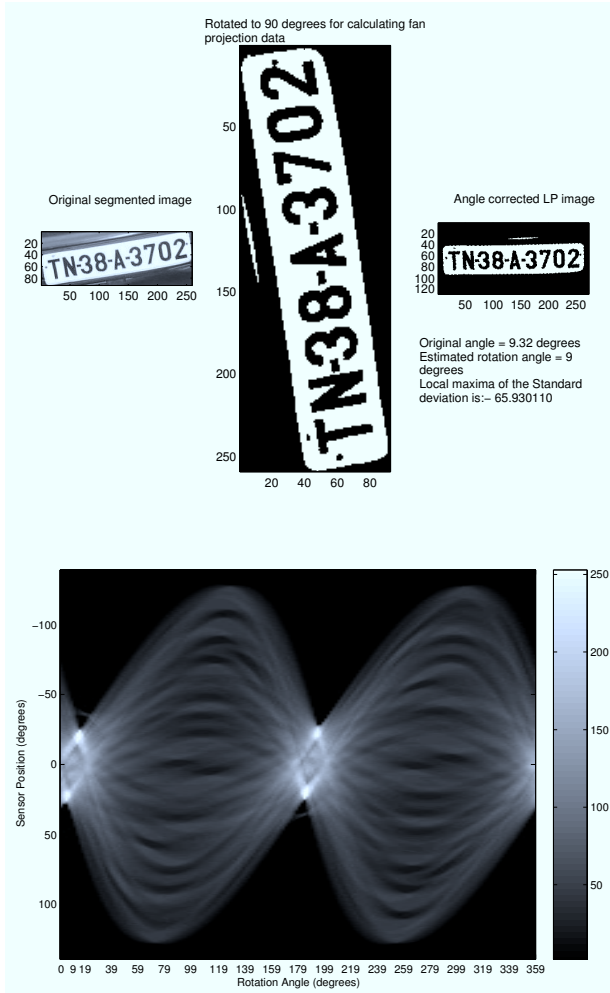

Fig. 4 Illustration of rotation correction process based on fan beam projection.

B. Estimation using Radon Transform

The basic property of Radon transform is to determine an internal constitution of an object without bodily snooping the interior structure. For this reason, It is adopted to tomography, x-ray, ultrasound, electron magnetic resonance (EMR) imaging, optics, stress analysis, geophysics and many others applications. We use multipoint sources to compute the line integrals along parallel beams in a specific direction. A projection of image f(x,y) is a set of line integrals to represent an image, this phase takes multiple parallel-beams from different angles by rotating the source around the centre of the image. This method is based on Radon transform, which estimates the angle of rotation using the projection data in

different orientations. Multipoint projection computes with any angle (θ), the Radon transform of f(x,y) is the line integral of parallel paths to the y axis. The multipoint projection is defined as

$$R(x',\theta) = \int_{-\infty}^{\infty} f(x'\cos(\theta) - y'\sin(\theta), x'\sin(\theta) + y'\cos(\theta))dy', \quad (11)$$

where $R(x',\theta)$ is a Radon transform, x' is the smallest distance to the origin of the coordinate system, θ is the angle of rotation $(0 - \pi)$, x' and y' are determined from the Eqs. (5-6). Radon projection data of the rotated images are used to estimate the rotation angle of the images. It uses the same algorithm of fan beam projection as given above except that it is projected angle from 0° to 179° in multi point sources. Fig. 5 depicts the process of rotation estimation of negative $(-10°)$ angle rotated image.
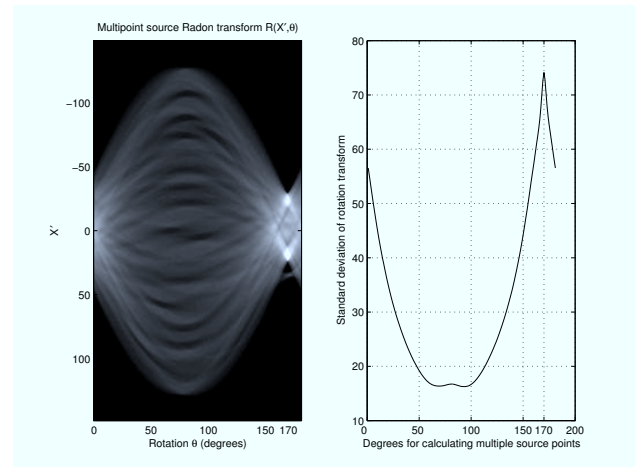
Fig. 5 Illustration of Radon multipoint source $R(x',\theta)$ and its standard deviations.

The algorithm for applying multipoint source projection to estimate the angle of rotated image is as follows:

Step 1: The given image is rotated to a specific angle such as   in counterclockwise because in the real time acquisition, system can predict the initial angle of rotation. Rotation of the image is performed using bi-cubic interpolation method.

Step 2: Set the rotation angle from   to   and apply Eq. (11) to generate peak area of rotation angles.

Step 3: After applying the multipoint sources, for example, if the rotated image size is 99 by 277, the resultant array has 297 by 180 projection data, i.e., 297 Radon transform coefficients have been generated for each angle. The standard deviation of radon transform coefficients is calculated to find the maximum deviation of rotation angle.

Step 4: After estimating an exact angle of object rotation, it is rotated to its original principal angle by bi-cubic

interpolation method. If the estimated angle (Φ) is positive then rotate the image as -(Φ+90°) in clockwise direction else if the estimated angle is negative or above 90° then rotate the image as -(Φ-90°) in clockwise direction.

Radon projection data of the rotated images are used to estimate the rotation angle of the LP and iris images. The maximum standard deviation of Radon projection data in the range 0° to 180° from multipoint sources is 73.614521. It is treated as the maximum (+10°) rotation of the given image.

III. PARAMETER OPTIMIZED GABOR FILTERS

In the current literature Gabor filters and its respective feature selections have been done on a trial and error basis. These techniques are either suitable for a simple problem oriented or chosen of filter parameters in a data independent manner. Gabor filters have been calculated for feature selection in two different methods one is called filter bank and another one is filter design approach. In the former methods [15][16], parameters are chosen in an improvised manner but it did not provide optimal solution for a particular task. Another problem with these filters is the redundancy of convolutions, which demands more operations in the feature extraction. A few set of filters are designed to classify the given patterns efficiently using filter design approach which provide an optimum set of Gabor filters and reduces the computational complexity than the former one. In [17], evolutionary Gabor filter optimization method was suggested for on-road vehicle detection process. In that genetic algorithm based chromosomes were used along with incremental clustering approaches to find the optimum parameters of Gabor filters. The problem of handwritten recognition had been performed by optimized Gabor filters [18]. Those methods had used an optimum response of surface method and a puddle of predefined filters with minimum error rates operated for feature selection process. We have used the combination of Boltzmann machine with K-means clustering for choosing the best values related with frequency, orientation and scale parameters of Gabor filters. Initially, Boltzmann machine with annealing process produces optimal set of Gabor parameters. Next, K-means clustering approach is used to group the redundant response of filters generated in the optimization. Finally, according to the result of classifier design, optimum filters are collected for a particular application domain. The global optimization approach is performed to optimize the parameters of Gabor filters. The filter selection is another essential process to collect similar kind of filter parameters together, in order to collect as a single group. This is performed by taking the mean value of parameters, which provide the same type of responses. Thus, the proposed algorithm senses to remove redundant filters, reduce unnecessary convolution operations and increase the efficacy of feature extraction with a compact set of filters.

The 1-D Gabor transform was initiated by Gabor and it was extended to 2D by Daugman [19]. A 2D Gabor function is an oriented sinusoidal jarring modulated by 2D Gaussian function [22]. This is described as

$$g_{\sigma_x,\sigma_y}(x,y) = \frac{1}{2\pi\sigma_x^2\sigma_y^2}\exp\left(\frac{-1}{2}\left(\left(\frac{x}{\sigma_x}\right)^2 + \left(\frac{y}{\sigma_y}\right)^2\right)\right), \quad (12)$$

$$G_{\sigma_x,\sigma_y,f,\theta(x,y)} = g_{\sigma_x,\sigma_y}(x,y).\exp(2\pi jf(x\cos\theta + y\sin\theta)), \quad (13)$$

where $g_{\sigma_x,\sigma_y}(x,y)$ is the Gaussian with scale parameter parameters (σ_x,σ_y), these parameters determine the effective size of the neighbourhood operation of a pixel in which the weight convolution is carried out, f is the centre frequency which is a span-limited sinusoidal grating. θ specifies the orientation of the normal to the parallel stripes of a Gabor function. Its value is specified in degrees ranging from 0° to 360°. However, θ is considered in between 0 degrees and 180 degrees because symmetry makes the other orientation redundant. In the specific application orientation θ can be computed as $\theta_o = \pi(o-1)/n$, $o = 1,2,3...n$ where π radians = 180 degrees, 1 radian = $(180°/\pi)$ and n represents number of orientations maintained in the system. The Gabor filter $G_{\sigma_x,\sigma_y,f,\theta(x,y)}$ forms complex valued function and it is composed into real and imaginary parts as

$$G_{\sigma_x,\sigma_y,f,\theta}(x,y) = R_{\sigma_x,\sigma_y,f,\theta}(x,y) + jI_{\sigma_x,\sigma_y,f,\theta}(x,y), \quad (14)$$

$$R_{\sigma_x,\sigma_y,f,\theta}(x,y) = g_{\sigma_x,\sigma_y(x,y)} \bullet \cos[2\pi f(x\cos\theta + y\sin\theta)], \quad (15)$$
$$I_{\sigma_x,\sigma_y,f,\theta}(x,y) = g_{\sigma_x,\sigma_y(x,y)} \bullet \sin[2\pi f(x\cos\theta + y\sin\theta)]$$

A. Parameter Selection and Conditions

In this phase, parameter selection for Gabor filters is discussed. It determines the best way to find the parameters set for the given problem domain. A best parameter set $G_P = \{\theta, f, \sigma_x, \sigma_y\}$ is determined by the proposed approach. Initially, the parameters should satisfy the Eq. (16).

$$0° \leq \theta \leq 180, f_{\min} \leq f \leq f_{\max}, \sigma_{\min x} \leq \sigma_x \leq \sigma_{\max x}, \sigma_{\min y} \leq \sigma_y \leq \sigma_{\max y}, \quad (16)$$

where $\theta_o = \pi(o-1)/n, o = 1,2,...,n$, $f_{\min}, f_{\max}$ denote minimum and maximum frequency wave length assigned by the system, $\sigma_{\min x}, \sigma_{\max x}$ represent minimum and maximum standard deviation of Gaussian envelope which is used for assigning scale parameters, $\sigma_{\min y}, \sigma_{\max y}$ signify minimum and maximum of y-direction scale factor.

The four parameters $P = \{\theta, f, \sigma_x, \sigma_y\}$ are selected for determining each Gabor filter. Thus, selecting a set of Gabor filter for a problem specific domain is related with optimizing these four parameters efficiently. Perhaps, a pattern recognition application needs G filters then 4*G parameters involve to be optimized. For example, if 20 filters are required by the application then 80 parameters are to be optimized. In general, optimizing such a large dimensional problem is more difficult and consequently it demands more time complexity to achieve the optimal states. The Boltzmann optimization method is used

for optimizing the parameter space of the Gabor filters. This network accepts bipolar features as set of input units and the output units represent the output categories. It is nothing but a recurrent network consisting of N two state units. These states can be chosen from bipolar space, that is, each Gabor filter parameters are converted to bipolar string as it looks like $P = \{1,-1\}^N$. If G filters are necessary for the filter design and parameters required M bipolar string then G*M length of patterns are needed. Each of the four parameters in P is a determined using M/4 bipolar pattern. The energy function of the Boltzmann machine is defined as

$$E(P) = -1/2 \sum_{i,j=1}^{N} w_{ij} p_i p_j \,, \tag{17}$$

where the w_{ij} is set of weight vector, and can be either positive or negative, $w_{ii} = 0$ is a prerequisite for converging the network. The main objective of Boltzmann machine is to reach the global minimum of its energy function, which is the minimum energy of the state. Thus it uses a stochastic acceptance criterion, thus allowing it to escape from its local minima. Let P denote the state space of the machine that is the set of all possible states. Among these, the state vectors differing by one bit are called neighbouring states. The neighborhood $N_p \subset P$ is defined as the set of all neighboring states of p. Let p^j, the neighboring state obtained from p by changing the state of neuron j be defined as

$$P_i{}^j = \begin{cases} + p_i & if \quad i \neq j \\ - p_i & if \quad i = j \end{cases} \quad P \in (1,-1)^N, \; P^j \in N_p \,, \tag{18}$$

The difference in energy when the global state of the machine is changed from P to p^j is denoted as

$$\Delta E(p^j \mid p) = E(p^j) - E(p) \cdot \tag{19}$$

Note that the contribution of the connections $W_{km}, k \neq j, m \neq j$ to E(P) and $E(P^j)$ is identical if $W_{ij} = W_{ij}$, this described as

$$\Delta E(P^j \mid P) = (2P_j)(\sum_i W_{ij} P_i) \quad P \in (1,-1)^N, W_{ii} = 0 \cdot \tag{20}$$

Therefore, the change in the energy can be computed by considering only local information. The Boltzmann machine can escape from the local minima because of its probabilistic nature. Two phases involve in the optimization using Boltzmann machine, in the first phase, an energy function for the given application is decided. In the constrained optimization, the energy function must be derived using both the original cost function and constrains. In contrast, the energy function can be directly obtained by using the cost function in the non-constrained applications. Next in the second phase, machine searches global minimum through the annealing procedure. The algorithm runs for a certain number of iterations controlled by the temperature and in each state try to find equilibrium. The temperature is reduced or increased in a controlled manner by the parameters α^A or β^A, respectively. The annealing is terminated when the time exceeds the permitted time.

K-means partitions the observations of optimized Gabor parameters into k mutually exclusive clusters and returns a vector of indices indicating to which of the k clusters it has assigned each observation. K-means is more suitable for clustering large amounts of data because it groups the Gabor parameters using their local-maximum-likelihood estimations. It takes each observation of parameter data as an object having a location in space and seeks a partition in which objects within each cluster are as close to each other cluster as feasible, and as far away from objects in other clusters as feasible. If the application needs twelve diverse distance measures then depending on the kind of optimized parameters the cluster can be grouped. The algorithm of K-means clustering as follows:

Step 1: Assign the number of optimized Gabor filters parameters that are provided indistinguishable responses.

Step 2: Initialize the number of clusters needed for the application domain. That is, according to these parameters such as orientation, frequency, scaling factor of x and y directions the cluster can be formed.

Step 3: Compute $\hat{\mu}_i = \dfrac{\sum_{k=1}^{n} \hat{P}(\omega_i \mid x_k, \hat{\theta}) x_k}{\sum_{k=1}^{n} \hat{P}(\omega_i \mid x_k, \hat{\theta})}$ for K different clusters.

Step 4: Classify the number of optimized Gabor parameters according to the nearest $\hat{\mu}_i$

Step 5: Compute the next mean vector $\hat{\mu}_{i+1}$ for the same cluster.

Step 6: Repeat the step 4 and step 5 until $|\hat{\mu}_i - \hat{\mu}_{i+1}| =$ Threshold.

Step 7: Compute the mean vector for the remaining number of clusters. Finally, groups of K divergent clusters are formed. From these clusters the mean values of single filter parameters are chosen as a Gabor filter. Thus K numbers of Gabor filters are selected for the convolution process.

However, Gabor filter produces local band pass frequency for rotation-invariant recognition. Its accuracy is limited to local orientation of shifting of pixels alone. In large extent orientations, Gabor filter produces more false positives for intra-class. Therefore, we overcome the problem of making features as rotation invariant by estimating and correcting orientations before applying rotation invariant Gabor filters. Hence, it provides a complete set of features, which are invariant to large variations of orientations in real-time acquisitions. In addition, it assists the classifiers not to settle in converging state of local orientation features for intra-classes patterns and tends to get global rotation-invariants [23].

IV. PERFORMANCE ANALYSIS AND EXPERIMENTS

In order to evaluate the efficacy of the estimation process, comparison of rotation estimation of projection data of fan beam arc, fan beam line and Radon transform have been carried out. These methods respond a bit different response of peak projection data at a particular angle. These variations occur due to high frequency of the components present in the images. Among these methods Radon and fan beam line provide narrow peak estimation than the fan arc method because it produces little bit wide angle in all the angles like 0, 45 and 90 degrees as shown in Fig 6. However, due to illumination changes in twilight and nighttime, LP image rotation estimation is crucial factor and its illumination level should be estimated before estimating the rotation angle for binarization. After rotation correction, optimized Gabor filters are applied to extract rotation-invariant features, which give more accuracy than the traditional Gabor filters because, the optimized approach searches filter parameters which are provided high separability in the classification. Moreover, before feature extraction, real-time images' orientation are corrected its principal direction that afford more positive intra-class classifications. Thus incorporation of optimizing Gabor filters with real-time orientation correction produces higher interclass separability than other existing approach.
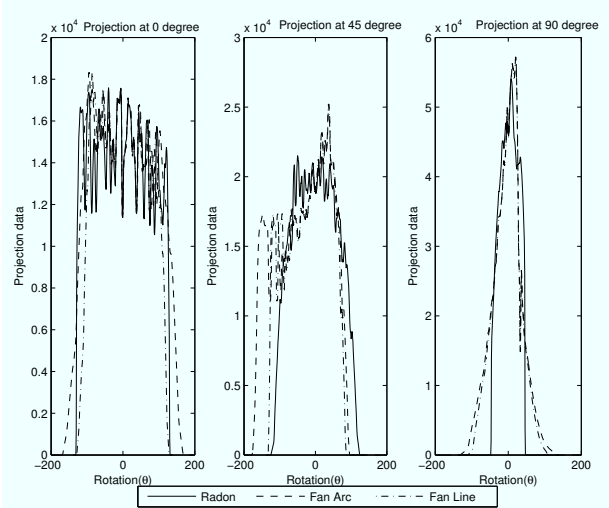

Fig. 6 Comparison of projection data in the particular angles.

Two phases of experiments were conducted for evaluating the efficacy of the proposed system. In the first phase, image orientation estimation was analyzed and results are studied. Classification rate of the rotation-invariant features based on classifiers were studied in the second phase. Our database has 535 images, which are acquired in different illuminations. It consists of 237 license plates and 298 eye images. In the real-time, license plate images were captured in 45 different angles of rotation varying from 4° onwards. 9 different angles of iris images were captured by changing its orientation. Experimental results reveal that fan-arc (FA) method causes more errors in the estimation process than the rest of the methods such as fan-line (FL) and Radon transform (RD). This was mainly due to approximation of numeric value of projection data and selection of sensor sources. However, these errors may not produce more false positives in the recognition process because error differences are very smaller than the actual capturing orientations. Furthermore, vehicle images are also captured from $-1°$ to $-90°$ in clockwise directions to test the estimation algorithm. In addition to that, acquired images are added Gaussian noise with local variance to check the efficiency of the proposed method. The average estimation of rotation angle variation was slightly diverged between noise and clear images. However, estimation angle was not widely varied for noisy images. Fig 7 shows the result of projection data of these methods at 0, 45 and 90 degrees.

Due to factor of high gray level magnitude in iris patterns all the three estimation methods have produced the slight variation in the estimation process.
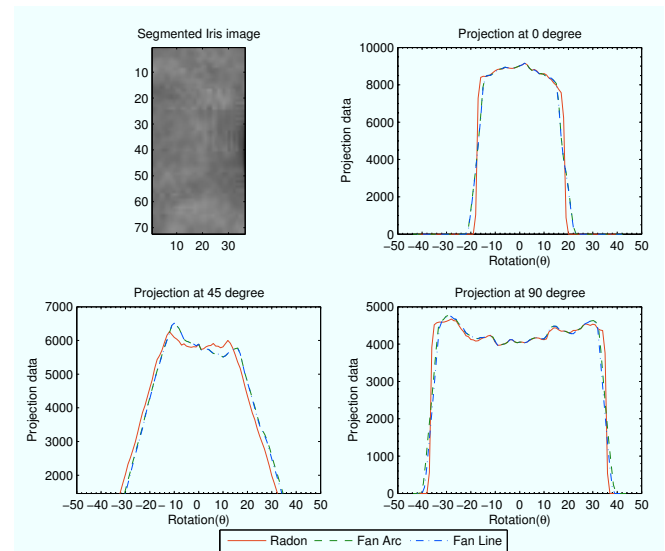

Fig. 7 Iris image orientation estimation with FA, FL and RD methods.

The rotation estimation of license plate images is also carried out with FA and FL and RD methods. These methods respond a bit different from peak projection data at a particular angle. These variations occur due to high frequency of the components present in the LP images. Among these methods Radon and fan beam line provide narrow peak estimation than the fan arc method because it produces little bit wide angle in all the angles like 0, 45 and 90 degrees as shown in Fig 8. However, due to illumination changes in twilight and nighttime, LP image rotation estimation is a crucial factor and its illumination level should be estimated before estimating the rotation angle for binarization.

In order to evaluate the robustness of the method, Zero-mean Gaussian white noise with an intensity dependent variance and Poisson noises are added to the segmented image. After estimating the expected rotation angle of the image, it can be skewed to its principal angle using bi-cubic interpolation method. These algorithms are tested with diverse eye images in real time conditions. In the capturing process, subjects' head

moments are directed to acquire the eye images by different rotation angles.
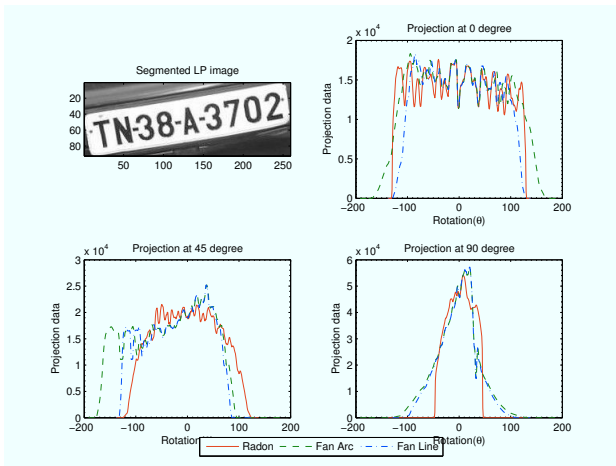

Fig. 8 License plate image orientation estimation with FA, FL and RD methods.

Hence, eye images were captured in 0° to 90° in both clock and anticlockwise directions. However, as far as iris recognition is concerned, head moments are in left, right, bottom and top directions only. Thus, the maximum rotation of angles was from 0° to 45° for the estimation process. Moreover, in the experimentation Gaussian white noise, Poisson noises and eye wears noises were added up to verify the robustness of the proposed approaches. Fig. 9 shows the rotation estimation with noisy iris patterns.
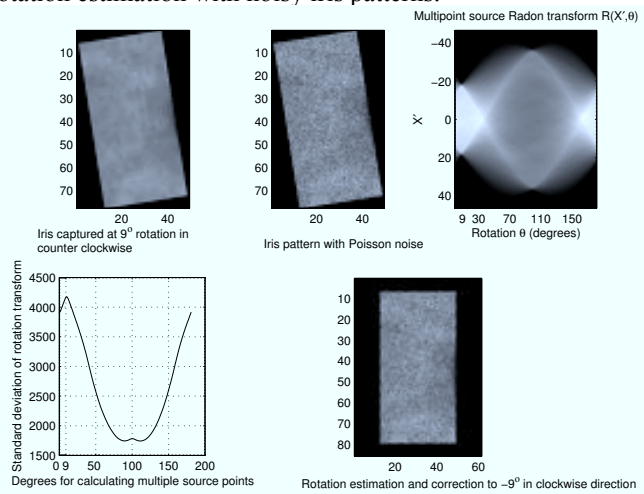

Fig. 9 Rotation estimation in noisy iris images.

After generating Poisson noises, iris pattern's pixel intensity is altered based on the number of photons of pixel information and the mean square signal-to-noise ratio (SNR) of the resultant image which was 31.6048. However, noisy data occur in the iris pattern that may not affect the estimation process because projection data of the estimation process were approximately equivalent to the clear images, i.e., it was produced as maximum of standard deviation magnitude. Hence, noisy iris pattern acquired due to eyewear and environment illuminations may slightly affect the estimation

process. The result comparison of these methods has been shown in Table I.

TABLE I.   RESULTS OF IRIS IMAGES ROTATION ESTIMATION

Actual orientation in degree	No. of sample rotated images	Rotation Estimation in degree			Average Rotation correction in degree			Average error rate in degree		
		FA	FL	RD	FA	FL	RD	FA	FL	RD
3	47	3.4	3.3	3.2	3.3	3.3	3.2	0.3	0.3	0.2
9	56	9.5	9.4	9.4	9.5	9.4	9.4	0.5	0.4	0.4
15	68	15.7	15.4	15.3	15.6	15.5	15.4	0.6	0.5	0.4
20	40	20.8	20.6	20.5	20.7	20.6	20.5	0.7	0.6	0.5
30	72	31	30.7	30.8	31	30.8	30.8	1	0.8	0.8
45	64	46.6	46	46	46.5	46	46	1.5	1	1
-5	42	-4.5	-4.6	-4.8	-4.4	-4.6	-4.7	-0.6	-0.4	-0.3
-15	32	14.3 (-)	14.5 (-)	14.8 (-)	14.3 (-)	14.4 (-)	14.7 (-)	-0.7	-0.6	-0.3
-20	46	19.1 (-)	19.4 (-)	19.5 (-)	19 (-)	19.5 (-)	19.5 (-)	-1	-0.5	-0.5

TABLE II.   INCORPORATION OF NOISY MEASURE IN ROTATION ESTIMATION OF IRIS IMAGES

Noise type	Mean square	Error Square	SNR_{ms}	Root Mean square error
Poisson	606198	23036	26.315246	2.470928
Zero-mean Gaussian	564368	194464	2.902172	7.179203
Gaussian Mean=0,variance=0.01	605038	75772	7.984981	4.481372
Eye wears	261258	62934	4.151301	4.927483

From further investigation, we can understand that in worst-case rotation estimation the average error rate between actual orientation and correction angles were reported by FA method. It produced 1.5-degree error, while estimating 45-degree iris rotation patterns, whereas RD and FL produced better result than FA and it's worst-case estimation error is reported 1° . This is shown in Fig 10. However, the minimum errors in rotation estimation may not affect the recognition process. It outperforms the other methods as maintained by the template matching of iris patterns in different angles and a bit shifting in left or right while matching the iris patterns. Hence this method removes the overburden of storing additional iris patterns for compensating rotation invariants and it eliminates shifting of iris bits in the recognition. Thus computational complexity is considerably reduced by the proposed approach. Table II shows the noise measures incorporated in the iris rotation estimation process.
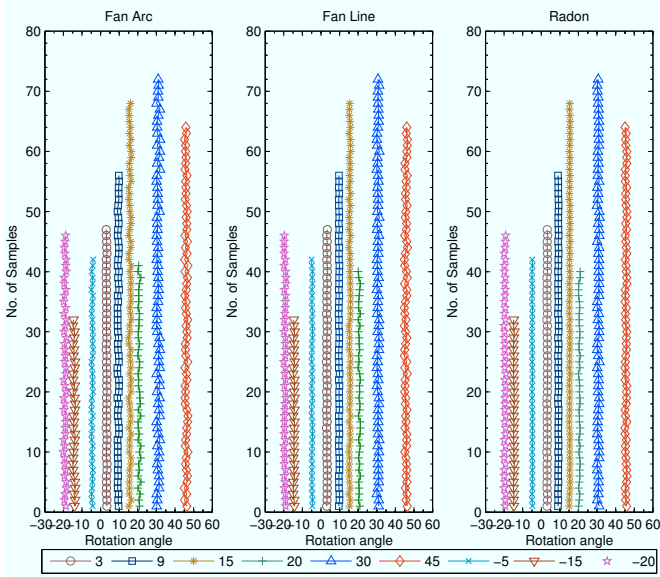
Fig. 10 Estimation result of rotation estimation of real-time iris images.

In order to evaluate parameter optimized Gabor features we have conducted experiments with different measures of classifiers. In the recognition phase, correct accept rate (CAR) and false positive rate (FAR) of the training sets were evaluated for the different classifiers. Training set consists of 142 and 154 samples of license plates and iris images, respectively. The reminder samples were treated as test samples. The CAR of the diverse classifiers was observed, it was: Hamming neural network 98.37%, back propagation network 97.02%, Euclidean-norm distance 94.86% and k-nearest neighbor-94.32%. Fig.11 shows receiver operating characteristics curve (ROC) of the recognition process of different classifies using parameter optimized Gabor features.
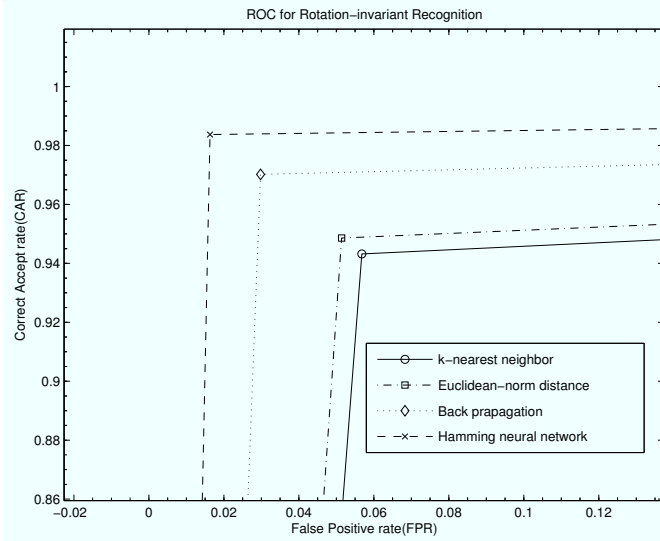

Fig. 11. ROC of Rotation invariant recognition with diverse classifiers.

V. CONCLUSION

In view of the fact that there is no an appropriate set of signal present in the image, it is a difficult process to estimate its orientation while capturing image at diverse angles. In this paper, we proposed a method which is based on line integrals. It projected the captured data using fan-arc, fan-line and Radon transform methods to estimate the maximum angle variations. The suggested algorithms will be further extended to estimate the orientation angle of face, fingerprints, palm, electron magnetic resonance and other kind of images with minimum estimation error. In the context of invariant recognition, the estimation process is possibly incorporate with parameter optimized Gabor filter. It achieved the sufficient rotation invariance of features and produced better accuracy for the real-time patterns with a compact set of characteristics. This paper opens a new direction of research in the computer vision committee to acknowledge the rotation estimation and invariant problems with relative simplicity, accuracy and robust to noise.

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RSS-Crawler Enhancement
for Blogosphere-Mapping

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Abstract— **The massive adoption of social media has provided new ways for individuals to express their opinions online. The blogosphere, an inherent part of this trend, contains a vast array of information about a variety of topics. It is a huge think tank that creates an enormous and ever-changing archive of open source intelligence. Mining and modeling this vast pool of data to extract, exploit and describe meaningful knowledge in order to leverage structures and dynamics of emerging networks within the blogosphere is the higher-level aim of the research presented here. Our proprietary development of a tailor-made feed-crawler-framework meets exactly this need. While the main concept, as well as the basic techniques and implementation details of the crawler have already been dealt with in earlier publications, this paper focuses on several recent optimization efforts made on the crawler framework that proved to be crucial for the performance of the overall framework.**

Keywords – weblogs, rss-feeds, data mining, knowledge discovery, blogosphere, crawler, information extraction

I. INTRODUCTION

Since the end of the 90s, weblogs have evolved to an inherent part of the worldwide cyber culture [9]. In the year 2008, the worldwide number of weblogs has increased to a total in excess of 133 million [14]. Compared to around 60 million blogs in the year 2006, this constitutes the increasing importance of weblogs in today's internet society on a global scale [13].

One single weblog is embedded into a much bigger picture: a segmented and independent public that dynamically evolves and functions according to its own rules and with ever-changing protagonists, a network also known as the "blogosphere" [16]. A single weblog is embedded into this network through its trackbacks, the usage of hyperlinks as well as its so-called "blogroll" – a blogosphere-internal referencing system.

This interconnected think tank thus creates an enormous and ever-changing archive of open source intelligence [12]. Modeling and mining the vast pool of data generated by the blogosphere to extract, exploit and represent meaningful knowledge in order to leverage (content-related) structures of emerging social networks residing in the blogosphere were the main objective of the projects initial phase [4].

Facing this unique challenge we initiated a project with the objective to map, and ultimately reveal, content-, topic- or network-related structures of the blogosphere by employing an intelligent RSS-feed-crawler. To allow the processing of the enormous amount of content in the blogosphere, it was necessary to make that content available offline for further analysis. The first prototype of our feed-crawler completed this assignment along the milestones specified in the initial project phase [4]. However, it soon became apparent that a considerable amount of optimization would be necessary to fully account for the strong distinction between crawling regular web pages and mining the highly dynamic environment of the blogosphere.

Section II is dedicated to related academic work that describes distinct approaches of how and for what purpose the blogosphere's content and network characteristics can be mapped. While section III focuses on the crawler's original setup, functionality and its corresponding workflows, the following section IV is digging deeper into the optimization efforts and additional features that were realized since then and that ultimately proved to be crucial for the overall performance. Recommendations for further research are dealt with in section V. A conclusion is given in section VI, followed by the list of references.

II. RELATED WORK

Certainly, the idea of crawling the blogosphere is not a novelty. But the ultimate objectives and methods behind the different research projects regarding automated and methodical data collection and mining differ greatly as the following examples suggest:

While Glance et. al. employ a similar data collection method as we do, their subset of data is limited to 100.000 weblogs and their aim is to develop an automated trend discovery method in order to tap into the collective consciousness of the blogosphere [7]. Song et al. in turn try to identify opinion leaders in the blogosphere by employing a special algorithm that ranks blogs according to not only how important they are to other blogs, but also how novel the information is they contribute [15]. Bansal and Koudas are employing a similar but more general approach than Song et al. by extracting useful and actionable insights with their *BlogScope*-Crawler about the 'public opinion' of all

blogs programmed with the blogging software blogspot.com [2]. Bruns tries to map interconnections of individual blogs with his *IssueCrawler* research tool [5]. His approach comes closest to our own project's objective of leveraging (content-related) structures and dynamics of emerging networks within the blogosphere.

Overall, it is striking that many respectable research projects regarding knowledge discovery in the blogosphere [1] [10] hardly make an attempt in explaining where the data - necessary for their ongoing research - comes from and how it is ultimately obtained. We perceive it as nearsighted to base research like the ones mentioned before on data of external services like Technorati, BlogPulse or Spinn3r [6]. We also have ambitious plans of how to ultimately use blog data [3] - we at least make the effort of setting up our own crawling framework to ensure and prove that the data employed in our research has the quantity, structure, format and quality required and necessary [4].

III. ORIGINAL CRAWLER SETUP

The feed crawler is implemented in Groovy[1], a dynamic programming language for the Java Virtual Machine (JVM) [8]. Built on top of the Java programming language, Groovy provides excellent support for accessing resources over HTTP, parsing XML documents, and storing information to relational databases. Features like inheritance of the object-oriented programming language are used to model the specifics of different weblog systems. Both the specific implementation of the feed crawler on top of the JVM, as well its general architecture separating the crawling process into retrieval, scheduling and retrieval, allow for a distributed operation of the crawler in the future. Such distribution will become inevitable once the crawler is operated in long-term production mode. These fundamental programming characteristics were taken over for the ongoing development of the crawler framework.

The crawler starts his assignment with a predefined and arbitrary list of blog-URLs (see figure 1). It downloads all available post- and comment-feeds of that blog and stores them in a database. It than scans the feed's content for links to other resources in the web, which are then also crawled and equally downloaded in case these links point to another blog. Again, the crawler starts scanning the content of the additional blog feed for links to additional weblogs.
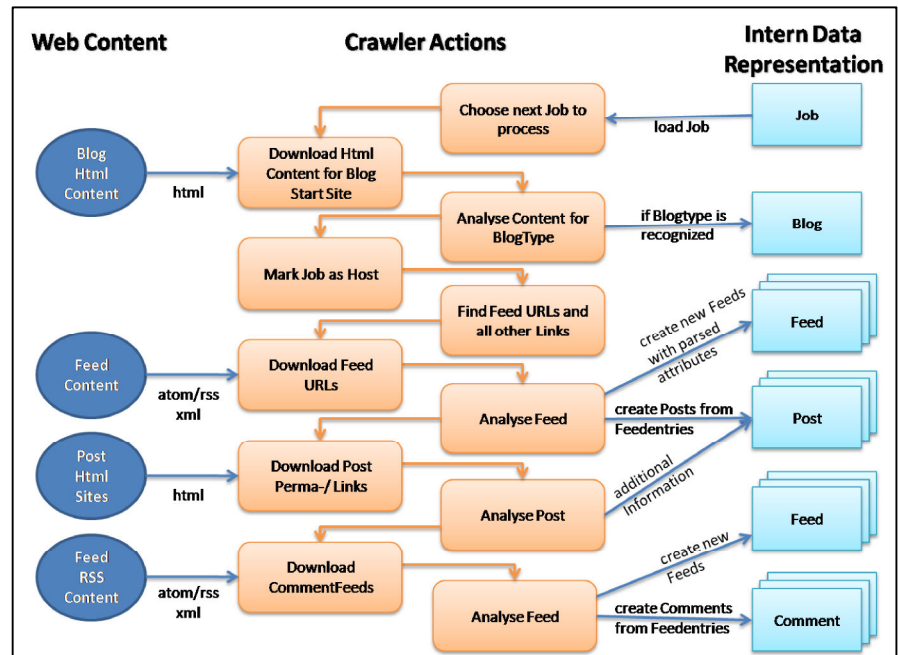

Figure 1. Action Sequence of RSS-Feed Crawler

Whenever a link is analyzed, we first of all need to assess whether it is a link that points to a weblog, and also with which software the blog is created. Usually this information can be obtained via attributes in the metadata of a weblogs header. It can however not be guaranteed that every blog provides this vital information for us as described before. There is a multitude of archetypes across the whole HTML page of a blog that can ultimately be used to identify a certain class of weblog software. By classifying different blog-archetypes beforehand on the basis of predefined patterns, the crawler is than able to identify at which locations of a webpage the required identification patterns can be obtained and how this information needs to be processed in the following. Originally the crawler knew how to process the identification patterns of three of the most prevalent weblog systems around [11]. In the course of the project, identifications patterns of other blog systems followed. In a nutshell, the crawler is able to identify any blog software, whose identification patterns were provided beforehand.

The recognition of feeds can similarly to any other recognition-mechanism be configured individually for any blog-software there is. Usually, a web service provider that likes to offer his content information in form of feeds, provides an alternative view in the header of its HTML pages, defined with a link tag. This link tag carries an attribute (rel) specifying the role of the link (usually "alternate", i.e. an alternate view of the page). Additionally, the link tag contains attributes specifying the location of the alternate view and its content type. The feed crawler checks the whole HTML page for exactly that type of information. In doing so, the diversity of feed-formats employed in the

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[1] http://groovy.codehaus.org/

web is a particular challenge for our crawler, since on top of the current RSS 2.0 version, RSS 0.9, RSS 1.0 and the ATOM format among others are also still used by some web service providers. Some weblogs above all code lots of additional information into the standard feed. The original version of the crawler only supported standard and well-formed RSS 2.0 formats, of which all the information of our currently employed object-model is readout.

Whenever the crawler identifies an adequate (valid) RSS-feed, it downloads the entire corresponding data set. The content of a feed incorporates all the information necessary, to give a meaningful summary of a post or comment – thus a whole weblog and ultimately the entire blogosphere. General information like title, description, categories as well as the timestamp indicating when the crawler accessed a certain resource, is downloaded first. Single items inside the feed represent diverse posts of a weblog. These items are also downloaded and stored in our database using object-relational mapping[2] (refer to figure 2). The corresponding attributes are unambiguously defined by the standardized feed formats and by the patterns that define a certain blog-software. On top of the general information of a post, a link to the corresponding HTML representation is downloaded and stored as well. In case this information is not provided in the feed information of a blog provider, we are thus still able to use this link information at a later point for extended analyses that would otherwise not be possible. Comments are the most important form of content in blogs next to posts, and they are usually provided in form of feeds as well.

same form by all blog software systems. This again explains why we pre-defined distinct blog-software classes in order to provide the crawler with the necessary identification patterns of a blog system. Comments can either be found in the HTML header representation or in an additional XML attribute within a post feed. Comment feeds are also not provided by every blogging system. With the predefined identification patterns, our crawler is however able to download the essential information of the comment and store it in our database. Another important issue is the handling of links that are usually provided within posts and comments of weblogs. In order to identify network characteristics and interrelations of blogs within the whole of the blogosphere, it is not only essential to store this information in the database, but to save the information in which post or comment this link was embedded.

How often a single blog is scanned by our crawler depends on its cross-linking and networking with other blogs. Blogs that are referenced by other blogs via trackbacks, links, pingbacks or referrers are thus visited with a higher priority than others by the crawler. Well-known blogs that are referenced often within the blogosphere are also revisited and consequently updated more often with our original algorithm. It can be considered possible that with this algorithm blogs of minor importance are visited rarely – a side-effect that we do not consider to be limiting at this time. Implementing a different algorithm could at all times be realized by substituting the so-called "scheduler" of our crawler. As we will see in the following (section IV.f), this proved to be fundamentally important.
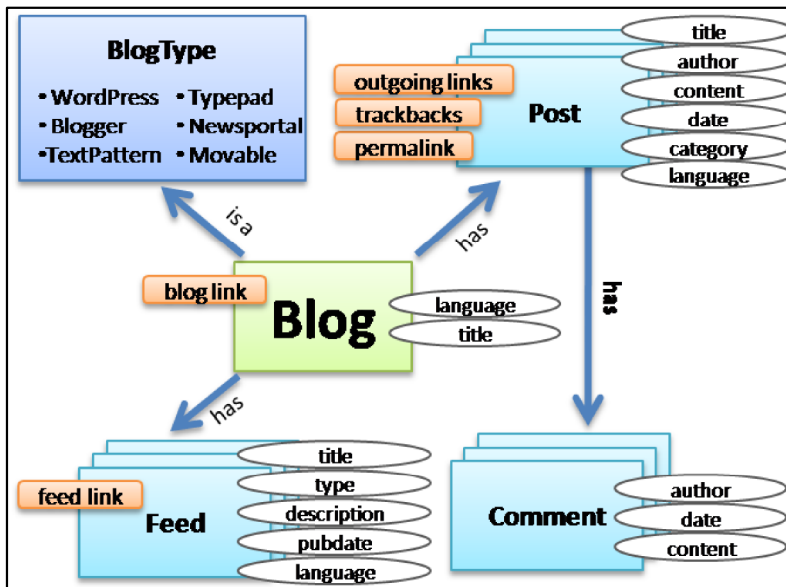
IV. Ongoing Optimization Efforts

A. Identification of blogrolls

A 'blogroll' is a list of links in a blog that a blogger defines irrespectively of the usual posting activities in his weblog. Usually, weblogs of friends or colleagues, with similar interest and topics or personal favorites are listed in such a blogroll. It is usually positioned in the sidebar of the starting page and represents one of the solely static parts of a weblog.

Since the original implementation of the crawler was determined to only analyze the RSS-feeds of weblogs, the information incorporated within blogrolls was entirely ignored. We did however come to the conclusion that blogrolls do represent an exclusive set of links to other weblogs due to the fact that their graphical positioning in the blog is visible to nearly every visitor of a weblog. To adhere to the distinct importance of interlinkages between weblogs, blogroll-linkages therefore had to be considered as well.

Identifying links within the listing of a blogroll is however not as easy as automatically identifying links within

Figure 2. Intern Data Representation

However, we do need to take into account that a comment's feed-information is not always provided in the

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[2] https://www.hibernate.org/

the standardized format of RSS-feeds. An analysis of the entire HTML-page of a weblog is necessary to identify a blogroll due to the fact that HTML-structure of blog-pages can fundamentally differ between bloggers and the blog software they employ. This is why blogrolls cannot be found at a particular position within the HTML-tree – also because they are often not embedded with an explicit tag.

Via a random analysis of the 100 biggest weblogs, we managed to identify patterns within their respective HTML-Content with which we are now able to identify blogrolls for the majority of blogging software systems around. These patterns are based upon the following two characteristics of blogrolls:

First, additional features such as a blogroll is often embedded into blog software systems via so-called 'plug-ins' – small software packages that can be modularly added to the main blogging system. Hereby, blogrolls can ultimately be identified via particular CSS-classes or Tag-IDS.

Secondly, the boxes on web pages that incorporate blogrolls are usually labeled with a common title ('blogroll', 'bloglisting', or 'blogrolle' in German language), after which the listing of referenced external weblogs follows within the HTML-code. This identification pattern was also used to track referencing links to other weblogs within the HTML code.

On the basis of the first identification pattern, blogrolls are identified and saved as links in the database. If this criterion will be sufficient to identify blogrolls within the majority of weblogs crawled remains to be seen and should be subject to further analyses. First results however indicate that this routine might be sufficient. The appliance of the second identification method requires the identification of specific titles and corresponding content within an HTML-document. This second method was not implemented yet, since we believe that the first method is sufficient for the crawler framework.

B. Identification von trackbacks

The identification of 'trackbacks' underlies similar particularities as the identification of blogrolls. 'Trackbacks' are referencing links to single posts, through which a blogger can explicitly state that a post of another weblog is of interest for himself and his own weblog. Regrettably, these special interlinkages are not represented in a common and standardized way throughout the blogosphere. This is why trackbacks generated within a weblog made of one blog software system might not be recognized as such in a weblog of another system. The rationale of identifying trackbacks is similar to the one of blogrolls: trackbacks are exclusive links that represent interdependencies of special interest between weblogs. They should therefore be tracked as well. Trackbacks can usually be identified as follows:

Trackbacks can – similar to blogrolls – be represented in an extra box within the HTML representation of a post. These areas can therefore also be identified via particular IDs

or CSS-classes, but also through the recognition of the plain title 'trackback'.

Trackbacks are usually depicted as a citation of the referencing post in the commenting-section of a post (extract of the post's content) which is furthermore referenced via a hyperlink. This appearance of trackbacks can solely be identified via its unique citation form (usually like follows: *"[...]extract[...]"*).

Manual trackbacks can also be found in the commenting section of a post. Manual trackbacks are referencing links that bloggers can enter in blog systems that do not support automated trackbacks - meaning that a blogger cannot add a trackback via an automated pingback or via a manual entry. Comparable with cross references to special news channels in services like Twitter, bloggers can than as alternativly enter comments in a format comparable to *„@Trackback myblog.de/p=12"*.

To extract manual trackbacks with an automated crawling system, you should thus be able to identify the word "trackback" and an immediately following link within a comment. Due to this rather general pattern we ultimately abdicated it from our analysis.

C. Reliability of the Feedparsing

The original crawler implementation processed feeds by making use of an XMLSluper API of Groovy that incorporates a LazyXMLDOM Parser. An HTML document was hereby converted in a valid DOM object by the XMLSluper API that was then analyzed for ATOM or RSS2.0 feed tags. This mechanism was however not perfectly applicable to map the entire blogosphere, since there are still many predecessor versions of RSS around (RSS0.9 or RSS1.0). We originally tried to embrace all feed formats by making use of the ROME framework of Apache in our original implementation [4]. Since the ROME API works on top of the Java SAXParser that in turn collapses every time it comes across invalid XML structures like unclosed tags (e.g. content in posts), special characters and other XML non -conform constructs, we had to come up with another solution. It was thus necessary to clean all feeds before the parsing process. Due to an enormous amount of characteristics that needed be adhered to in this regard, a manual implementation was not feasible. We therefore make use of the HTMLCLeaner, a library developed with the objective to clean XHTML pages. This cleaner successfully corrects any impurities in the feed format: it not only automatically adds valid namespaces, it also correctly closes HTML tags that were left open and therefore invalid and sources out all XML-reserved constructs in a corresponding CDATA tag. The subsequent result can then successfully be processed by the ROME framework.

D. Language Detection

In the course of the crawler project we came to the conclusion that language detection of those blogs crawled might be an interesting value-add when it comes to the analyses of the data crawled. However, the attribute

‚language' is only used in very rare occasions in the structure of a feed.

This is why the language detection module „JLangDetect"[3] was recently implemented on top of the original implementation. This library is written entirely in C-code and published under the Apache2 license. It requires so called 'gam-trees'. By making use of the *European Parliament Parallel Orpus*, we are now able to identify the following languages: danish (da), german (de), greek (el), english (en), spanish (es), finnish (fi), french (fr), italian (it), dutch (nl), portuguese (pt), and swedish (sv). The crawler analyzes the content's language of every post. This information is furthermore saved in our database (see figure 2). Since posts with different languages may have been published within one single weblog, language parameter of an entire blog is set according to the majority of posts with common language.

E. Postlinks

We soon had to discover that downloaded feeds in our original crawler implementation often incorporated only a short extract of the corresponding post content. This is due to a configurable setting in the backend of blog software systems. Since we are especially interested in content analyses of single weblogs at a later project phase, the entire HTML page of the posts therefore needed to be downloaded via the permalink address. Since there is a permalink address within every feed, this could be realized fairly easy.

Overall network analysis of the blogosphere is of major interest for us as well. It is therefore imperative that link information extracted from feed-crawling or parsing activities can be perfectly allocated to the corresponding posts, comments or weblogs. We therefore adapted the original crawling algorithm to ensure that not just feed-content is analyzed for link information, but HTML-pages of posts as well.

F. Priorization

How often a single blog is scanned by our crawler should depend on its cross- linkages with other blogs. Blogs that are referenced by other blogs via trackbacks, links, pingbacks or referrers are thus visited with a higher priority than others by the crawler. Well-known blogs that are referenced often within the blogosphere are also revisited and consequently updated more often with our original algorithm. It can be considered possible that with this algorithm blogs of minor importance are visited rarely - a side-effect that we do not consider to be limiting at this time. Since the blogosphere is constantly changing with new blogs being setup and other blogs disappearing, it is of crucial importance that the crawler preferable also finds new blogs and not only refreshes existing ones. We realized this

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[3] http://www.jroller.com/melix/entry/nlp_in_java_a_language

requirement during our ongoing enhancement efforts on the basis of "priorities" - hereafter referred to as "Prio". A Prio is the number of hops necessary to get from the initial URL starting page to a particular blog, whereas all blogs within the starting list do have a Prio-value of 0. All those links that are collected on the front pages of one of the starting list blogs thus have a Prio-value of 1.

To guarantee that the crawler neither only updates those blogs it already found, nor merely tries to find new blogs without updating the information of the existing ones, new jobs to be crawled are scheduled as follows: There are several parallel working analyzers and a scheduler that determines which job will be processed next by the analyzers. The scheduler processes all jobs with Prio=0 on a daily basis. After that, all those links with Prio=1 that point to other blogs are also processed on a daily basis. At the time the analysis of blogs with Prio=1 is completed, the scheduler assigns two thirds of those analyz- ers available to analyze blogs with Prio = 2 that were not analyzed for more than a week. The remaining third of analyzers is assigned with new jobs. At the time these jobs are completed as well, one third of those analyzers available are assigned with jobs that point to blogs of Prio > 3 that were not processed for more than a week. The remaining analyzers are than equally filled up with new jobs. When all blogs in the database are updated, the scheduler assigns all analyzers with new jobs that were not visited so far.

Since the amount of collected jobs grew continuously since the start of the crawler project, it soon became necessary to optimize the queries on the database. Since blogs with Prio ">1" are revisited, it was so far necessary to know which job was pointing on a blog. As a consequence, both entities (jobs and blogs) needed to be logically connected – a highly time-consuming task for the analyzer. The job entity in the database was therefore extended by another field, indicating if a particular job is a blog or not. This considerably increased performance of the crawler.

G. News-portals

News-portals are of particular interest when it comes to the analysis of the blogosphere, since these portals often represent the virtual subsidiary of traditional news corporations. These players were traditional the ones to decide upon the daily headlines worldwide. With the advent of weblogs the rules of this game fundamentally changed. Without any central supervision or editorial standards, weblogs could write about whom and what they wanted – and they could do so a lot faster than traditional news corporations – even though this sometimes proved to be at the expense of journalistic quality. We consider it highly interesting to understand the interdependence of the blogosphere and traditional news corporations. The crawling algorithm therefore needed to be adapted in order to crawl news portals as well. For a start we only included the biggest German news portals in our analysis. Since RSS-feeds in highly respected news portals are greatly standardized and

well-formed compared to the feed-quality in the blogosphere, we include news portals as another "blogtype" in our framework. In this case, the recognition patterns are linked to an internal URL-list of the biggest 100 German news portals.

Similar to the crawling activity in the blogosphere, news portal pages can then be scanned for links that point to weblogs. Due to the special annotation of news portals, it is then possible to analyze jumps between the blogosphere and "traditional" websites, and to find out what type of medium covered a particular story first.

It would even be possible to generate a kind of weblog-ranking, in which those weblogs that have a traceable influence on traditional media get a higher score than those without.

V. SUGGESTIONS FOR FURTHER RESEARCH

The feed crawler scans, recognizes and downloads blogs through their URI. It therefore needed to be ensured that a blog can only be found once. In the original implementation it could happen that two different job URLs were pointing on the same blog, which then was saved twice in the database. In the enhanced crawling framework, these blog duplicates can now be easily identified due to their identical host address. It is in contrast to that still not possible when the crawler encounters so-called redirects or short-URIs.

Currently, the feed-crawler recognizes feeds through the official feed link format. It is <link>-tag that has set *type= „application/rss+xml"* or *„application/atom+xml"*. This identifies the referenced resource without doubt as a feed. A tag can additionally be annotated with *rel="alternate"*. This identifies the feed explicitly as an alternative view of the currently opened resource (blog). It is therefore ensured that the feed incorporates the latest posts of a weblog. This method is quite effective to scan blogs for well-formed feeds. However, feeds that were identified this way often only enumerate the most recent posts and misses' information about older posts or categorization.

In order to find as much valid links as possible, our crawler currently scans all links without paying attention to the rel-attribute with the result that single posts could be crawled twice. Due to our internal identification of posts via their links, this is not a disadvantage eat the moment.

Blog-Analysis-Engines such as Spin3r use the so-called 'Brutal Feed recognition" or "Aggressive RSS discovery" method to adhere to this particularity. In doing so, they analyze every single link they come across on a blog page regarding its feed-characteristics. They hereby do not run the risk of skipping blog-feeds due to a missing annotation. The additional analysis however poses substantial additional expenses since the annotation of feeds is widespread in the Web – not only for blogs, but also for news-portals and other websites.

VI. CONCLUSION

Generally, we try to investigate in what patterns, and to which extent blogs are interconnected. We also have great interest in analyzing the content of single weblogs. In doing so we want to face the challenge of mapping the blogosphere on a global scale, maybe limited to the national boundaries of the German blogosphere. The visualization of link patterns, a thorough social network analysis, and a quantitative as well as qualitative analysis of reciprocally-linked blogs will to a large extend form the following project phase of our overall project, which will build upon the enhanced data collection method and technique described in this paper. Even though the original implementation performed well along the milestones defined within the initial project phase, it soon became apparent that those enhancements discussed in section IV of this paper were crucial for the overall performance of the crawling framework. We conclude that the feed-crawler is now running on a performance level that satisfies all requirements for long-term and large-scale data-mining in the blogosphere. Due to the enormous amount of blogs currently around, as well as those thousands of blogs and posts that add up to this amount of data every day, a final performance analysis of the crawler will follow in a couple of month.

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Effect of Glimepiride on Renal Marker, Nitrite And Histopathology Study of Kidney Tissues Ischemia/Reperfusion Induced Renal Damage in Diabetic Rats

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Abstract— **Present study was designed to evaluate the effect of Glimepiride as a beneficial agent in the treatment of Ischemia/reperfusion induced renal damage in diabetic rats. Ischemia/reperfusion injury, which is commonly seen in the field of renal surgery or transplantation in diabetic condition, is a major cause of acute renal failure. Type 2 Diabetes was induced in rats by a single intraperitoneal (i.p) injection of Streptozotocin (65 mg/kg, STZ) in overnight fasting rats followed by the i.p administration of Nicotinamide (110 mg/kg, NIC) after 15 minutes. After right nephrectomy, Glimepiride (0.5 mg/kg/day, p.o) was administered for 15 days. On the 16th day, ischemia was induced in contra lateral kidney for 45 min, followed by reperfusion for 24 hr. Renal function marker and histopathology were estimated at the end of 24 hr reperfusion. At the end of experimental period the level of nitrite in kidney tissue, serum marker Albumin and Blood urea nitrogen were significantly changed. Glimepiride improved the renal dysfunction and nitrite after renal ischemia/reperfusion injury in diabetic rats. Light microscopic evaluation of the kidneys of the diabetic rats with I/R only showed tubular cell swelling, interstitial edema, tubular dilatation, and moderate to severe necrosis, whereas, Glimepiride may not reduced tubular dilation, loss of interstitial hemorrhage, and glomerular atrophy. In conclusion, Glimepiride as a may be not beneficial agent in the treatment of Ischemia/reperfusion induced renal damage in diabetic rats**

Keywords- Glimepiride; Renal marker; Nitrite; Type 2 diabetes

I. INTRODUCTION

Ischemic injury to brain, heart, and kidney is associated with high morbidity and mortality. Improving the ability of these organs to tolerate ischemic injury would have important implications. Ischemic insults are often recurrent in diabetic patients. In the setting of loss of renal blood flow autoregulation that characterizes the post-ischemic kidney [1], Renal ischemia/reperfusion (I/R) injury is a major cause of acute renal failure (ARF) [2], which is faced in many clinical situations such as kidney transplantation, partial nephrectomy, renal artery, angioplasty, aortic aneurysm surgery, and elective urological operations. In these conditions, I/R injury initiates a complex and interrelated sequence of events, resulting in injury to and the eventual death of renal cells [3, 4]. Several factors have been implicated in the pathophysiological changes occurring while renal I/R injury including vascular or microvascular injury, endothelial dysfunction, accelerated cell necrosis, granulocyte activation, and modulation of nitric oxide/angiotensin II axis [5, 6].

The rennin-angiotensin system plays a pivotal role in regulation of blood pressure. Renin acts on angiotensinogen to form angiotensin I, which is converted to angiotensin II with the help of angiotensin-converting enzyme (ACE) [7]. Angiotensin II is an important mediator in kidney injury. Accumulating evidence suggests that angiotensin II stimulates intracellular formation of reactive oxygen species (ROS) such as the superoxide anion and hydrogen peroxide that leads to kidney damage [8].

Recent studies clearly indicate that nitric oxide is fundamentally involved in the regulation of renal hemodynamics and homeostasis [9]. Moreover, it has been shown that reactive oxygen species (ROS) increase in the areas of ischemia and reperfusion [10]. ROS avidly react with nitric oxide (NO) and produce highly reactive nitrogen species (peroxynitrite), which can lead to functional NO deficiency. Peroxynitrite is an important agent that causes lipid peroxidation of vascular membranes [11, 12]. Studies proved that functional deficiency of NO leads to increased renal sympathetic nerve activity and this sympathetic activation increases β receptor activities in the body [13]. In addition, studies have shown that the β adrenoceptor present in kidney were exclusively of the β 1 type [14].

Glimepiride (GLI) an oral blood glucose lowering drug of the sulfonylurea class is reported to have pancreatic and extra pancreatic effects as well. The blockages of K_{ATP} channels of pancreatic cells by sulphonylurea are critical in the regulation of glucose regulated insulin secretion. It has been demonstrated to be effective in the treatment of non-insulin dependent diabetes mellitus with insulin resistance. GLI is pharmacologically distinct from glibenclamide because of

differences in receptor-binding properties which could result in a reduced binding to cardiomyocyte K_{ATP} channels. Some have reported the antioxidative properties of GLI. Moreover, GLI is pharmacologically different than other sulfonylurea drugs for its cardiovascular effects.

The present study, we investigated Glimepiride on renal I/R injury in diabetic rats and other word effect of Glimepiride on renal marker, nitrite and histopathology study of kidney tissues in I/R induced renal damage in diabetic rats.

II. MATERIALS AND METHODS

A. Drugs and Chemicals

Glimepiride was obtained as a gift sample from Alembic Pharmaceuticals Pvt. Ltd., Baroda, India. STZ and NIC were obtained from SIGMA, St. Louis, MO, USA. All other chemicals and reagents used in the study were of analytical grade.

B. Experimental Animals

All experiments and protocols described in present study were approved by the Institutional Animal Ethics Committee (IAEC) of Dharmaj Degree Pharmacy College, Anand. Sprague Dawley rats (210 ± 15 g) were housed in-group of 3 animals per cage and maintained under standardized laboratory conditions (12- h light/dark cycle, 24°C) and provided free access to palleted CHAKKAN diet (Nav Maharashtra Oil Mills Pvt., Pune) and purified drinking water *ad libitium*. The animal experiment was approved by Animal Ethical Committee of the Institute (1163/a/08/CPCSEA).

C. Experimental Induction of Type 2 Diabetes in Rats

Type 2 Diabetes was induced in rats by a single intraperitoneal (i.p) injection of Streptozotocin (65 mg/kg, STZ) in overnight fasting rats or mice followed by the i.p administration of Nicotinamide (110 mg/kg, NIC) after 15 minutes. STZ was dissolved in citrate buffer (pH 4.5) and NIC was dissolved in normal saline. After 7 days following STZ and NIC administration, blood was collected from retro-orbital puncture and serum samples were analyzed for blood glucose [15]. Animals showing fasting blood glucose higher than 250 mg/dL were considered as diabetic and used for the further study.

D. Experimental Protocol

The rats were divided into three groups each consisting of six animals:

Group 1: Animals served as sham-operated (underwent all surgical procedures without ischemia reperfusion).

Group 2: After right nephrectomy on day 1, vehicle (0.5 % sodium CMC) was administered for 15 days; on day 16, ischemia was produced in the left kidney for 45 min, followed by reperfusion of 24 hr (I/R control).

Group 3: After right nephrectomy on day 1, Glimepiride (0.5 mg/kg/day, p.o.) was administered for 15 days; on

day 16, ischemia was produced in the left kidney for 45 min, followed by reperfusion of 24 hr (I/R + GLI).

E. Surgical Procedure

The progress of the experiment	
Day 1	Unilateral right nephrectomy
Day 15	Treatment
Day 16	45 minutes ischemia (left kidney)
Day 17	24 hr reperfusion

Right nephrectomy was performed through a right flank incision (2 cm) under general anesthesia, ketamine (100 mg/kg, i.p.). After right nephrectomy, several treatments were given as mentioned previously for 15 days. On day 16, ischemia was produced in the left kidney by performing a left flank incision and dissecting the left renal pedicle to expose the renal vessels. Non traumatic vascular clamps were used to stop blood flow (in artery and vein) for 45 min. Reperfusion was established by removing the clamp after 45 min ischemia. The abdominal wall (muscular layer and skin) was closed with 4.0 mononylon suture. At the end of reperfusion period (after 24 hr), blood samples were collected and used for the estimation of renal function (BUN and creatinine). The abdomen was opened, and the kidneys were harvested for the biomarkers of oxidative stress.

F. Characterization of Type 2 Diabetes Model

Type 2 diabetes was confirmed by measuring fasting serum glucose using standard diagnostic kit (SPAN diagnostics Pvt., India) and the degree of uncontrolled diabetic state was confirmed by measuring HbA1c (Ion Exchange Resin method). After seven day, diabetes was confirmed by measuring glucose and HbA1c as mentioned above.

G. Estimation of renal function marker

Blood was collected from the rats by retro-orbital puncture at the time of sacrify and was allowed to clot for 10 minutes at room temperature. Clots were centrifuged at 2500 rpm for 10 minutes to separate the serum. Blood urea nitrogen level was measured by assay kits (SPAN Diagnostics Pvt. India) and Serum Albumin levels were measured by assay kits (Crest Biosystems Ltd. India).

H. Estimation of kidney Tissue Nitrite Levels

The level of nitrite level was estimated by the method of Lepoivre et al. [16]. To 0.5 mL of tissue homogenate, 0.1 mL of sulphosalicylic acid was added and vortexed well for 30 minutes. The samples were then centrifuged at 5,000 rpm for 15 minutes. The protein-free supernatant was used for the estimation of nitrite levels. To 200 μL of the supernatant, 30 μL of 10% NaOH was added, followed by 300 μL of Tris-HCl

buffer and mixed well. To this, 530 μL of Griess reagent was added and incubated in the dark for 10–15 minutes, and the absorbance was read at 540 nm against a Griess reagent blank. Sodium nitrite solution was used as the standard. The amount of nitrite present in the samples was estimated from the standard curves obtained.

I. Histopathology

For light microscopic evaluation, kidneys were fixed in 10% phosphate buffered formalin. Paraffin-embedded specimens were cut into 6 mm-thick sections and stained with hematoxylin and eosin (H&E). The kidneys were examined under a light microscope (Olympus Bioxl) for the presence of tubular changes and interstitial inflammatory cell infiltration by an observer blinded to the animal treatment group.

J. Statistical Analysis

All of the data are expressed as mean ± SEM. Statistical significance between more than two groups was tested using one-way ANOVA followed by the Bonferroni multiple comparisons test or unpaired two-tailed student's t-test as appropriate using a computer-based fitting program (Prism, Graphpad 5). Differences were considered to be statistically significant when $p < 0.05$.

III. RESULTS

A. Characterization of Type 2 Diabetes

Single intraperitoneal (i.p) injection of Streptozotocin (65mg/kg) followed by i.p administration of Nicotinamide (110 mg/kg) to rats produced severe hyperglycemia and increased HbA1c in 70 to 80 % the animals (Table 1).

Table 1. Effect of Streptozotocin (65mg/kg/day, p.o) and Nicotinamide (110 mg/kg/day, p.o) on serum glucose and HbA1c changes level in rats.

Groups	Glucose	HbA1c
CON	101.8 ± 6.799	5.455 ± 0.3729
STZ + NIC	332.8 ± 9.167***	9.900 ± 0.6323***

Values are expressed as mean ± SEM for six animals in the group. ***P<0.001 considered statistically significant as compared to respective Control group.

B. Effect of GLI on kidney function marker

The six rats which underwent renal I/R exhibited a significant increase in the serum concentrations of Albumin (1.950 ± 0.1746 mg/dL tissue, p<0.001, n = 6) and blood urea nitrogen (66.55 ± 3.32 mg/dL tissue, p<0.001, n = 6) compared with the sham control animals (4.133 ± 0.1532, 25.96 ± 3.396 mg/dL tissue, respective Sham control, p<0.001, n = 6), suggesting a significant degree of glomerular dysfunction mediated by renal I/R. In I/R+GLI treated diabetic rats, serum Albumin and blood urea nitrogen levels were non significantly as compared to I/R control group alone (Fig.1).

C. Effect of GLI on kidney Tissue Nitrite Levels

Renal I/R resulted in a significant decrease in the tissue levels of nitrite (127.5±7.68 nmol/gm tissue, p<0.05, n = 6) as compared to values obtained from the tissue of sham-operated animals (156.5 ± 9.68, n = 6). In I/R+GLI treated rats, a significant increase in the tissue levels of nitrite as compared to I/R control group alone (from 127.5 ± 7.68 to 163.3 ± 8.89 nmol/gm tissue, p<0.05, n = 6) (Fig.2).

IV. HISTOPATHOLOGICAL ANALYSIS

Light microscopic evaluation of the sham-operated groups revealed a regular morphology of renal parenchyma with well-designated glomeruli and tubuli (Fig. 3). The sham control group of rats did not show any morphological changes. By contrast, the kidneys of the diabetic rats with I/R only showed tubular cell swelling, interstitial edema, tubular dilatation, and moderate to severe necrosis, whereas, Glimepiride may be not educed tubular dilation, loss of interstitial hemorrhage, and glomerular atrophy were the regenerated features (Fig. 3).

Figure 1. Effect of Glimepiride (0.5 mg/kg/day, p.o) on serum Albumin (A) and Blood Urea Nitrogen (B) in the diabetic rats exposed to renal ischemia/reperfusion (I/R) injury.
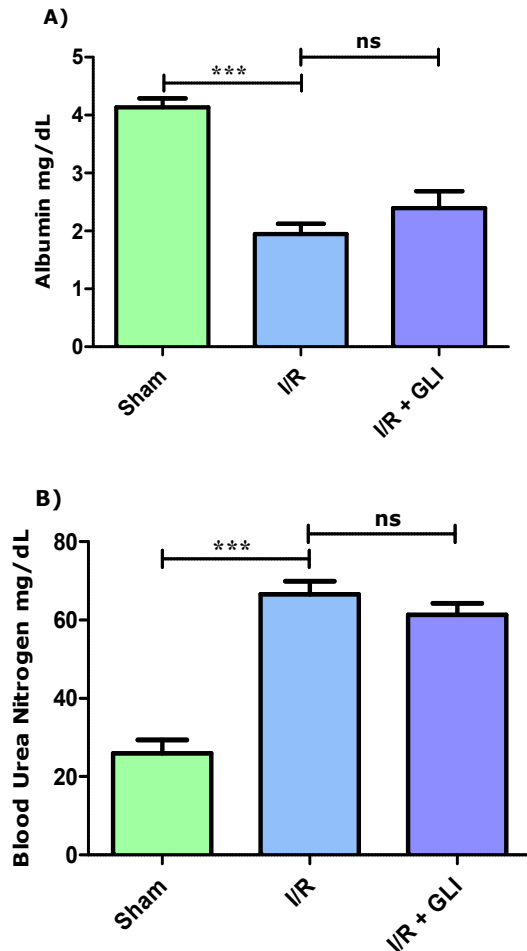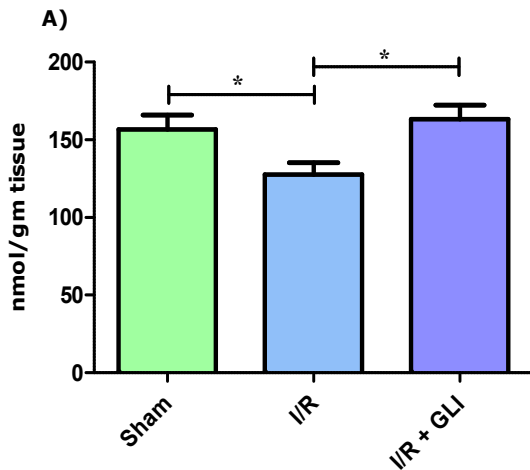
Values are expressed as mean ± SEM for six animals in the group. [*]P<0.05, [**]P<0.01, [***]P<0.001 considered statistically significant as compared to respective Sham group. **A)**[***]P<0.001 sham vs. I/R control, **B)** [***]P<0.001 sham vs. I/R control.

V.   DISCUSSION

The present study was under taken with the objective of exploring evaluate the effect of Glimepiride as a beneficial agent in the treatment of Ischemia/reperfusion induced renal damage in diabetic rats. The transient discontinuation of renal blood supply is encountered in many clinical situations such as kidney transplantation, partial nephrectomy, renal artery angioplasty, aortic aneurysm surgery, and elective urological operations [3, 4]. This transient discontinuation causes renal I/R injury which results in decreased glomerular filtration and renal blood flow and increased urine output characterized by natriuresis and impaired concentrating ability. Acute renal failure produced by ischemia and reflow is histopathologically characterized by extensive tubular damage, tubular cell necrosis, glomerular injury, and signs of tubular obstruction with cell debris [17, 18].

Figure 2.   Effect of Glimepiride (0.5 mg/kg/day, p.o) on Tissue nitrate level in kidney tissue in diabetic rats exposed to renal ischemia/reperfusion (I/R) injury.

Values are expressed as mean ± SEM for six animals in the group. [*]P<0.05, [**]P<0.01, [***]P<0.001 considered statistically significant as compared to respective Sham group. [*]P<0.05 sham vs. I/R control, [*]P<0.05 I/R vs. I/R+GLI.
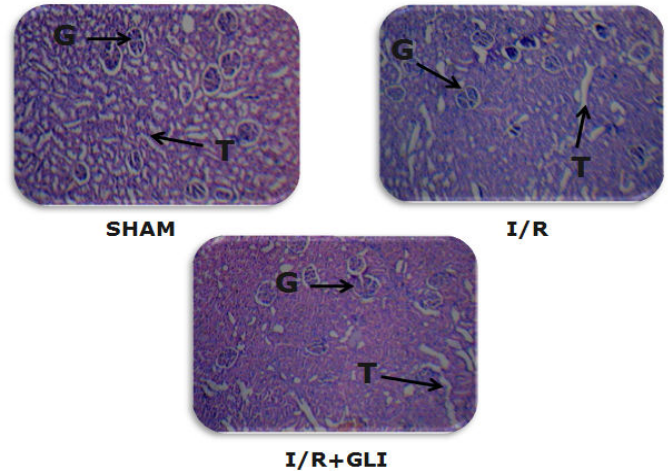

Figure 3. Morphological Changes Assessed by Histopathological Examination of Kidneys of diabetic Rats Exposed to Ischemia/Reperfusion (I/R) Injury With and Without Preceded Treatment with Glimepiride (GLI) and Sham Operation. **Sham:** kidney section of a rat in the sham operation group shows normal glomeruli and tubuli, **I/R**: Kidney section of a rat exposed to bilateral renal ischemia/reperfusion shows severe interstitial hemorrhage surrounding the glomeruli and tubuli. Tubular epithelial degeneration is apparent, **I/R+GLI**: Kidney section of the rats with ischemia/reperfusion injury treated with Glimepiride, in which may be not improve I/R degeneration of tubuli and glomeruli are seen. **G** = Glomerul, **T** = Tubuli.

In the clinical settings, renal I/R are a consequence of systemic hypoperfusion with subsequent circulatory resuscitation, such as following aortic cross-clamping or renal transplantation [19]. There is good evidence from both in vivo and in vitro studies that the formation of NO plays an important role in I/R [20]. One of the important mechanisms for I/R injury is excessive ROS, which scavenges NO and cumulates in reduced NO bioavailability [21].
Endothelial cells produce less bioactive NO in the presence of higher oxidative stress [22, 23].

In the present study, there was a significant decrease NO in I/R control group in comparison to the sham-operated group, A increase in NO level in the Glimepiride-treated I/R+GLI group showed significant improvement in renal function as compared to the I/R control and I/R+GLI groups.

Previous studies have shown that peroxynitrite level in the heart increases greater than 10-fold in the first minute of reperfusion [24]. In this study, there was a significant decrease in tissue nitrite levels in kidney of I/R group animals as compared to sham-operated group. Moreover, peroxynitrite could initiate lipid peroxidation, which damages the proximal tubular cells, nitration of tyrosine residues (nitro tyrosine), and nitration of cellular proteins, with a subsequent loss of protein structure resulting in reduction of the kidney function [25, 26]. Similar results were obtained in this study as well. There was a significant increase (3 fold) in the levels of serum BUN and significant decrease (3 fold) in the levels of serum albumin in I/R control group, whereas animals treated with GLI may be not improve renal function in comparison to I/R control group.

VI. CONCLUSIONS

In the present study, may not improve Blood urea nitrogen, Nitric oxide, histophathology parameter to not prevent renal I/R injury in diabetic condition. Our data support effect of Glimepiride as a may be not beneficial agent in the treatment of Ischemia/reperfusion induced renal damage in diabetic rats.

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