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RESEARCH ARTICLE

Optimization of Turning Parameters Such as Speed Rate, Feed Rate, Depth of Cut for Surface Roughness by Taguchi Method

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QR Code for Mobile users

ABSTRACT

This project is based upon the study which means it is derived from experiment and observation rather than theory. For the fulfilment of objective our first motive is selection of cutting tool & work tool material selection of various process and performance parameters after parameterssss selection aims to study various techniques for the optimization for that purpose literature review and industrial survey is conducted. The objective of this study was to utilize Taguchi methods to optimize surface roughness in turning mild steel, EN-8 and EN-31. The turning parameters evaluated are cutting speed of 200, 250, and 300 m/min, feed rate of 0.08, 0.12 and 0.15 mm/rev, depth of cut of 0.5 mm and tool grades of TN60, TP0500 and TT8020, each at three levels. The experiment was designed and carried out on the basis of standard L9 Taguchi orthogonal array. The results show that the Taguchi method is suitable to solve the stated problem with minimum number of trials as compared with full factorial design.

Keywords - Surface Roughness, Turning , Cutting Tool, MS, EN-8,EN-31 Taguchi Method

Conflict of Interest: None Declared !

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Data Extraction and Annotation for Web Databases using Multiple Annotators Approach- A Review

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ABSTRACT
Web contain huge amount of information on Web sites the user can retrieve this with help of the search input query to Web databases & fetch the relevant information. Perhaps Web databases return the multiple search output records dynamically on Web browser, these search record are containing the Deep Web pages in the form of HTML pages. It is time consuming &human efforts are involved. The traditional search engine does not index the hidden Web pages from Web databases, such as (Google, Yahoo etc.). Many existing proposed techniques have addressed the problem of how to extract efficient structure data from Deep Web. The deep web refers to the hidden database used by web sites. But the information extraction & annotation is key challenge in web mining. The information retrieval should be done automatically & arrange in a systematic way for further processing. Various methodologies like wrapper induction is been induced. The labeling is done to the extracted information as per the concept.Various types of annotators are used on the basis of the data to be annotated. In this paper survey the automatic annotation approach on the basis of different feature of text node and data units.

General Terms
Data extraction, Web data annotation, Deep web pages and Wrapper induction

Keywords
Data Extraction, Data annotation, Annotators, Text nodes, Data Units and Wrapper

1. INTRODUCTION
Now a day's web technology is getting an emergence importance in day to day life! Everyone is familiar with surfing the web, uploading personal or important data on the web, sharing data with friends or social communities like the Facebook. Even mobile technology focus on the various trends in web. There are various technologies & researches are focusing on the extraction of relevant information from large web data storage. But still there is requirement of availability of automatic annotation of this extracted information into a systematic way so to be processed later for various purposes Web information extraction and annotation has been active research area in web mining. A huge amount of the data is available on the web. The user enter the search input query in the search engine, and search engine return the dynamically search output records on Web browser. Many E-commerce sites are available to users, for example, when a user wants to check the details while buying a notebook such as configuration and price, but such type of information is only stored in the form of hidden back-end databases of the various notepad vendors, then the user has visit to each web site and collect regarding information from various web site and distinguish these all retrieved information manually so he can get the required product at reasonable price. This is a time consuming process & due to human effort it leads to inaccuracy up to particular extent. There is a need for technique which should help us to provide retrieved relevant data as per user requirements. The last decade focus on multiple methodologies in firing queries, information fetching & optimization. The concept of wrapper is introduced. The wrapper is a software concept which wraps the contents of a web page using its source code via HTTP protocols [8] but it does not change the original query mechanism of that web page. This scenario assumes that every web database is having a common schema design. Therefore, we use the terms extractors and wrappers interchangeably [2]. We know that Word Wide Web having huge amount of data available on it but there is no tools or technology to extract relevant information from Web databases. In deep web databases search engines is referred as Web databases (WDB). When we extract the pages, the resulted pages returned from a WDB have multiple Search Result Records (SRRs). Each SRRs contain multiple data units each of which describes one aspect of real-world entity & text units [1]. Consider a book comparison web; we can compare SRRs on a result page from a book WDB. Each SRRs represents one book with several data &text units .It consists text node outside the <HTML>, Tag node surrounded by HTML Tags & title, author ,price, publication& the values associated with it as data units. A data unit is a piece of text that semantically represents one concept of an entity. It corresponds to the value of record under an attribute. It different from the text node which is refers to the sequence of text surrounded by a pair of HTML tag.

The relationship between the data unit and text node is very important for the purpose of annotation because the text node are not always identical to data nodes. The WDBs has multiple sites to store in it. For this task, labeling to required data & storing the collected SRR into a data base is important. Early applications require tremendous human efforts to annotate data units manually, which severely limit their scalability. Later approaches focus on how to automatically assign labels to the data units within the SRRs returned from WDBs. So this well reduces human involvement &increase the accuracy. For example in a book comparison website we wish to find the price details from the different websites for

the same book so we can decide the choice to buy the book with the reasonable price & the reliable website. The ISBNs can be compared to achieve this. If ISBNs are not available, their titles and authors could be compared.

2. LITERATURE SURVEY

The World Wide Web is having vital data in numerous formats the users have to deal with this data by using a search based form. The user will retrieve the information by firing the query. In traditional approach the search base form is design to fire the queries & required data is fetched. HTML form is containing the plain text. Querying, Integration, and Meditation etc. are used. But this techniques are not effective to produce accurate search result record from web databases, because of human involvement and poor quality of the data extraction output. Two main problem aeries during extracting the relevant information First: to categorized the unstructured view of data such as search engine. Second: categorized structure and semi-structure view of data. The web sites are also having heterogeneous nature due to language independent. The e commerce website or the information portals are updating their content on a regular basic. *Domain oriented approach* is used to automatically extract news; the domain oriented approach is based on tree edit-distance approach. This approach is not only capable for to extract relevant information text passages but also eliminates not-useful matters e.g. banners, menus and links. The tree edit distance algorithm was used for news extraction [4].The web data is now machined process able so, we require the relevant information extraction with the semantic grouping. The semantic grouping means the data with similar meaning can form group with same concept. XML/RDF has been widely used for representing semantic web that required annotation for recognition of semantic web. These techniques provide manual mapping of unlabeled document segment to ontological concepts. In bootstrapping semantic labeling is addressed in semantic web annotation. The presentation style & spatial locality in the HTML tag is focused [3].The sites like educational, news portal and e-commerce are dynamically update contents on a regular basis so called as content-rich web sites contents management software that creates HTML pages by populating templates from databases. The two things have to be focused. Spatial locality in HTML page and its corresponding DOM tree can also representing the content similarity. The structural analysis technique use to group together related elements in a HTML pages into unlabeled tree. The algorithm can use the hand-labeled concept instances from HTLM pages for identification of unlabeled concept instances in HTML pages and assigns semantic labels to them. The algorithm does not used hand-crafted ontology. For determining the consistency in presentation style we can use the feature extraction i.e. likelihood measures the closeness of data item to the concept at every node in the partition tree is used. So the data belong to same concept or set of concepts lie under similar group.

Table 1. Analysis of Approaches based on Techniques & tools used

Sr. No	Approaches	Techniques	Tools	Limitation
1.	Manual	Identify & Extract data items using wrapper	Minerva TSIMMIS Web-OQL	Low Efficiency & Poor scalability
2.	Semi-Automatic	Sequence based	WIEL Soft-Mealy Stalker	Manual efforts for labeling Web pages & time consuming
		Tree based	W4F XWrap	
3.	Automatic	Data Record Extraction	Omini	Vary as per the techniques, Only text node level annotation
		Data Record Extraction	Road-Runner IEPAD	
		HTML Tag Tree Structure	DEPTA DeLa	

For spatial locality we can use the likelihood estimation to assign the semantic labeled to nodes in partitioning tree. For improving ambiguity we can use the bipartite-graph based ambiguity resolution technique to provide the facility disambiguation to improve the precision of semantic label assignment. Three types of approach for data extraction techniques are analyzed on the basis of the various techniques and tools [7]. As per the analysis from Table 1, the limitation of manual approach had overcome by inducing sequence based and tree based techniques. In RoadRunner[11] comparison between HTML pages and generate wrapper based on their similarity and differences. The Labeller is used for the automatic wrapper generation [5] Due to problem of human efforts and low efficiency, the unsupervised approach is an active research area in data extraction. Automatic data extraction approach is mainly categorized into three techniques data records extraction, HTML tag tree structure, Tree and pattern matching. But this approaches not suitable for the dynamic Web databases. ViDE is the Visual data extraction system which is independently works without HTML tag tree structure. ViDE is focused on the Visual features of the Web pages. ViDE is primarily based on the visual features human users can capture on the deep Web pages while also utilizing some simple non visual information such as data types and frequent symbols to make the solution more robust. [7]

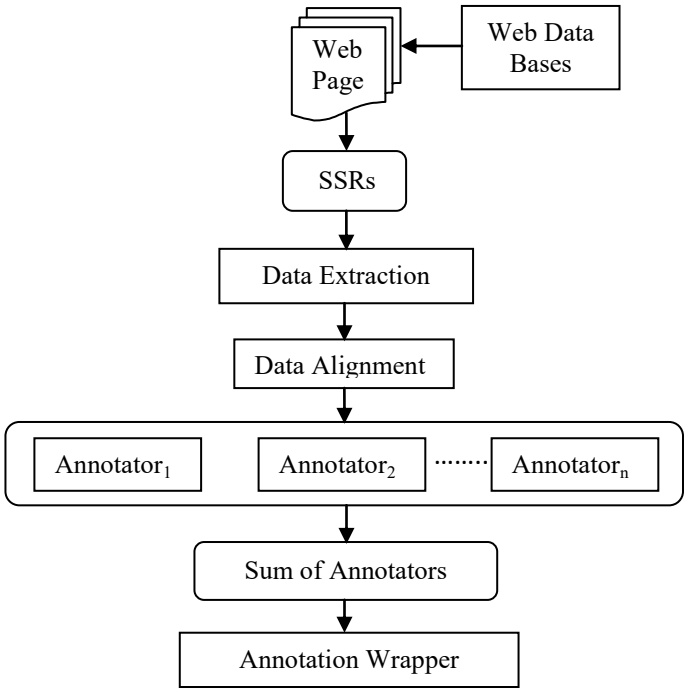

Fig 1: Data Extraction and Annotation

3. DATA EXTRACTION & ANNOTATION

According to user query search engine provide the information from the back-end deep web databases or we can say hidden database. The data extraction is performed by the wrapper induction many approaches focused on the effective grammar or regular expression for wrapper induction. But wrapper induction is used for data extraction not for automatic annotation [1] or labeling the data records. The Data extraction and Annotation system as shown in Fig. 1 Consists of four major components: from deep web crawler [10], a wrapper generator, a data aligner and a label assigner (Annotators).

Web Crawler: Web Crawler are a tool that solving the resource discovery problem in the World Wide Web. Find search result record from the hidden web, two main function of the Web crawler is first: To building an indexes of the various search result records and second: Navigation the web automatically on the basis of user demands.

Wrapper: Wrapper is a program or set of rules are to define for the HTML tags for Web data extraction. Wrapper generates automatic regular expression for HTML web pages, and performs heuristic-based automatic data extraction and annotation for web databases.

Data Aligner: Given the induced wrapper and the web pages, the data aligner first extracts data objects from the pages by matching the wrapper with the token sequence of each page. It then filters out the HTML tags and rearranges the data instances into a table similar to the table defined in a relational DBMS, where rows represent data instances and columns represent attributes.

Annotation/Label Assigner: The main roll of label assigner is assigning labels to the data units by matching the form labels obtained by the form crawler to the columns of the table. The basic idea is that the query word submitted through the form elements will probably reappear in the corresponding fields of the data objects, since the web sites usually try their best to provide the most relevant data back to the users.

3.1 Data Extraction

Given a regular expression pattern and a token sequence representing the web page, a nondeterministic, finite-state automaton can be constructed and employed to match its occurrences from the string sequences representing web pages. each occurrence of the regular expression represents one data object from the web page so we can found the occurrence from regular expression & from data tree.

A data-tree is defined recursively as follows: [2]

- If the regular expression is atomic, then the data-tree is a single node and the occurrence of the expression is the node label.
- If the regular expression is $E_1E_2...E_n$, then the data-tree is a node with n children and the i^{th} ($1<i<n$) child is a data-tree that records the occurrence of E_i.
- If the regular expression is $(E_1|E_2)$, then the data-tree is a node with one child that records the occurrence of either E_1 or E_2.
- If the regular expression is $(E)^*$ and there are m occurrences of E, then the data-tree is a node with m children and the i^{th} ($1<i<m$) child is a data-tree that records the m^{th} occurrence of E.

The following methods are used for building DOM tree

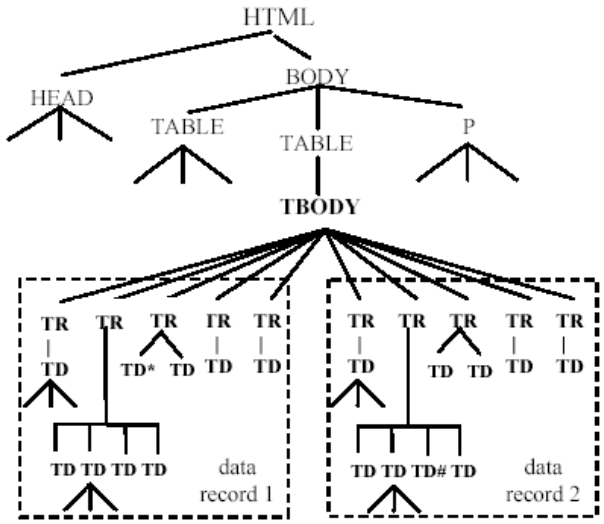

Fig. 3 Building DOM Tree

Fig. 4 Sample HTML page

3.1.1 Edit distance

It is defined as the no of point mutations to change, insert or delete a letter. The matrix can be used to hold the edit distance.

3.1.2 Tree edit distance

Tree edit distance between two trees A and B (labeled ordered rooted trees) is the cost associated with the minimum set of operations needed to transform A into B. The set of operations used to define tree edit distance includes three operations like node removal, node insertion& node replacement. A cost is assigned to each of the operations

3.1.3 Multiple alignments

Pair wise alignment is not sufficient because a web page usually contains more than one data records. We need multiple alignments. Two techniques are utilized for this: Center Star method & Partial tree alignment. This is a classic technique, and quite simple. It is commonly used for multiple string alignments, but can be adapted for trees.

3.1.4 Building DOM trees

The usual first step is to build a DOM tree (tag tree) of a HTML page. Most HTML tags work in pairs. Within each corresponding tag-pair, there can be other pairs of tags, resulting in a nested structure. Building a DOM tree from a page using its HTML code is thus natural. As per Fig.1, in the tree, each pair of tags is a node, and the nested it are the children of the node.

4. TYPES OF ANNOTATORS

The returned result page contains multiple SRRs. the data units corresponding to the same concept (attribute) often share special common features in certain patterns. Based on this, in this paper we used the six basic annotators have been defined to label data units, with each of them considering a special type of patterns/features. Each annotator are play unique role in labeling the name to the data units are extracted by the wrapper. Four of these annotators (i.e., table annotator, query-based annotator, in text prefix/suffix annotator, and common knowledge annotator) are similar to the annotation heuristics used by DeLa but there different implementations for three of them (i.e., table annotator, query-based annotator, and common knowledge annotator) [1] [6] [2].

4.1 Table Annotator

The resulted page fetch from multiple website consist of different SRR. Each information can be stored in the form of table .A table consist of different column header &rows. The cell of this table indicates the data unit. We can store the multiple data units. The table annotator used in Dela [2] Approach mainly focus on the <TD> tag elements. The information stored in <TD>elements is stored in the annotator table. But few websites contain the <TD> tag elements. So the table annotator is modified .The row is considered as SRR & the column is considered as attribute. The data unit having same features can be aligned under header & the column header. By considering the special feature we can annotate the SRR. Firstly we have to identify all the values of column then as per SRR we have to fill the data. In such way the limitation of Dela [2] is improved.

4.2 Query-Based Annotator

The SRR is always returned from WDB on the basis of fired query. When the user submits the data in the text box or select field from the list box on the search form, the query is fired on the WDB. Then the SRR is identified & the data is stored under the column header. The no of occurrences of matching the column header will decide the group & we can label it. The Dela uses only the local labels in the query. However, DeLa uses only local schema element names, not element names in the IIS [2].so, the new approach is use to utilize the global schema.

4.3 Schema Value Annotator

Many attributes on a search interface have predefined values on the interface. For example, the attribute vendor may have a set of predefined values in its selection list. More attributes in the IIS tend to have predefined values and these attributes are likely to have more such values than those in LIS. When values from different LIS are integrated then we have to modify the schema values to perform annotation.

4.4 Frequency Based Annotator

The adjacent units have different occurrence frequencies. The data units are always associated with the higher frequency & lower frequency. The higher frequencies are the attribute

names, as part of the template program for generating records, while the data units with the lower frequency most probably come from databases as embedded values. Suppose there is a group of lower frequency then we can easily find its preceding values shared by all data units in the group .We can analysis the data unit until it is different & map its preceding. Then we can combine the preceding to form the label.

4.5 In-Text Prefix/Suffix Annotator

In some cases, the data unit is aligned with its label. The data unit consists of the comma separated vales & the labels associated with it. Theses lie in a particular sequence separated from each other in all multiple SRR. After alignment it will form a group. The in text prefix/suffix will check for data unit. If the same prefix is there &not a deliiminator then it is removed from all data units but if the number of data nodes match with the same suffix to the data node within next group then the suffix is used for the annotation. Any group whose data unit texts are completely identical is not considered by this annotator.

4.6 Common Knowledge Annotator

Some data units on the result page are self-explanatory because of the common knowledge shared by human beings For example, "in stock" and "out of stock" occurs in many SRRs from e-commerce sites. Human users understand that it is about the availability of the product because this is common knowledge. Each common concept contains a label and a set of patterns or values. As another example, the e-mail address (assume all lower cases) so the common knowledge annotator work on the data units which exploit the interpretation of common knowledge data.

5. DATA UNITS SIMILARITIES

The data alignment is to put the data units of the same concept into one group so that they can be annotated holistically. Whether two data units belong to the same concept is determined by how similar they are based on the features likes *Data content (DC), Presentation Style (PS), Data Types (DT), Tag path (TP)* and *Adjacency (AD)* the similarity between two data units (or two text nodes) d1 and d2 is a weighted sum of the similarities of the five features between text nodes and data units as in [1] Yiyao Lu et al.

$$Sim(d_1,d_2) = w_1*SimC(d_1,d_2) + w_2*SimP(d_1,d_2) + w_3*SimD(d_1,d_2) + w_4*SimT(d_1,d_2) + w_5*SimA(d_1,d_2) \quad (1)$$

5.1 Data content similarity (Sim C)

It is the Cosine similarity between the term frequency vectors of d_1 and d_2: Where, V_d is the frequency vector of the terms inside data unit d, $\|V_{d1}\|$ is the length of V_d, and the numerator is the inner product of two vectors [1].

$$SimC(d_1,d_2) = V_{d1}+V_{d2} / \|V_{d1}\| * \|V_{d2}\| \quad (2)$$

5.2 Presentation style similarity (Sim P)

It is the average of the style feature scores (FS) over all six presentation style features (F) between d_1 and d_2 [1]

$$SimP(d_1,d_2) = \sum_{i=0}^{6} FSi/6 \quad (3)$$

5.3 Data type similarity (Sim D)

It is determined by the common sequence of the component data types between two data units. The longest common sequence (LCS) cannot be longer than the number of component data types in these two data units. Thus, let t_1 and t_2 be the sequences of the data types of d_1 and d_2, respectively, and TLen(t) represent the number of component types of data type t, the data type similarity between data units d_1 and d_2 is [1]

$$SimD(d_1,d_2) = LCS(t_1,t_2) / Max(Tlen(t_1), Tlen(t_2)) \quad (4)$$

5.4 Tag path similarity (Sim T)

This is the edit distance (EDT) between the tag paths of two data units. The edit distance here refers to the number of insertions and deletions of tags needed to transform one tag path into the other. It can be seen that the maximum number of possible operations needed is the total number of tags in the two tag paths. Let p_1 and p_2 be the tag paths of d_1 and d_2, respectively, and PLen(p) denote the number of tags in tag path p, the tag path similarity between d_1 and d_2 is [1]

$$SimT(d_1,d_2) = 1- EDT(p_1,p_2) / PLen(p_1) + PLen(p_2) \quad (5)$$

5.5 Adjacency similarity (Sim A)

The adjacency similarity between two data units d_1 and d_2 is the average if the similarity between d_1^p and d_2^p and the similarity between d_1^p and d_2^p, that is [1]

$$SimA(d_1,d_2) = (Sim'(d_1^p, d_2^p) + Sim'(d_1^p, d_2^p)) /2 \quad (6)$$

6. PHASES OF ANNOTATOR

From the SRR, first identify all data units and then organize them into different groups with each group corresponding to a different concept. The data unit with same concept can fall under the same column header like table annotator. E.g.: All names of the vendors for notepad are in group together. Grouping data units of the same semantic can help identify the common patterns and features among these data units [1] so it will help for better accuracy in semantic annotation.

6.1 Alignment Phase

This phase identify all data units in the SRRs and then organize them into different groups with each group corresponding to a different concept

6.2 Annotation Phase

In this phase, single or combined multiple annotators are used as per the requirement for annotation. This work on the probability based.

6.3 Wrapper generation Phase

The wrapper set the rules for extracting the information from same WDB. The annotator wrapper can be used for further analysis. We can write the wrapper after combining the multiple annotators. For mapping the information between text node &data node we have to first find the relationship between them. Relationship between the data unit and text node are as bellow:

- **One-to-One**

In some cases the text nodes are equivalent to data nodes so can be used for annotation in a easy way. For example the <a>… in HTML itself indicate the data value & attribute .But this is not the general case always to be considered in fig 4. Show that *title* attribute each search result considers as a one-to-one relationship [2][1].

- **One-to-Many**

This relationship contained many data nodes can be associated with one text node. For example by observing one particular text node we can multiple information (data units) are present in single text node like publication details. As shown in fig 4. each SRR (e.g., "Springer-Verlag/1999/0387984135/0.06667" in the first record) is a single text node. It consists of four semantic data units: Publisher, Publication Date, ISBN, and Relevance Score [1].

- **Many-to-One**

In this case, multiple text nodes together form a data unit. For example the vendor name can be embedded inside the <a>.. tag .Another example can be considered that the price can be entitled within … tag [1].

- **One-to-Nothing**

In this case the text node is not part of any data unit. For Example vender name does not contain data unit but instead describe the meaning data unit. It is also known as *Template text node* [1].

7. DATA & TEXT NODE ALIGNMENT

Data alignment algorithm is based on the assumption that attributes appear in the same order across all SRRs on the same result page, although the SRRs may contain different sets of attributes (due to missing values) [1]. SRRs from the same WDB are generated by the same schema. Thus, we can consider the SRRs on a result page in a table format where each row represents one SRR and each cell holds a data unit (or empty if the data unit is not available). The goal of alignment is to move the data units in the table so that every alignment group (column) contain similar data unit, preserving the order within every SRR is preserved. The alignment algorithm is based on following steps:

- **Merge Text Nodes**

This mainly focuses on removing the decorative or presentation style tags so that all text nodes can be merged.

- **Align Text Nodes**

This will align the nodes with the same concept or set of concepts under one group for atomic node as well as for composite nodes.

- **Split (Composite) Text Node**

The split node again have to be focused on the annotation work .we have to split the "values" in composite text nodes into individual data units. This step is carried out based on the text nodes in the same group.

- **Align Data Units**

This step is to separate each composite group into multiple aligned groups with each containing the data units of the same concept.

8. CONCLUSION

In this paper we reviewed that various data extraction techniques as well as automatic annotation approach using multiple annotators from different Web data bases. We also surveyed that how the data extraction from the various web pages but the traditional approach is having many drawbacks like human interference, the inaccuracy in result and poor scalability. Some approach are used the different feature extraction techniques such as sequence based Tree edit distance, DOM tree, pattern matching and HTML tag structure. In visual data extraction approach is the language independent. This approach mainly focus on the presentation style of and extract the visually information from the template. But still there is need to identify the best technique for data annotation problems.

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Review of Multicast Key Distribution with Reduced Method

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Abstract: Many emerging web and Internet applications are based on a group communications model. Thus, securing group communications is an important Internet design issue. The Key Distribution is major problem of communication and network security. Group communication can benefit from IP multicast to achieve scalable e□change of messages. However, there is a challenge of effectively controlling access to the transmitted data. IP multicast by itself does not provide any mechanisms for preventing non□group members to have access to the group communication.
In this paper, we present new method for making scheme for efficient computation. In which we include MDS code which is related to the problem of efficient information updates. We also include the efficient re□keying of large groups with dynamic membership: minimi□ing the overall time it takes for the key server and the group members to process the re□ keying message. Specifically, we concentrate on re□keying algorithms based on the Logical Key Hierarchy (LKH), and minimi□e the longest se□uence of encryptions and decryptions that need to be done in a re□keying operation, then we provide an optimal schedule of re□keying messages. We propose a new scheme for a scalable multicast key distribution scheme. It focuses e□plicitly on the issue of snowballing member removal and presents an algorithm that minimi□es the number of messages re□uired to distribute new keys to the remaining group members.

Keywords: Multicasting, Rekeying, Group Key Member, MDS.

I. INTRODUCTION

Multicast is an effective method for distributing information to multiple users in a group communication; it reduces the consumption of network resources. Multicast is supported on the internet, or via satellite communication, wireless network, sensors etc., in multicast group communication, all the authori□ed members share a session key, which will be changed dynamically to ensure forward and backward secrecy referred as "group rekeying".

Traditional networking depends heavily on physical cables or reliable communication channels to provide end□ to□end network paths, and with moderate round□trip times and small packet loss probabilities (Zhu et al., 2□□□). However, with some new emerging networking technologies such as satellite, sensor and vehicle communication networks technology, traditional networks fail to perform well as the new technology has a very long delay network path and possible link distributions (Bhutta et al., 2□□□) [2].The goal is to actually communicate, i.e. transfer information from one party to another, we also need to keep an eye on practicality. Usually we will assume that any party involved can run polynomial time and space algorithms, no matter whether we are talking about the legitimate parties or an adversary [1]. In this paper, the hierarchical key distribution algorithm (or, scheme), which is regarded as the most efficient category of key distribution architectures in term of efficiency and scalability is provided.

One of the most efficient approaches to ensure confidentiality of group communications is employing a symmetric□key encryption scheme. But before the sender encrypts and transmits the data over a group communication channel to a group of privileged users, a shared key called group key must be established among them [4]. Group key establishment can be subdivided into group key distribution (GKD) and group key e□change (or group key agreement). Two parallel lines of research, commonly referred to as broadcast encryption (BE) [6] and multicast key distribution (MKD) (or multicast encryption), have been established to study the GKD problem. This paper only focuses on multicast key distribution protocols. To prevent a new member from decoding messages e□changed before it joins a group, a new group key must be distributed to the group when a new member joins. This security re□uirement is called group backward secrecy [□]. On the other hand, to prevent a departing member from continuing access to the group's communication (if it keeps receiving the messages), the key should be changed as soon as a member leaves. This security re□uirement is called group forward secrecy [□]. To provide both group backward secrecy and group forward

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secrecy, the group key must be updated upon every membership change and distributed to legitimate members. This process is referred to as immediate group rekeying in literature.

II. MAXIMUM SEPARABLE CODES

An MDS (Ma□imum Distance Separable) codes are a class of block error control codes that meet the Singleton Bound, i.e., d = n □k + 1 for an (n, k, d) code over GF(□). A k□symbol message block m = m1 …. mk is expanded to an n□symbol code word block c = c1..…cn [1] [10]. Using a proper erasure decoding algorithm, the message block m can be perfectly recovered from any k symbols of the code word c. We choose the Reed Solomon codes (RS) [□] as the MDS codes, since it is the most widely used MDS code. For a □ary (n,M,d)□code, the Singleton bound states that

M □ □n□d+1. This implies that for a linear [n,k]□code we must have □k □ □n□d+1, from which it follows that k □n □d + 1, or as we prefer to write it, d □n □k + 1. A linear code which meets this bound is called a Ma□imum Distance Separable (MDS) code. Since error correcting capability is a function of minimum distance, we see that for given dimensions n and k, the MDS codes are those with the greatest error correcting capability.

2.1Characterizing MDS Codes

There are several useful characteri□ations of MDS codes. The simplest being;

Proposition 1: A □ary [n,k] linear code is an MDS code if, and only if, the minimum non□□ero weight of any codeword is n □k + 1 the trival e□ample are as follows:

1. For any n and □, V [n,□], a linear [n, n]□code, is an MDS code, since the minimum non□□ero weight of any codeword is 1.
2. Another trivial e□ample for any n and □, is the cyclic code generated by the all 1's vector. This is an [n, 1]□code with minimum weight n.
3. Yet another trivial MDS code (for any n and □) is obtained by taking all the vectors of even weight in V [n, □]. It is not difficult to see that this is an [n, n□ 1] code (linear subspace) with minimum distance 2.
4. MDS codes which are not one of these three e□amples are called nontrivial MDS codes.

2.2 Maximum Distance Separable Codes Algorithm

It mainly consist of three parts, they are as follows:

a) Initiali□ing Group controller.

b) Subscribing new members.

c) Applying the procedure of Re□Keying whenever member leaves the group.

Steps for the Algorithm:

Step I : GC Initialization by constructing codeword C using MDS.
Step II : Applying One-Way Hashfunction
Step III : H(x)=y, propoerty of Hashfunction
Step IV : Subscribing new member
Step V : Ji= +ve integer ji!=jk
Step VI : Select Si
Step VII : Applying the procedure of Re-Keying whenever member leaves the group.
Step VIII: Cj=H(Si+r)
Step IX : Member j every 'n' members in the group
calculates these own codeword C1 C2.....Cn

Fig.1: *MDS Code Algorithm*

III. P NOVEL APPROACH FOR COMPUTATION-EFFICIENT REKEYING

All In the earlier approach, the rekeying is done at every member join or leave. The new group key is multicast to the group members each time by the group controller through multicasting. Using this group key, the group controller establishes a secure multicast channel with the authori□ed group members. In this, the group controller GC has to communicate with the group members each time when member leaves the group. The comple□ity of the rekeying operation changes because rekeying is done at every member join or leave the group. This makes the computational comple□ity very high. In our approach, the computational comple□ity can be much more reduced. The computational comple□ity can also be further reduced by reducing the no of rekeying operations. Consider a group of n members. Usually when a member leaves the group rekeying operation should be performed to compute the new group key. This increases the burden on the server to recompute the group key and once again multicast to all the members of the group. As the nature of the members in group communication is dynamic, several rekeying has to happen. This is the major drawback in the earlier approach and in order to overcome that we introduce a new novel approach which makes the computation comple□ity much more efficient and makes the rekeying cost more significant. A set of dummy user are introduced by the server in order to protect the si□e of the group (which plays a critical role in our approach). The dummy users introduced by the server randomly join or leaves the group. Now at any point of time the members in the group will be as GrpSi□eold= uj +dj – (

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ul + dl), where uj and ul is user join and user leave and d j and d l is dummy user join and dummy user leave. Inorder to protect the group key information even when a user leaves, we consider the group si□e as the critical factor. It is understood that in group communication member join and member leave is a dynamic process. When a member leaves the group key should be redistributed and so computation cost becomes more tedious. To calculate the new group key, the authenticated group member e□ecutes the following steps:

1. Initially, the GC computes the group key GrpKey and distributes to users by using the MDS Codes[1□].

2. When uj no of user leaves the group, server randomly introduces djnew and dlleave. The user uj who left the group cannot predict the group si□e changes that has made in the group after he leaves.

□ Now the group si□e will be GrpSi□enew= GrpSi□eold + uin + din – (uout + dout) where uin is the no of members joining the group, uout is the no of members leaving the group, din is the no of dummy users joining the group and dout is the no of dummy users leaving the group.

4. The new group key is calculated as GrpKeynew =GrpSi□enew □ GrpKey.

□ Now a new value j is calculated such that

j= GrpSi□enew mod 64.

6. The new group key GrpKeynew is updated by undergoing a cyclic shift of GrpKeynew.

The steps 2, □, 4, □, 6 continues when the user leaves the group. Thus a new group key is calculated by each group members and rekeying is done. This makes the computation cost less and the rekeying is more significant. But, in the earlier approach the computation cost is more because the multicasting is done at every rekeying process. For security reasons, the rekeying using MDS codes has to be done in some interval. The fre□uency of rekeying is much lesser than earlier case when rekeying is done for every user leave. This subse□uently reduces the rekeying cost and significantly improves the security. Moreover the group dynamic membership information.

IV. REKEYING FOR MULTICAST KEY DISTRIBUTION:

To Novel approach for Computation□Efficient Rekeying In the earlier approach, the rekeying is done at every member join or leave. The new group key is multicast to the group members each time by the group controller through multicasting. Using this group key, the group controller establishes a secure multicast channel with the authori□ed group members. In this, the group controller GC has to communicate with the group members each time when member leaves the group. The comple□ity of the rekeying operation changes because rekeying is done at every member join or leave the group. This makes the computational comple□ity very high. In our approach, the computational comple□ity can be much more reduced. The computational comple□ity can also be further reduced by reducing the no of rekeying operations. Consider a group of n members. Usually when a member leaves the group rekeying operation should be performed to compute the new group key. This increases the burden on the server to recompute the group key and once again multicast to all the members of the group. As the nature of the members in group communication is dynamic, several rekeying has to happen. This is the major drawback in the earlier approach and in order to overcome that we introduce a new novel approach which makes the computation comple□ity much more efficient and makes the rekeying cost more significant. A set of dummy user are introduced by the server in order to protect the si□e of the group (which plays a critical role in our approach). The dummy users introduced by the server randomly join or leaves the group. Now at any point of time the members in the group will be as GrpSi□eold= uj +dj □(ul + dl), where, uj and ul is user join and user leave and dj and dl is dummy user join and dummy user leave. In order to protect the group key information even when a user leaves, we consider the group si□e as the critical factor. It is understood that in group communication member join and member leave is a dynamic process.

V. CONCLUSION

We have presented a review on some of the proposed efficient multicasting key distribution with reduced computation for improving the overall efficiency of the key distribution and secure multicasting. In this paper there is two techni□ue and MDS Algorithm describe for multicasting key distribution By Combing Both Scheme we can reduce comple□ity. This schemes were undertaken according to storage re□uirements at both group controller and group members and the number of updates in case of a single leave or multiple leaves.

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BIOGRAPHY

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Comparative Analysis of Object Oriented Database and Relational database

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Abstract: The Object Oriented Database is best characterized as a transformational process, mapping declarative descriptions of objects and classes to implementation plans. The database store data together with the appropriate methods for accessing it. In this paper we have discussed the concept of object oriented database. For complex data the object oriented database management system is faster and better than relational database management system. The main advantages of object databases are their rich type system which matches the expressive power and preserves the strong typing of its counterpart in Object Oriented programming languages and the performance advantage they offer in certain applications to which relational systems are not suited. The paper also describes a further extension of object-oriented database technology, which we call distributed object management technology that focuses on the need to integrate data and knowledge processing, as well as the data and knowledge itself.

Index Terms: Database, ACID, Object Oriented Database and Relational Database

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I. INTRODUCTION

The Object-oriented design is concerned with developing an object-oriented model of a software system to implement the identified requirements. The objects in an object-oriented design are related to the solution to the problem that is being solved. There may be close relationships between some problem objects and some solution objects but the designer inevitably has to add new objects and to transform problem objects to implement the solution [1]. Object oriented databases are also called Object Database Management Systems (ODBMS). Object databases store objects rather than data such as integers, strings or real numbers. Objects are used in object oriented languages such as Smalltalk, C++, Java, and others. Objects basically consist of the following:

- Attributes - Attributes are data which defines the characteristics of an object. This data may be simple such as integers, strings, and real numbers or it may be a reference to a complex object.
- Methods - Methods define the behavior of an object and are what was formally called procedures or functions.

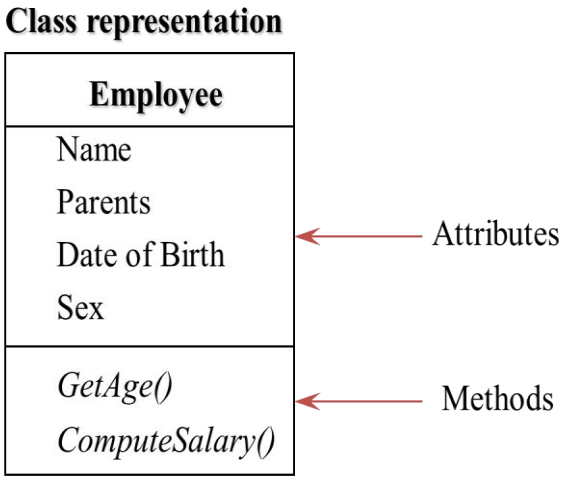

Figure 1: Class Representation

Therefore objects contain both executable code and data. There are other characteristics of objects such as whether methods or data can be accessed from outside the object. We don't consider this here, to keep the definition simple and to apply it to what an object database is. One other term worth mentioning is classes. Classes are used in object oriented programming to define the data and methods the object will contain. The class is like a template to the object. The class does not itself contain data or methods but defines the data and methods contained in the object [4]. The class is used to create (instantiate) the object. Classes may be used in object databases to recreate parts of the object that may not actually be stored in the database. Methods may not be stored in the database and may be recreated by using a class [6].

Figure 2: Extension of Object and Relational Model

Developing object-oriented model was dueto inability of the relational model to successfully deal with very large data volumes, of great complexity, encountered most often in new types of computer applications (multimedia, Internet, XML, spatial applications etc.)[1].This paper is how to use the object-relational database management system (ORDBMS) to overcome the relational database (RDB) existing problems and to improve database performance in the database development [3].

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II. RELATIONAL DATABASE DESIGN

2.1 Basic Concepts

A database is an collection of logically related records.a relational database stores its data in 2-dimensional tables. a table is a two-dimensional structure made up of rows (tuples, records) and columns (attributes, fields) example: a table of students engaged in sports activities, where a student is allowed to participate in at most one activity.

Table -1:Student Activity table

StudentID	Activity	Fee
100	Skiing	200
150	Swimming	50
175	Suash	50
200	Swimming	50

2.2 Table Characteristics

- Each row is unique and stores data about one entity.
- Row order is unimportant.
- Each column has a unique attribute name.
- Each column (attribute) description (metadata) is stored in the database.
- Column order is unimportant all entries in a column have the same data type access examples: text..This method has advantages in reading the records faster as compared to classical row-stores in which every row are stored one after another in the disk [8].

III. OBJECT ORIENTED DATABASE

Paragraph content goes here. Object-oriented database management systems (OODBMSs) generally attempt to capture the same concepts as object-oriented programming, but also emphasize certain additional characteristics necessary to support large, shared, persistent object stores (i.e., facilities for objects that must persist beyond the lifetime of a single program execution). These characteristics include efficient processing over large secondary storage organizations, concurrency control, recovery facilities, and (sometimes) efficient processing of set-oriented requests (queries). The general idea is that an OODBMS stores not data, but objects in the sense described in the last section: encapsulated combinations of data structures together with associated procedures (methods). This allows instances of arbitrary data types to be stored within the "database." The OODBMS provides data integration, overall control, and DBMS support facilities for all types of objects. Applications using any of these types can then communicate via the shared "database" (actually, "object base" would be a more appropriate term). Compared to a conventional relational DBMS, a typical OODBMS differs primarily in trying to support user-defined data structures and operations on them, in terms of object classes and (method) inheritance. Other aspects found in OODBMS descriptions include support for the concept of object identity (the object has an identity independent of its attribute values), and direct object relationships (objects related to a given object are accessed by invoking a method of the given object, as if the related objects were part of the given object's internal data). Representative examples of current OODBMS work are described in, e.g., [1, 2, 3]. These systems have been developed to support applications whose data structures are too rich to fit into the simple structures provided by conventional database models, such as the tables provided in the relational model. Examples of these

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applications include support for spatial objects, graphics objects (e.g., images), AI knowledge representations, and software engineering environments. Commercially-available OODBMSs include Servio Logic's GemStone[4], Object Oriented Databases (ODBMS) store data together with the appropriate methods for accessing it i.e. encapsulation. Relational databases hammer the world flat by normalization [11]. Object Oriented Database Support data abstraction, encapsulation, and inheritance. It allows object identification and communication. Reuse and modify objects. It deal with complex data types the following Figure show as follows:

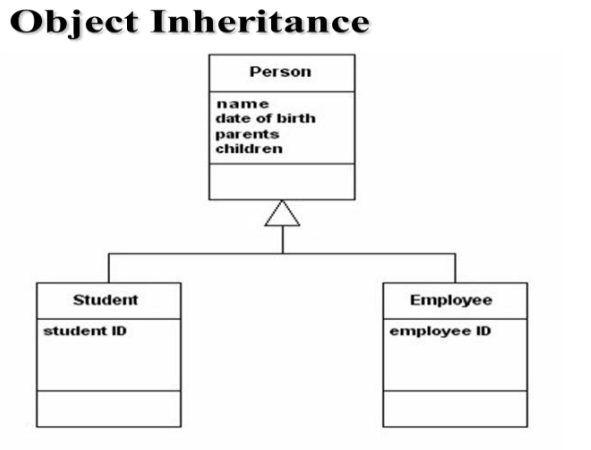

Figure 6: Object Inheritance

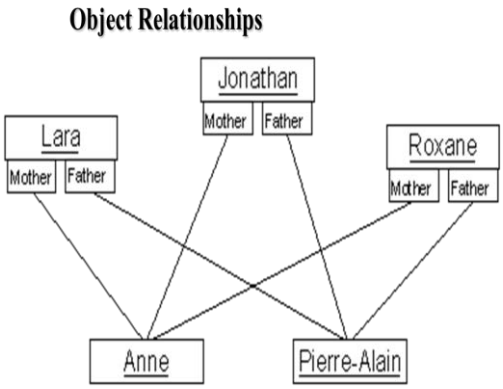

Figure 7: Object Relationship

3.1 Process Strategy

Two basic methods are used to store objects by different database vendors. Each object has a unique ID and is defined as a subclass of a base class, using inheritance to determine attributes. Virtual memory mapping is used for object storage and management. Data transfers are either done on a per object basis or on a per page (normally 4K) basis [12]. Object oriented databases can store free standing objects. In recent years there has been a trend in the direction of object oriented programming languages, object oriented databases have found only a small market niche. Object oriented database systems enables direct access to objects defined in the programming language in question and the storage of such objects in the database without conversion. It is precisely this that is not possible with relational database systems, in which everything must be structured in tables. Both simple and complex objects can be stored in an object oriented database model. In object oriented database other types of data can be stored. Object oriented database includes abstract data types that allow the users to define the characteristics of the data to be stored when

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developing an application. This overcomes the limitations of relational databases. Relational databases limit the types of data that can be stored in table columns. Instead of tables an object oriented database stores the data in objects[5].

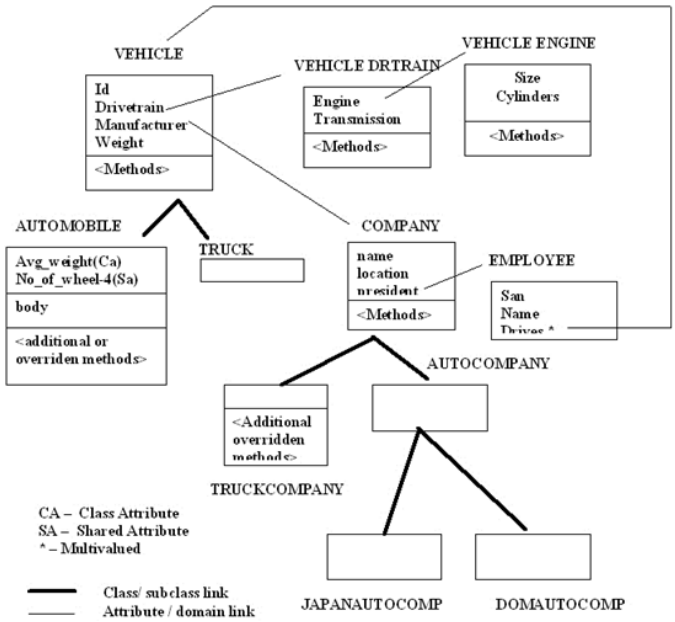

Figure 8: Object Oriented Model

In addition, class(s) (its/their objects) can inherit operations (methods) from the higherlevel class(s) (its/their objects) as well. In some cases, an inherited operation may need more programming code to take into account the additional properties of the lowerlevel class. This can be accomplished by refining the higherlevel's operation. Only the additional programming code is included in the refined operation. The lowerlevel object automatically retrieves the higherlevel's operation whenever the lowerlevel's operation is invoked. Generalization allow us to impose structure onto the set of object types in the database, and the structural and behavioral relationships between objects can be seen more clearly and organized in a more modular manner. This allows easy modifications on the schema and allows the objects to be reused for other applications.

3.2 Applications

The first areas where ODBMS were widely used were:

- CASE
- CAD
- CAM
- telecommunications
- healthcare
- finance
- multimedia
- text/document/quality management

3.3 Advantages

1. The objects do not require re-assembling from their component tables each time they are used thereby reducing processing overheads by increasing access speeds e.g. up to 100 times faster for some applications (Sun Cattel benchmark)

2. Paging is reduced

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3. Versioning is easier

4. Navigation through the database is easier and more natural, with objects able to contain pointers to other objects within the database

5. Reuse reduces development costs

6. Concurrency control is simplified by the ability to place a single lock on an entire hierarchy (while still retaining the choice to lock individual objects)

7. Better data model as based on the 'real world' instead of the 'flattened' relational model

8. Good for applications where the relationships between items in the database carry key information e.g. in the student database, we were particularly interested in what students studied (i.e. the STUDIES relationship). This is handled very efficiently by navigation.

9. Relationships and constraints on objects can be stored in the server application rather than the client application therefore any changes need only be made in one place thus reducing the need for and risks involved in making multiple changes

10. Fit in well with client/server and distributed architectures

3.4 Disadvantages

1. Poor for applications where the values of items in the database carry key information e.g. if we had been more interested in student age (e.g. to calculate the mean age) than the courses they study then relational database would clearly be more efficient

2. Speed of access may be reduced by late binding which may cause extensive searches through the inheritance hierarchies

3. Present lack of standards including the lack of a common query language such as SQL (though OQL on its way?)

4. There are as yet no formal semantics for ODBMS. Relational databases can be 'proved' correct by means of set theory and relational calculus

5. The simplicity of relational tables is lost

IV. COMPARING OBJECT ORIENTED DATABASE AND RELATIONAL DATABASE

The success of relational DBMSs cannot be denied, but they experience difficulty when confronted with the kinds of "complex data" found in advanced application areas such as hardware and software design, science and medicine, and mechanical and electrical engineering. To meet the challenges, Oracle, IBM and Microsoft have moved to incorporate object-oriented database features into their relational DBMSs under the name of object-relational DBMSs. The major database vendors presently support object-relational data model, a data model that combines features of the object-oriented model and relational mode[2].We compare the two models from the following criteria: ACID Property, application, advantage and disadvantage.

4.1 ACID Property

In computer science, ACID (Atomicity, Consistency, Isolation, Durability) is a set of properties that guarantee that database transactions are processed reliably. Both models support ACID properties differently. In the context of databases, a single logical operation on the data is called a transaction. For example, a transfer of funds from one bank account to another, even involving multiple changes such as debiting one account and crediting another, is a single transaction. The chosen initials refer to the acid test

1 Atomicity

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Atomicity requires that each transaction is "all or nothing": if one part of the transaction fails, the entire transaction fails, and the database state is left unchanged. An atomic system must guarantee atomicity in each and every situation, including power failures, errors, and crashes. To the outside world, a committed transaction appears (by its effects on the database) to be indivisible ("atomic"), and an aborted transaction does not leave effects on the database at all, as if it never existed.

2 Consistency

The consistency property ensures that any transaction will bring the database from one valid state to another. Any data written to the database must be valid according to all defined rules, including but not limited to constraints, cascades, triggers, and any combination thereof. This does not guarantee correctness of the transaction in all ways the application programmer might have wanted (that is the responsibility of application-level code) but merely that any programming errors do not violate any defined rules.

3 Isolation

The isolation property ensures that the concurrent execution of transactions results in a system state that would be obtained if transactions were executed serially, i.e. one after the other. Providing isolation is the main goal of concurrency control. Depending on concurrency control method, the effects of an incomplete transaction might not even be visible to another transaction.

4 Durability

Durability means that once a transaction has been committed, it will remain so, even in the event of power loss, crashes, or errors. In a relational database, for instance, once a group of SQL statements execute, the results need to be stored permanently (even if the database crashes immediately thereafter). To defend against power loss, transactions (or their effects) must be recorded in a non-volatile memory.

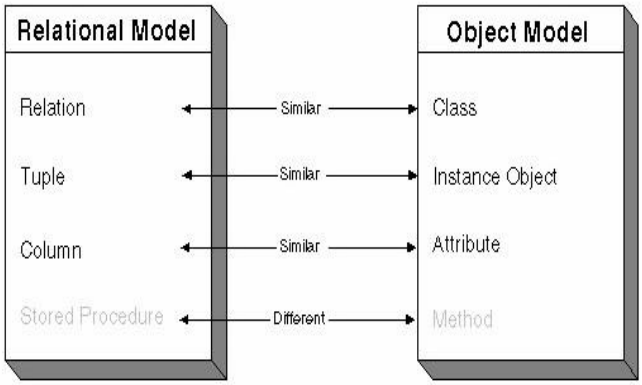

Figure 9: Difference between OODB and Relational Database

4.2 Database Functionality:

In Database Functionality, it include Transactions, Recovery, Back up and restore. Following tables show that difference between Object oriented database and relational database on the functionality basis

Table 5: Difference between OODB and Relational Database on Database Functionality

Relational Model	Object Oriented
• Multi-user access with temporary transaction locking.	• Multi-user access with cooperative transactions.

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• Strict recovery requirements.	• Less strict recovery requirements
• Supports full and incremental back up/restore.	• Supports full and incremental back up and restore.
• Pessimistic concurrency, arbitrary deadlock.	• Optimistic concurrency, prevents deadlocks by using complex controls.
• Uses small to large servers.	• . Requires large servers.
• Mandatory security controls.	• Discretionary security controls

Database allows transactions, enforces security, and concurrency based on user roles and privileges

4.3 Query Language

A comprehensive database language with statements for data definition, query, and update.

Table 6: Difference between OODB and Relational Database on Query Language

Relational Model	**Object Oriented**
• User-friendly syntax.	• Complex syntax.
• Allows definition and deletion of tables.	• Queries object data and methods.
• Supports high-level programming languages (C, COBOL, and Pascal).	• Supports OO programming languages (C++, Java, Smalltalk).
• Contains commands for inserting, deleting, and updating records.	• Handles from 1 to billions of objects.
• Creates table views.	• Supports object search, optimization, indexing, and access.
• Grants/revokes user privileges	• Navigates object relations

There are languages such as SQL, QUEL, and QBE are available for relational systems. These are based on the relational calculus.

In Object Oriented systems, the DML is typically incorporated into some programming language, such as C++. Hence, the structures of both stored persistent objects and programming language transient objects are often compatible. Query languages have been developed for Object Oriented databases. Work on a standard Object Oriented model and language is progressing, but no complete detailed standard has emerged as yet [2].

4.4 Database Management System

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It is a software system that enables users to create and maintain the database. Different database models differ in their representation of relationships. In relational model, connections between two relations are represented by foreign key attribute in one relation that references the primary key of another relation. Individual tuples having same values in foreign and primary key attribute are logically related. They are physically not connected. Relational model uses logical references.

In object oriented model, relationships are represented by references via the object identifier (OID). This is in a way similar to foreign keys but internal system identifiers are used rather than user-defined attributes. The Object Oriented model supports complex object structures by using tuple, set, list, and other constructors. It supports the specification of methods and the inheritance mechanism that permits creation of new class definitions from existing ones.

Table 7: Difference between OODB and Relational Database on Database Management System

Relational	**Object Oriented**
• Decision support applications.	• Engineering design applications.
• Ordinary business applications.	• Multimedia applications.
• Applications that integrate with legacy systems.	• Knowledge bases.
• Conservative implementations	• Applications with demanding distribution and concurrency.
•	• Applications that require advanced features.
•	• Electronic devices with embedded software

In relational model, each base relation is implemented as a separate file. If the does not specify any storage structure, most RDBMS will store the tuples as unordered records in the file. It allows the user to specify dynamically on each file a single primary or clustering index and any number of secondary indexes. It is the responsibility of user to Object Oriented the attributes on which the indexes are set up. Some RDBMSs give the user the option of mixing records from several base relations together. It is useful when related records from more than one relation are often accessed together. This clustering of records physically places a record from one relation followed by the related records from another relation. In this way the related records may be retrieved in most efficient way possible.

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Object oriented systems provide persistent storage for complex-structured objects. They employ indexing techniques to locate disk pages that store the object. The objects are often stored as byte strings, and the object structure is reconstructed after copying the disk pages that contain the object into system buffers.

4.5Applications

- Object oriented database management systems were developed (largely) in response to engineering needs.
- Applications include computer aided design, and integrated software development environments (IDEs).
- Relational database systems were developed (largely) in response to commercial needs,

1 Requirements on Commercial Databases

- Information can largely be described before the database is implemented
- Infrequent schema update, controlled by DBA
- Atomic, fixed-length data
- Few entity types, with many instances
- Large initial data load, with slow constant growth there after
- Single value for each data item; updates in situation
- Short transactions can be used as a basis for concurrency control

2 Requirements on Engineering Databases

- Continuous changes to the schema, made by different user
- Large, complex, variable length data items
- Many entity types, few instances, complex relationship
- Small initial data load, rapid early growth, slowing after Design
- Need for configuration and version management
- long transactions, periods of inconsistency, problems with concurrency control

4.6 Advantages of Object Oriented compared with Relational Database

- Object model intuitively closer to real world
- Extensibility - inheritance
- Complex values
- Removal of impedance mismatch
- More expressive query language
- Tight coupling between data and applications allows schema to capture more of the meaning of applications
- Support for long transactions
- Better support for applications like software engineering or computer aided design (CAD)
- Arguably better performance, though benchmarks have mainly been applied in areas like engineering support to which OODBMS are better suited.

4.7 Disadvantages of Object Oriented compared with Relational Databases

- Lack of a theoretical foundation, so exact meaning of OODM is not well denied
- More difficult to get staff experienced with OODBMSs
- Lack of standards in OODB
- Competition from relational and object-relational DBMS's
- Encapsulation compromised to optimize queries (but in RDBMS's, normalization may be compromised to improve performance).

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- OODBMS's usually control concurrency by locking; locking an inheritance hierarchy is difficult and may affect performance.
- OODM is inherently more complex than relational data model; OODBMS provides more complex functionality than RDBMS;
- Complexity leads to higher implementation and maintenance costs.
- Lack of views; but are views necessary with an object model?
- OODBMS's usually provide for coarse-grained access control; finer grained security mechanisms are needed for most commercial applications.

4.8 Selection Criteria:

Currently object-relational database technology is setting the direction for the future of data management. The appearance of object-relational database (ORDB) technology into the business database market caused the database user's attention in search of how to utilize its object-oriented features in the database development [9].

Selection Criteria depends on the company:

- Business needs and practices.
- Monetary constraints.
- Infrastructure and resources.
- Short and long term corporate goals

Table 4.4: Selection Criteria

Commercial DMBS Name	Programming Languages	Operating Systems
Relational		
Access	Visual Basic, C++, Java, C	Windows
Adabas	Integrated SQL and procedures	Unix, Linux, Windows
DB2	Java, COBOL, SQL, Basic	Linux, Unix, Windows
Informix	Java, C++, and C	Linux, Unix, Windows
Ingress II	COBOL, Java, C	Linux, Unix, Windows
Oracle8	C, C++, Java	Unix, Windows
Sybase 11	Powerbuilder, Java, visual Basic, C, C++	Windows
SQL Server	Visual Basic, C++, C	Windows
Object Oriented		
GemStone	C++, C, Smalltalk	OS2, DEC, SunOS
Objectivity DB	C++, C	DEC, Solaris, VMS, Unix
ObjectStore	Java	OS2, Solaris, DEC
Ontos DB	C++	OS2, Unix, SunOS, DEC
Versant	C++, C, Smalltalk	OS2, Unix, SunOS

In response to the evolutional change of ORDBMSs, SQL: 1999 started supporting object-relational data modeling features in database management standardization and SQL:2003 continues this evolution. Currently, all the major database vendors have extended to their relational database to object-relational database products to reflect the consensus of SQL the standards [2]. Using ORDBMS to develop applications can enforce use of standard data structure, provide object-oriented programmers' integrated view of data and allow multiple applications to operate cooperatively. Ultimately, this can result in improved operational efficiency for the IT department, increase object

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oriented programmers' productivity, lower development efforts, decrease maintenance cost, reduce risk of defect rate, and raise applications' reliability[7].

V. CONCLUSION

In recent years, with the development of database technology and the rapid growth of a large number of object-oriented databases in action, schema evolution for object-oriented databases has emerged as a serious research area. In this paper we have discussed the concept of object oriented database. For complex data the object oriented database management system is faster and better than relational database management system. The main advantages of object databases are their rich type system which matches the expressive power and preserves the strong typing of its counterpart in OO programming languages and the performance advantage they offer in certain applications to which relational systems are not suited. The main drawbacks are that, unlike relational systems, they don't rest on a mathematical foundation and, partly as a consequence of this; they haven't currently attained the same maturity. New products are being brought out and refined continuously, both in academia and industry, but there is no universally agreed benchmark (like Codd's rules for RDBMS) against which to compare them. In the future we will try to enhance our research for more friendly environmental domains so as to reach the more flexible object oriented database system. Conclusion section must be included and should indicate clearly the advantages, limitations, and possible applications of the paper. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extension.

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BIOGRAPHY

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Effect of Homomorphic Filter on Infrared Images for Exposure Fusion

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Abstract: *An important factor to improve the visual quality of an image is contrast enhancement. The more the value of contrast, the simpler it is to identify and compare between different objects in an image. This paper focuses on experimenting how efficient different contrast enhancement techniques developed for visual images work for infrared images. It also determines which technique suites well to site a weapon hidden beneath a person's clothing application of infrared imaging. We have compared Homomorphic filtering to the classical technique of histogram equalization using metrics of entropy, sharpness and user observations. These metrics provide both qualitative and quantitative analyses of the implemented work which has relevance to the end user application of concealed weapon detection using infrared imaging.*

Keywords: *Infrared images; contrast enhancement; homomorphic filter; histogram equalization; entropy; sharpness; concealed weapon detection CWD.*

I. Introduction

There are a number of imaging sensors for CWD based on their portability, proximity and whether they use active or passive illumination. Though most of the illuminations required are low-power radiation, legal issues such as posting warnings or seeking consent from people being screened may alert carriers of concealed weapons and diminish the value of the CWD system. Infrared imagers utilize the temperature distribution information of the target to form an image [1], [2]. Normally they are used for a variety of night-vision applications, such as viewing vehicles and people. The underlying theory is that the infrared radiation emitted by the human body is absorbed by clothing and then re-emitted by it. As a result, infrared radiation can be used to show the image of a concealed weapon only when the clothing is tight, thin, and stationary. Before an image sequence is presented to a human observer for operator-assisted weapon detection or fed into an automatic weapon detection algorithm, it is desirable to preprocess the images to maximize their exploitation. The preprocessing steps considered in this section include contrast enhancement and filtering for the removal of shadows, wrinkles, and other artifacts.

A considerable amount of research has been done in the field of contrast enhancement. The field of contrast enhancement can be broadly divided into two major areas of research: (1) Global contrast enhancement techniques and (2) Local contrast enhancement techniques. Global contrast enhancement techniques are simple and powerful but cannot adapt to the local brightness features of the input image because these techniques use only global information collected over the entire image [3]. Local contrast enhancement techniques adjust picture element (pixel) values are over smaller regions of an image to improve the visualization of structures in both the darkest and the lightest portions of the image at the same time. The purpose of image enhancement is to improve the interpretability or perception of information contained in the image for human viewers.

Histogram equalization (HE) is a commonly used global contrast enhancement technique for both color and grayscale images. HE spreads out and flattens the histogram of the number of image pixels at each gray level value, thus stretching the intensity values in the image over more of the available dynamic range of gray-levels and increasing the apparent contrast in the image [4]. This method is especially useful when an image is represented by close contrast values, such as images in which both the background and foreground are both bright, or else both are dark at the same time. While easy to implement and not very computationally intensive, HE has several known drawbacks. First, HE does not preserve the average brightness of the input image in the output image. Therefore, the processed output image will often appear unnaturally bright or "washed out." Also, the method is indiscriminate. It may increase the contrast of background noise, while decreasing the usable signal. To overcome these drawbacks, numerous variations of the classic HE technique have been published [5], [6], [7].

Homomorphic filtering is a frequency domain method for contrast enhancement [8]. It has been used in a variety of applications like shadow identification [9], underwater image pre-preprocessing [10], [11], contrast enhancement for raised or indented characters [12], and seismic data processing [13]. Homomorphic filtering sharpens features in an image by enhancing high frequencies and sharpening object edges [12]. It also flattens lighting variations in an image, bringing details out of shadows. It provides simultaneous dynamic range

compression (reducing illumination variation) and contrast enhancement (increasing reflectance variation). Homomorphic filtering can thus prove to be most effective on images that have large variations in lighting.
This paper integrates the results from two different approaches of contrast enhancement techniques. Section II discusses the Histogram Equalization method. Section III covers contrast enhancement by homomorphic filtering. Section IV provides a comparison of the two techniques using metrics like entropy, sharpness and user observations.

II. Histogram Equalization

Histogram equalization is a technique for adjusting image intensities to enhance contrast [7]. It is accomplished by linearizing the cumulative density function of the image intensity levels. Consider a discrete grayscale image and let n_i be the number of occurrences of gray level i. A normalized histogram of the image shows the probability of occurrence of a pixel of level i in the image, and would be given by a collection of probability values for each pixel level:

$p(x_i)$ = probability that pixel x has gray level $i = ni / n$

where n = the total number of pixels in the image. The cumulative density function for this histogram would be given as in Eq. 1:

$$\text{cdf } x(i) = \sum_{j=0}^{i} p(x_i) \tag{1}$$

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

$$\text{cdf}x(i) = K\ i \tag{2}$$

For the purposes of this experiment, global histogram equalization is chosen as the "gold standard" for comparing alternative methods of contrast enhancement. The Matlab function *histeq* was used as the particular reference method for contrast enhancement implementation. The *histeq* function enhances the contrast of images by transforming the values in an intensity image, or the values in the color map of an indexed image [14].
While easy to implement and not very computationally intensive, HE has several known drawbacks. First, HE does not preserve the average brightness of the input image in the output image. Therefore, the processed output image will often appear unnaturally bright or "washed out." Also, the method is indiscriminate. It may increase the contrast of background noise, while decreasing the usable signal. To overcome these drawbacks, numerous variations of the classic HE technique have been published [3].

III. Homomorphic filtering

Homomorphic filtering is a frequency domain method for contrast enhancement. Homomorphic filtering sharpens features in an image by enhancing high frequencies and sharpening object edges [6]. It also flattens lighting variations in an image, bringing details out of shadows. It provides simultaneous dynamic range compression (reducing illumination variation) and contrast enhancement (increasing reflectance variation). Homomorphic filtering can thus prove to be most effective on images that have large variations in lighting. This model consider the image is been characterized by two primary components. The first component is the amount of source illumination incident on the scene being viewed i(x,y). The second component is the reflectance component of the objects on the scene r(x,y). The image f(x,y) is then defined as :

$$f(x, y) = i(x, y) * r(x, y) \tag{3}$$

In this model, the intensity of *i(x,y)* changes slower than *r(x,y)*. Therefore, *i(x,y)* is considered to have more low frequency components than *r(x,y)*. Using this fact, homomorphic filtering technique aims to reduce the significance of *i(x,y)* by reducing the low frequency components of the image. This can be achieved by executing the filtering process in frequency domain. In order to process an image in frequency domain, the image needs first to be transformed from spatial domain to frequency domain. This can be done by using transformation functions, such as Fourier transform. However, before the transformation is taking place, logarithm function has been used to change the multiplication operation of $r(x,y)$ with $i(x,y)$ in Eq. 3 into addition operation. In general, homomorphic filtering can be implemented using five stages, as stated as follows:
STAGE 1: Take a natural logarithm of both sides to decouple i(x,y) and r(x,y) components as in Eq. 4

$$z(x, y) = \ln i(x, y) + \ln r(x, y) \tag{4}$$

STAGE 2: Use the Fourier transform to transform the image into frequency domain as in Eq. 5

$$FFT\{z(x, y)\} = FFT\{lni(x, y)\} + FFT\{lnr(x, y)\} \tag{5}$$

or

$$Z(u,v) = F_i(u,v) + F_r(u,v)$$

STAGE 3: High pass the $Z(u,v)$ by means of a filter function $H(u,v)$ in frequency domain, and get a filtered version $S(u,v)$ as the following Eq. 6

$$S(u,v) = H(u,v)Z(u,v) = H(u,v)F_i(u,v) + H(u,v)F_r(u,v) \quad (6)$$

STAGE 4: Take an inverse Fourier transform to get the filtered image in the spatial domain as shown in Eq. 7.

$$\begin{aligned} s(x,y) &= FFT^{-1}\{S(u,v)\} \\ &= FFT^{-1}\{H(u,v)F_i(u,v) + H(u,v)F_r(u,v)\} \end{aligned} \quad (7)$$

STAGE 5: The filtered enhanced image g(x,y) can be obtained by using the following Eq. 8.

$$g(x,y) = exp\{s(x,y)\} \quad (8)$$

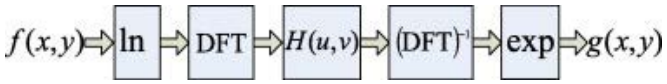
The typical filter for homomorphic filtering process has been introduced in [8]. This filter has circularly symmetric curve shape, centred at (u,v)=(0,0) coordinates in frequency domain. This filter is modified from Gaussian highpass filter, which is known as Difference of Gaussian (DoG) filter. The transfer function for DoG filter is defined as in Eq. 9.

$$H(u,v) = (\gamma h - \gamma l)\left[1 - \exp\left\{-c\left(\frac{D(u,v)}{D_0}\right)^2\right\}\right] + \gamma l \quad (9)$$

Where, constant c has been introduced to control the steepness of the slope, D_0 is the cut-off frequency, D (u, v) is the distance between coordinates (u, v) and the centre of frequency at (0, 0).

For homomorphic filter to be effective it needs to affect the low- and high-frequency components of the Fourier transform in different ways.To compress the dynamic range of an image, the low frequency components ought to be attenuated to some degree. On the other hand, to enhance the contrast, the high frequency components of the Fourier transform ought to be magnified. Figure 1 depicts the algorithm used to implement the homomorphic filter used in this paper. The algorithm is based on the equations above.

Figure 1 Block Diagram for Homomorphic filtering



IV. Metrics and Results

Test images have been chosen carefully to represent a wide variety of challenging contrast situations. The infrared images used here represent real imaging situations and challenges for IR image applications like night vision, security cameras, fire fighting and automobile night vision. A variety of images depicting low contrast, high contrast, features in shadows and features in highly saturated areas have been selected. The variety of the test images will prove to be useful while testing the effectiveness of the implemented methods.

The following metrics shave been chosen for the purpose of this investigation:

1. User Observations
2. Entropy
3. Image Sharpness and

A. User Observation

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

Based on an average of user observation outputs [15], homomorphic filtering was selected by users as providing the best results for contrast enhancement. Output images of homomorphic filtering were seen to have higher quality of contrast while not deleting information from the original test images but enhancing the details in the test images.

B. ***Entropy***

Entropy is a measure of information content of an image and is usually applied in image processing methods as a mean for measuring the information and complexity of images [16].
The Entropy of an image can be calculated by:

$$E = \sum_{i=0}^{255} -p_i \log(p_i) \tag{10}$$

Where, p_i is the probability that an arbitrary pixel in the image having intensity '*i*'. Assuming the number of pixels having intensity *i* is n_i and the image contains *n* pixels, $p_i = n_i/n$. It is obvious that when no change occurs in information content of images or both input images (initial and contrast enhanced image) are the same.

C. ***Image Sharpness***

The Prewitt operator from Matlab was used for detecting the sharpness of the output images compared with the input images. This is a discrete differentiation operator, computing an approximation of the gradient of the image intensity function. The Prewitt operator value therefore shows how "abruptly" or "smoothly" the image changes at each point in an image. This metric helps in analyzing how blurry the output image gets while enhancing the contrast [17]. Since contrast enhancement is used to enhance the overall visual clarity of the image, if in the process the output image becomes blurred then the contrast would not be prominent and effective. This metric helps understand the overall visual quality of the output image after the enhancement techniques have been applied. The higher the value of sharpness the better the contrast enhancement technique has preserved sharpness.
The Prewitt operator is based on convolving the image with a small, separable, and integer valued two-dimensional filter [18]. Figure 2 and fig. 3 show the kernel used for horizontal and vertical edge detection for the Prewitt operator.

Figure 2 Prewitt kernel for horizontal edge detection

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

Figure 3 Prewitt kernel for vertical edge detection

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

D. ***Image Results***

The test image data set was carefully chosen to include infrared images of the same scene that have different ranges of contrast as well as various exposure conditions for concealed weapon detection. The test images have been categorized as low exposed, medium exposed and highly exposed images of the four scenes respectively. The test results along with the respective histograms are presented subsequently.

Figure 4 Image Results: (a) Low exposed original Image (b) Histogram of (a) (c) Homomorphic filtering applied (d) Histogram of (c) (e) Histogram equalization applied (f) Histogram of (e)

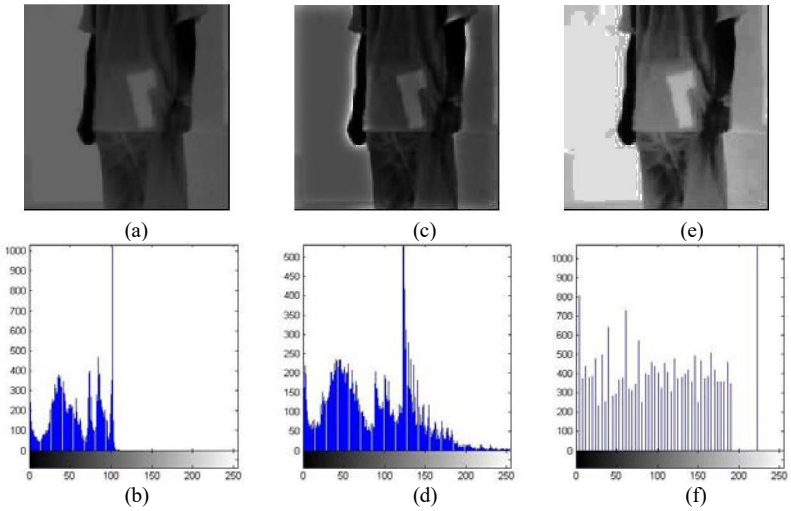


Figure 4 serves as a low exposed image with few details in the test image. In the histogram equalization output, left hand corners the output image are brighter and thus do not provide more contrast in that region whereas for the homomorphic filter output, better contrast is obtained in the entire output image and also in the weapon area. This technique also succeeded at bringing hidden objects and details.

Figure 5 Image Results: (a) Medium exposed original Image (b) Histogram of (a) (c) Homomorphic filtering applied (d) Histogram of (c) (e) Histogram equalization applied (f) Histogram of (e)

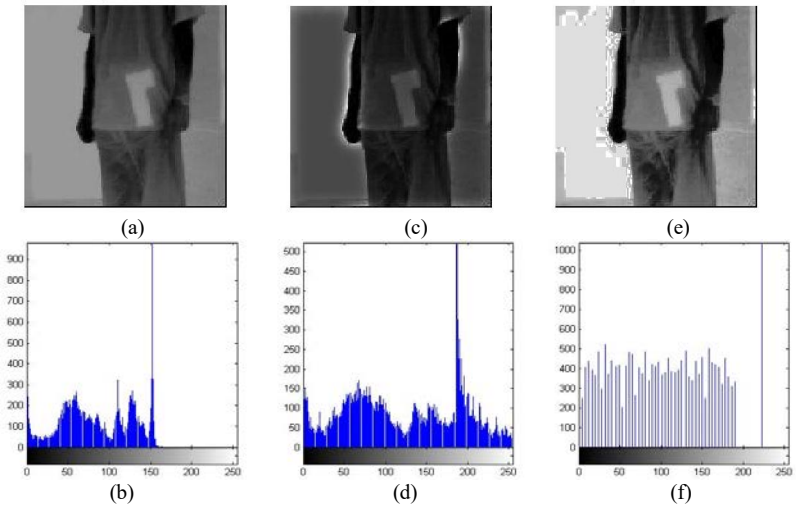


Figure 5 is a medium exposed test image with a lot of details and objects that are enhanced after the implementation of the contrast enhancement techniques. For this test image homomorphic filtering provides a crisp output image without loss of details.

Figure 6 Image Results: (a) Highly exposed original Image (b) Histogram of (a) (c) Homomorphic filtering applied (d) Histogram of (c) (e) Histogram equalization applied (f) Histogram of (e)

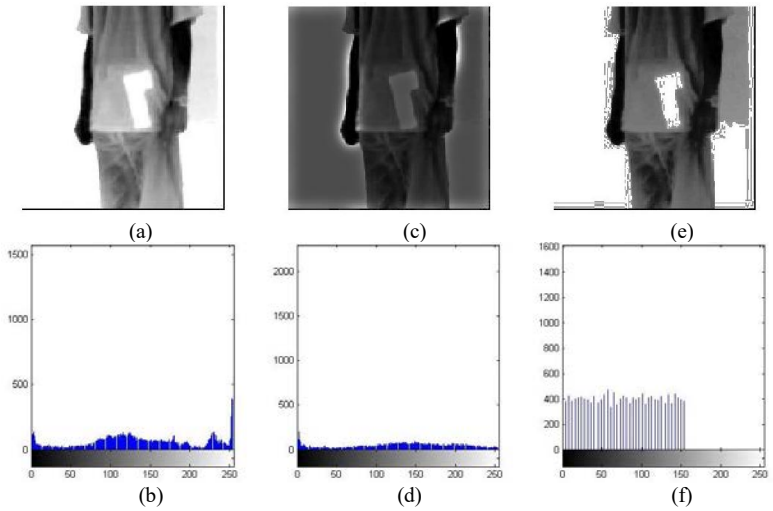


Figure 6 is a highly exposed image. The person and the hidden weapon are the only details in the image with the background being a plain. The output of histogram equalization as shown Figure 30(e) has a white washed effect near the weapon area. In homomorphic filtering, the weapon can be seen prominently.

Figures below are some more examples of other low exposure, medium exposure and high exposure infrared images. Figures 7, fig. 8 and fig. 9 are examples of low exposed infrared images of different scenes. Figure 7(a), fig. 8(a) and fig. 9(a) are original low exposed infrared images of different scenes with hidden objects. Figure 7(b), fig. 8(b) and fig. 9(b) are the Homomorphic filtering outputs on the input images. Figure 7(c), fig. 8(c) and fig. 9(c) are the Histogram equalized outputs on the input images with their respective histograms.

Figure 7 Image Result of Image set 2(Chair front) (a) Low exposed original Image (b) Histogram of (a) (c) Homomorphic filtering applied (d) Histogram of (c) (e) Histogram equalization applied (f) Histogram of (e)

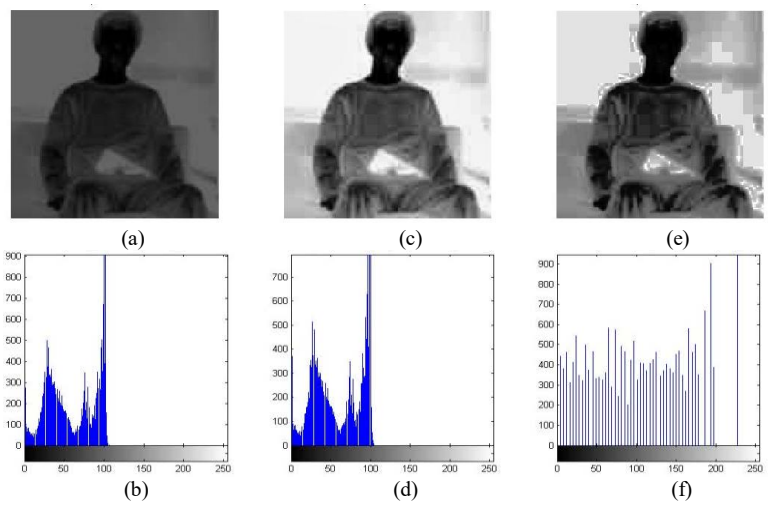


Figure 8 Image Result of Image set 3(Chair) (a) Low exposed original Image (b) Histogram of (a) (c) Homomorphic filtering applied (d) Histogram of (c) (e) Histogram equalization applied (f) Histogram of (e)

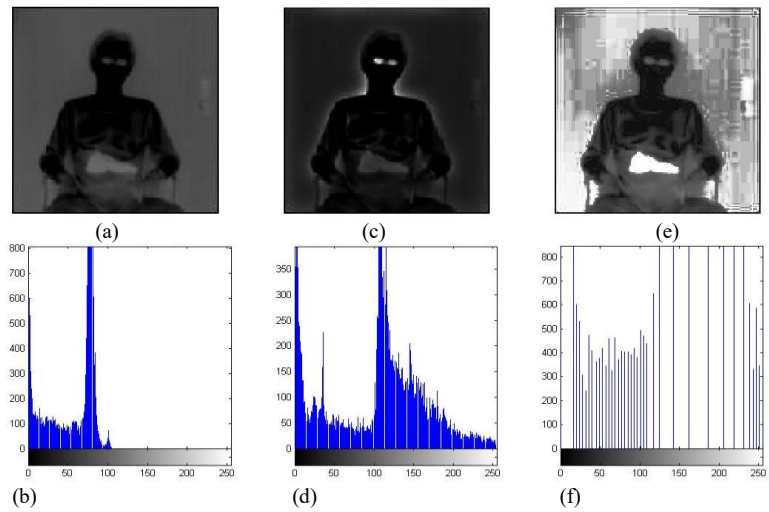
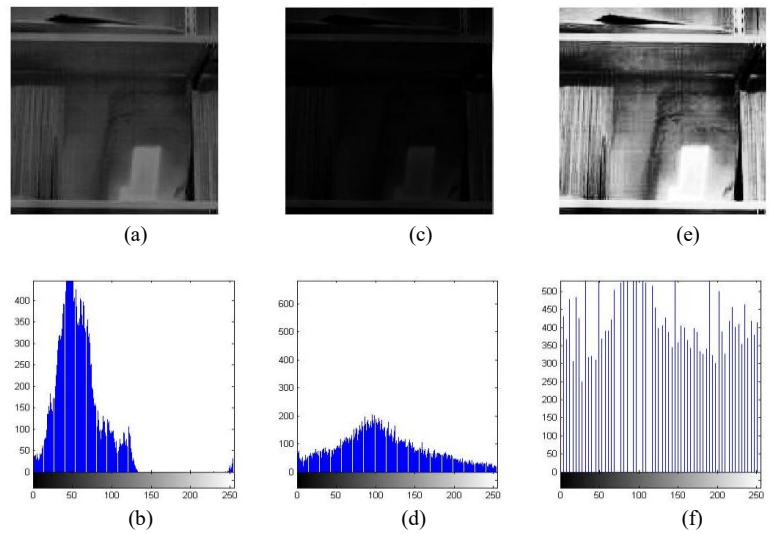


Figure 9 Image Result of Image set 4(Envelope) (a) Low exposed original Image (b) Histogram of (a) (c) Homomorphic filtering applied (d) Histogram of (c) (e) Histogram equalization applied (f) Histogram of (e)



Figures 10, fig. 11 and fig. 12 are examples of medium exposed infrared images of different scenes. Fig. 10 (a), fig. 11(a) and fig. 12 (a) are original medium exposed infrared images of different scenes with hidden objects. Figure 10 (b), fig. 11 (b) and fig. 12 (b) are the Homomorphic filtering outputs on the input images. Figure 10 (c), fig. 11(c) and fig. 12 (c) are the Histogram equalized outputs on the input images with their respective histograms.

Figure 10 Image Result of Image set 2(Chair front) (a) Medium exposed original Image (b) Histogram of (a) (c) Homomorphic filtering applied (d) Histogram of (c) (e) Histogram equalization applied (f) Histogram of (e)

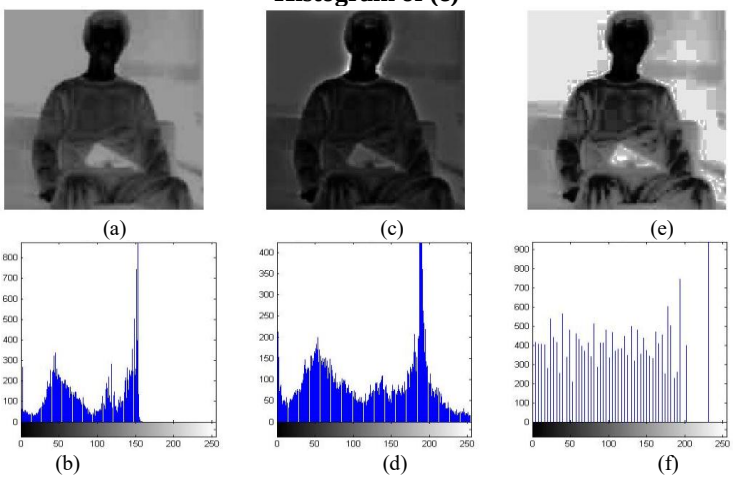


Figure 11 Image Result of Image set 3(Chair) (a) Medium exposed original Image (b) Histogram of (a) (c) Homomorphic filtering applied (d) Histogram of (c) (e) Histogram equalization applied (f) Histogram of (e)

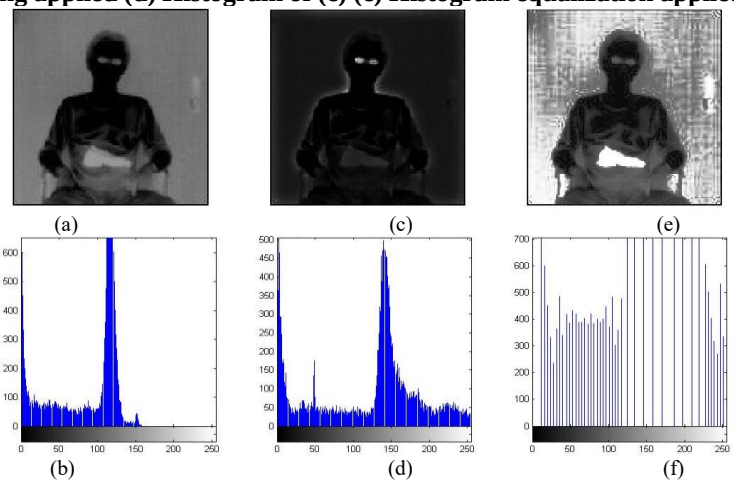


Figure 12 Image Result of Image set 4(Envelope) (a) Medium exposed original Image (b) Histogram of (a) (c) Homomorphic filtering applied (d) Histogram of (c) (e) Histogram equalization applied (f) Histogram of (e)

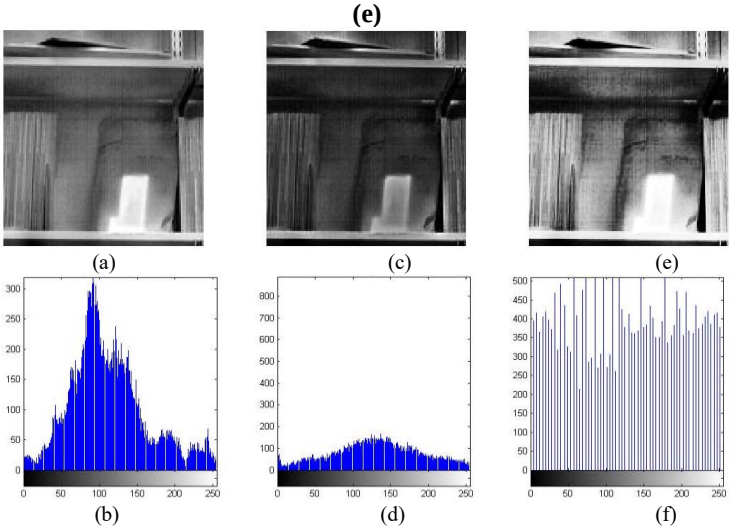


Figure 13, fig. 14 and fig. 15 are examples of highly exposed infrared images of different scenes. Fig. 13 (a), fig. 14(a) and fig. 15 (a) are original highly exposed infrared images of different scenes with hidden objects. Figure 13 (b), fig. 14 (b) and fig. 15 (b) are the Homomorphic filtering outputs on the input images. Figure 13 (c), fig. 14(c) and fig. 15(c) is the Histogram equalized outputs on the input images with their respective histograms.

Figure 13 Image Result of Image set 2(Chair front) (a) Highly exposed original Image (b) Histogram of (a) (c) Homomorphic filtering applied (d) Histogram of (c) (e) Histogram equalization applied (f) Histogram of (e)

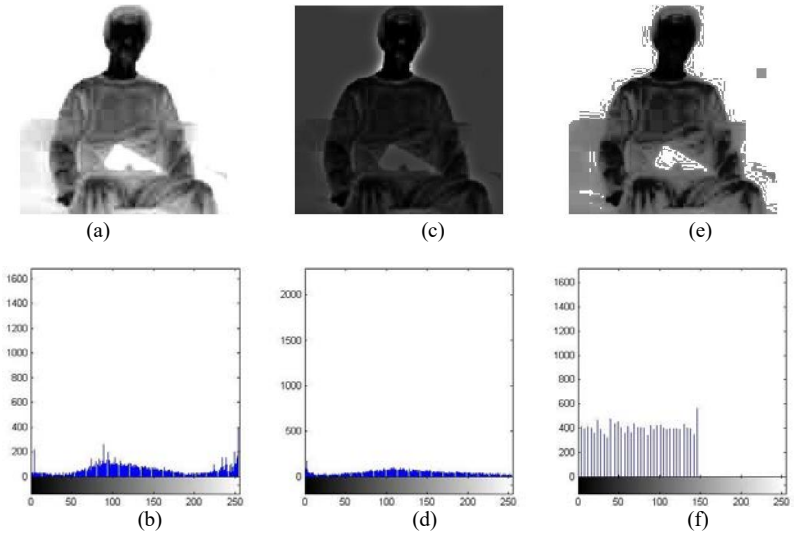


Figure 14 Image Result of Image set 3(Chair) (a) Highly exposed original Image (b) Histogram of (a) (c) Homomorphic filtering applied (d) Histogram of (c) (e) Histogram equalization applied (f) Histogram of (e)

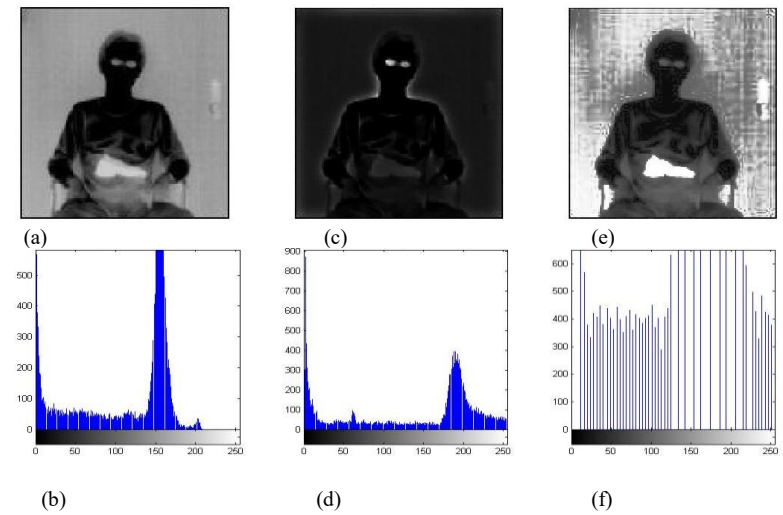
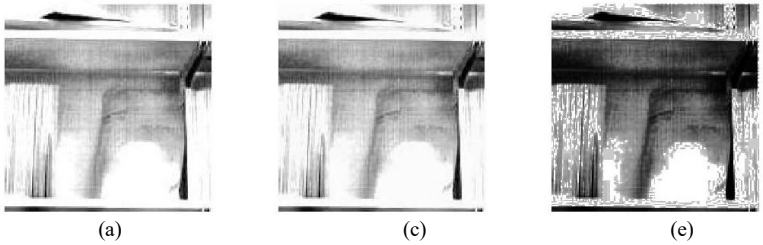
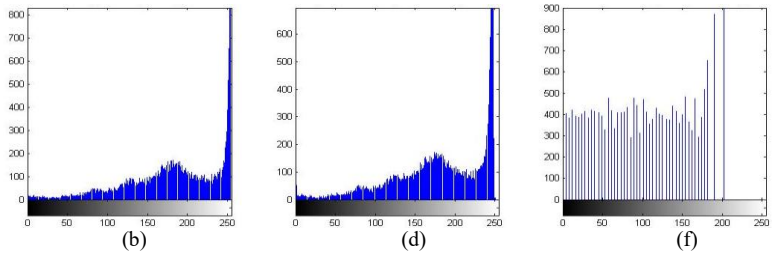


Figure 15 Image Result of Image set 4(Envelope) (a) Highly exposed original Image (b) Histogram of (a) (c) Homomorphic filtering applied (d) Histogram of (c) (e) Histogram equalization applied (f) Histogram of (e)





(b) (d) (f)

Table I depicts the calculated entropy of the histogram equalized output and homomorphic filtering output for the full test images. This metric provides a view of the overall exposure in the image. It is evident that homomorphic filtering achieves more information content after increasing the contrast in the image.

Table I Entropy of Test Images

		Original image	Histogram Equalization	Homomorphic filtering
Image Set 1 (Stand image)	Low exposed	5.7029	4.9868	7.1015
	Medium exposed	6.1944	5.0633	7.3278
	Highly exposed	5.6384	4.1833	4.3259
Image Set 2 (Chair front)	Low exposed	5.8071	5.1511	5.8918
	Medium exposed	6.2637	5.2091	7.4487
	Highly exposed	5.4258	4.0067	4.3363
Image Set 3 (Chair)	Low exposed	5.4878	4.8498	7.3373
	Medium exposed	6.0804	5.2393	7.1319
	Highly exposed	6.449	5.4097	6.4923
Image Set 4 (Envelope)	Low exposed	6.6202	5.8705	7.16
	Medium exposed	7.5692	5.9715	6.8887
	Highly exposed	6.6074	5.1807	6.7345

Table II depicts the calculated sharpness of the histogram equalized output and homomorphic filtering output for the full test images. It is clearly observed that homomorphic filtering provides better edge detection than histogram equalization.

Table II Sharpness of Test Images

		Original image	Histogram Equalization	Homomorphic filtering
Image Set 1 (Stand image)	Low exposed	22.4931	60.4151	66.6997
	Medium exposed	34.6703	54.6638	90.6113
	Highly exposed	60.0266	65.5797	169.7213
Image Set 2 (Chair front)	Low exposed	23.0628	56.6976	22.6772
	Medium exposed	34.5771	56.5549	76.3614
	Highly exposed	59.2233	67.1537	134.2507
Image Set 3 (Chair)	Low exposed	26.3268	80.9856	92.3004
	Medium exposed	41.6837	98.3211	138.531
	Highly exposed	53.8667	90.3867	189.2905
Image Set 4 (Envelope)	Low exposed	36.8023	96.9863	203.1531
	Medium exposed	65.6682	95.2566	193.8182
	Highly exposed	80.8859	116.7147	78.9767

These image examples again show that homomorphic filtering achieves better results than histogram equalization. In general, the contrast and average brightness results with homomorphic filtering make it subjectively easier to pick out objects in the image.

The very low contrast images as shown in fig. 6, fig. 7 and fig. 8, demonstrate that while histogram equalization increases the contrast in these images, it also greatly increases the noise in the image. Therefore, while quantitatively better in contrast levels and greatly "improved" in sharpness, these images are subjectively inferior and less useful than those enhanced by other techniques that scored lower on sharpness.

V. Conclusion

Based on the metrics comparison, homomorphic filtering has high values of sharpness on average. This feature might be important in security related applications where precise data is required. Based on user observations, homomorphic filtering was selected by most users in terms of overall better contrast without outputting a grainy or a white-washed effect. This subjective assessment, along with the apparent ability of homomorphic filtering to bring objects and details out of shadows, makes it well suited to most IR imaging applications such as night vision, firefighting, and security surveillance. To the existing methods, post-processing can be investigated in

the future. This could apply global contrast enhancement methods or local contrast enhancement methods based on the application. The same techniques might also be tested with color infrared images.

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Jute Fiber-PP Bio-Composite: State Of Art, Low Investment, In-House and Manual Preparation of Injection Moldable Bio-Composite Granules

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Abstract:- This paper briefs on manual fabrication process, to prepare injection moldable granules of jute-pp (NF-PP) bio composite, with different loading of jute reinforcement up to 30 % by weight(Jute or NF ratio 10, 20, 30, by wt%), without using parallel twin screw extruder. Low investment process for jute/NF composition up to 30% by wt of jute/NF in bio composite. External hot mixing of jute/NF and PP is accomplished in a pan, with incremental heat and control. Modified manual injection molding machine is used as extruder for in-house granule preparation. Even flax, hemp, sisal and any NF with PP can be prepared for test and development locally.

Index Terms: Jute, PP, Injection Moldable, Low Investment, Manual Preparation.

I. Introduction

Materials from renewable resources – are called biomaterials or 'green' materials – are currently gaining in importance worldwide. The natural fiber reinforced plastics are the bio-composites in demand for replacement in aero and auto industries. Injection mold ability is significant due to Low cost and high production, Interchangeability, Weight reduction, Metal part replacement & compatibility, abundant availability, easy to transport, and PP composition possibility. The bio composites are biodegradable and non-toxic. Jute products merge with the soil, provides nourishment to the soil. Being made of cellulose, on combustion, jute does not generate toxic gases. Molded bio composites provide good dimensional stability and harmlessness. And technically jute has high specific properties, low density. Jute is less abrasive to the processing equipment.

II. Experimental Set Up

The experimental set up is aimed to produce moldable bio composite granules manually to help produce in house which is an alternate to huge investment setups. This state of art experimental continuous and fragmented processes set up that will help researchers to carry out their work with least investment, and also flexibility in preparation of required bio composite compositions. The entire process is sub divided into smaller processes, suitable to use available equipment with technical modifications as needed.

The experimental procedure involves Hot mixing of fiber and pp, flake formation, flake cutting, converting flakes into jute-pp composite bar, cutting of bar into granules. The granules can now be sent to injection molding machine for molding. Some photographs of molded parts are shown.

2.1 Materials

2.1.1. PP Matrix

Polypropylene is commonly made from the monomer propylene by polymerization; the result is an iso-tactic polymer, in which all the methyl groups are on the same side of the chain. Isotactic polypropylene has good mechanical properties as well as low density. It is a non-polar material. The crystalline iso-tactic polypropylene is insoluble in all common solvents at room temperature, it starts swelling and is finally dissolved by specific

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Homography Estimation Using RANSAC

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Abstract—**Homography is a mapping between two spaces which is often used to represent the correspondence between two images of the same scene.Homography estimation is a key step in many image processing applications such as image mosaicing, stereo vision, geo-referencing, feature matching etc as it improves stability of image registration. Homography detection using RANSAC is explained in this paper.RANSAC homography is robust and provide good set of candidate matches as it provides accurate mapping between the images..**

Keywords—**Homography, RANSAC, image mosaicing, feature based, Projective.**

I. INTRODUCTION

In computer vision and image processing the concept of feature detection refers to methods that aim at computing abstractions of image information and making local decisions at every image point whether there is an image feature of a given type at that point or not. The resulting features will be subsets of the image domain, often in the form of isolated points, continuous curves or connected regions.
Feature extraction and matching feature points is an important step in image mosaicing.Image Mosaicing is a process of assembling images of same scene into large image. The output of image mosaic is the integration of multiple images of same view into one continuous image. An image mosaic is a synthetic composition generated from a sequence of images and it can be obtained by understanding geometric relationship between images. Image mosaic is widely used in satellite and aerial photographing, meteorological and environmental monitoring, military reconnaissance and taking evidence, etc. A large number of different approaches to image mosaicing have been proposed. [1]The methods can be roughly divided into two classes:direct methods and feature based methods.The direct method estimate the transformation parameters based on the direct method estimate the transformation parameters based on the intensity difference in area of overlap. The direct method provides very accurate registration but they are not very robust against illumination variance. Feature based method is robust against illumination variance, imaging noise, image rotation, image scaling and perspective distortions. Feature based methods mosaic the images by automatically detecting and matching the features in the source images, and then warping these images together. Basically, it consists of three steps: feature extraction and matching, local and global registration and image composition. Feature extraction and matching aims to detect image features such as edges, corners and represent geometric corresponding between them..Image composite blends all images together into a final mosaic.Image mosaic tries to composite several narrow-angle images into wide-angle image.Feature matching is an important steps in image mosaic as it maps similarities between images. Homography estimation is a key process in feature matching[2]. Homography is a mapping between two spaces which often used to represent the correspondence between two images of same scene. A homography is a non-singular linear relationship betweenpoints in two images . When the world points are on a plane, their images captured by two perspective cameras are related by a 3 x 3 projective homography H. It is well known that

$$y = Hx$$

where x and y are the corresponding points (homogeneous coordinates) in the first and second view respectively.Points in two images can be related by a unique homography under many other situations. It's widely useful for project where multiple images are taken from rotating camera having affixed camera centre ultimately warped together to produce a panaromic view.Homography estimation helps to improve stability of registration for feature based mosaic. There are many situations in computer vision where estimating a homography may be required such as

- •Camera calibration
- • 3D reconstruction
- • Visual metrology
- • Stereo Vision
- • Scene understanding

II. Literature Survey

In the real world there exist many objects with sharpboundaries. These boundaries have been traditionally utilizedin the form of lines, points, conics and contours, to estimatevarious multi-view relationships. Conventionally higher order primitives such as lines and curves have been foundto be more robust to path compared to points. Geometriccalculations, such as estimation of homography or fundamentalmatrix, are often done robustly based on these features.Homographies have been popular in literature for variousimage and video analysis tasks. Tasks like image registrationhave been conventionally formulated as an estimationof a similarity transform relating the points in two images.These methods were primarily based on correlation usingspatial or frequency domain techniques. With the popularityof the mathematical models for imaging, homographyestimation has become an integral part of applications likemetric rectificationmosaicing and geo-referencing. The homography between two views can be computed by findingsufficient constraints to fix eight degrees of freedom, sincehomographies are defined only upto scale. Homography hasbeen estimated using many geometrical primitives.Researches on wide baseline matching[3-5],object recognition[6-7] and image/video retrieval [8] shows that feature matching is improved by spatial consistency which means the match features of each feature and its every neighbouring feature should have the same spatial arrangement.J Sivic and Andrew Zisserman[8] used each region match in the neighbourhoodof each feature match to count this feature match. The sum of counts of the whole frame decides the rank of the frame and match without count is rejected. Vittorio Ferrari [3,6] iteratively applied an expansion and contraction scheme to add new matches and remove wrong matches while expansion is fulfilled based on the similarity of affine transformations between neighbouring region matches and contraction is reached by the sidedness constraint which bases on the fact that,to a triple of region

matches, the centre of a first regionshould be on the same side of the directed line going from the centre of a second region to the centre of a third region. The median flow filter is also used to remove wrong matches, which compares the length and anger of each match vector with the median length and anger of its several neighbouring match vectors respectively and selects the one whose length and angle below the thresholds.But on the image mosaic side, there are few researches considering eliminating wrong matches before robust registration. In [9] applied the median flow filter to remove wrong matches before registration for image mosaic.For image mosaic, to locally register the neighbouring images, 8-parameter homography can be applied to accurately model the mapping between views under general image condition. RANSAC [10] is a commonly accepted way to refine thehomography between images because RANSAC can return the final inliers when getting the final homography.
Table 1 reveals different homography estimation techniques in dense manner.

Table 1 Homography estimation techniques

Technique	Primitive	Transfor-mation	Remarks
Correlation, Transform Domain Analysis	Points, Patches	Similarity	Popular for image registration. Well studied in image processing literature.
Numerically solving linear equations (DLT)	Points, Lines	Projective	Direct closed form solution. Strong dependence on accurate correspondence
Projective invariants	Conics / Polygons	Projective	Two conic correspondences; Minimal (1 pair) correspondence, approximation
Use of weak calibration	Points with additional clues	Projective	Use additional clues like Fundamental Matrix, needs correspondence for estimation.
RANSAC, ML, Least Squares Estimates	Points, Lines	Projective	Large number of possibly noisy correspondences; More robust than DLT; Very popular.
Fourier Transform of sequences	Nonpara metric Contour	Affine	Computes affine invariants and polygonal approximations of contours in Fourier domain
Fourier Transform ofimage patches	Texture	Affine	Minimal line correspondence; upto affine homographies

III.Homography Estimation using RANSAC

The RANSAC algorithm (RANdom Sample And Consensus) was first introduced by Fischler and Bolles [5] in 1981 as a method to estimate the parameters of a certain model1 starting from a set of data contaminated by large amounts of outliers in a robust manner.
The computing of the homography includes two steps. The first step is toobtain interest points and determine putative correspondences, while the second one is toestimate the homography and the correspondences which are consistent with this estimateby RANSAC algorithmThe algorithm is essentially composed of two stepsthat are repeated in an iterative fashion.

1 Hypothesize. First minimal sample sets (MSSs) are randomly selected from theinput dataset and the model parameters are computed using only the elements ofthe MSS. The cardinality of the MSS is the smallest sufficient to determine the modelparameters (as opposed to other approaches, such as least squares, where the parametersare estimated using all the data available, possibly with appropriate weights).

2. Test. In the second step RANSAC checks which elements of the entire dataset areconsistent with the model instantiated with the parameters estimated in the first step.The set of such elements is called consensus set (CS).
RANSAC terminates when the probability of finding a better ranked CS drops below a certainthreshold. In the original formulation the ranking of the CS was its cardinality (i.e. CSs thatcontain more elements are ranked better than CSs that contain fewer elements).
Given a fitting problem with parameters x , it estimates the parameters by considering following assumptions.

•Parameters can be estimated from N data items.
• Total M data items are available
•Probability of a randomly selected data item being a part of a good model is Pg.
•The probability that algorithm will exit without finding a good fit if one exists is Pfail

Now Algorithm is:
Step 1: Select N data items randomly
Step 2: Estimate the parameter x.
Step 3: Find how many data items of M fit the model.
Call it as F
Step 4: If F is sufficient for processing, accept fit and exit with success
Step5: Repeat 1 to 4 M times
Step 6: Fail

If there are multiple structures then, after a successful fit, remove the fit data and repeat the steps.
M is calculated as

$$M = [\log(Pfail)] \div [\log(1 - Pg)\text{^}N]$$

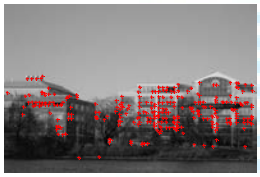
Where Pfail = Probability of M consecutive failures
Pfail= (Probability that a given trial is a failure)M
Pfail=(1- Probability that a given trial is success)M
Pfail = (1-(Probability that a random data item fits the modelN)M)

Algorithm for Homography using RANSAC:
1. Randomly pick four points from each point list, A and B
2. Feed the points into homography function, and get the Resultinghomography H
3. Apply Homography to the points in point list 1 and get

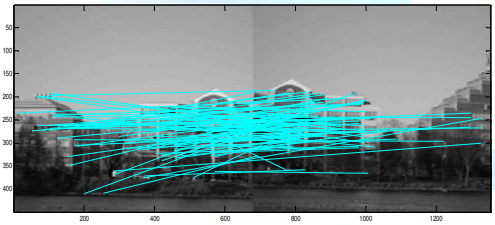
the result of putative point list.
4. Find the smallest distances between every point in the putative point list and point list2.
5. If the distances are smaller than a certain threshold defined by the user, count it as an inlier.
6. Re-do the above in a loop until it terminates.
7. The Homography that produces the most amount of inlier points will be the best Homography.

IV. Experimental Results

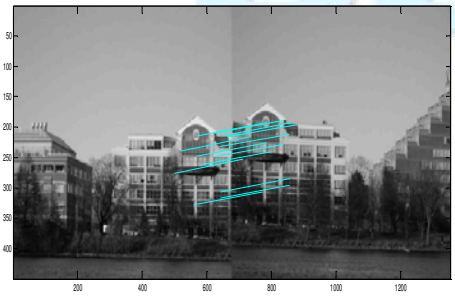

Image(1a) Image(1b)




Detected corners in Image(1a) and (1b) are 138 and 114

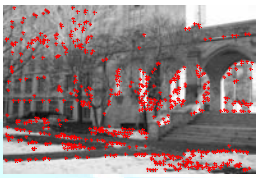
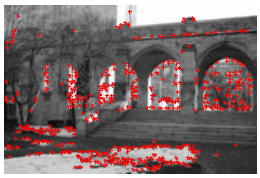


Number of matched pairs:79

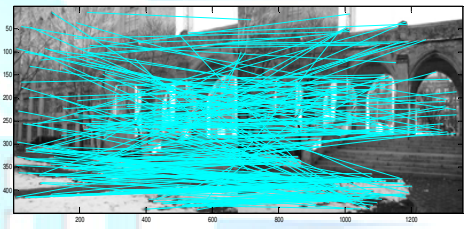


Candidate matches in Image(1a) and Image(1b)

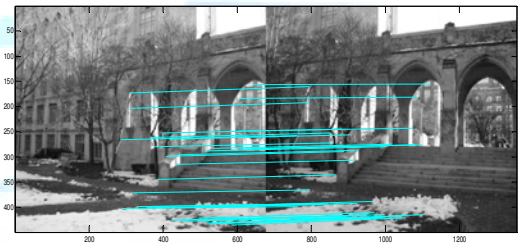

Image(2a) Image(2b)

Detected corners in Image(2a) and (2b) are 229 and 189

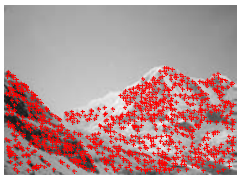
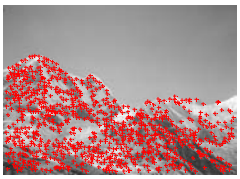


Number of matched pairs:167

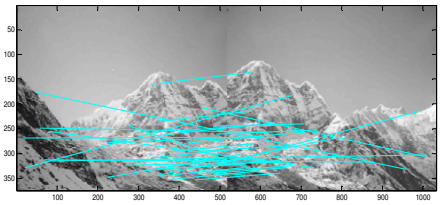


Candidate matches in Image(2a) and Image(2b)

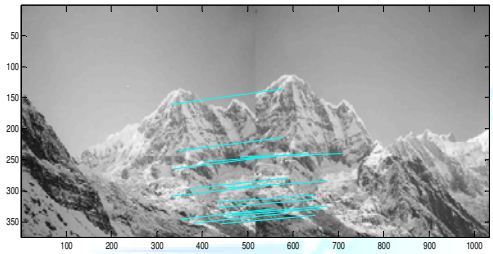

Image(3a) Image(3b)

Detected corners in Image(3a) and (3b) are 218 and 248



Number of matched pairs:64



Candidate matches in Image(3a) and Image(3b)

V. Conclusion

Homography estimation using RANSAC is a key step in feature matching as it improves the stability of image registration. It can estimate the parameters with a high degree of accuracy even when a significant number of outliers are present in the data set. On the basis of experimental results,homography estimation using RANSAC scheme is more robust than other techniques and provides accurate mapping between images and eliminates the mismatches.

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