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A SURVEY OF IMAGE MINING TECHNIQUES AND APPLICATIONS

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ABSTRACT

In the area of Data Mining, Image Mining technology has been considered an advanced field for discovering information related to the images. Image Mining is a process of extracting knowledge concerning images. The demand of image mining increases as the need of image data is growing day by day. There are many techniques developed in the earlier researches and eventually these techniques can reveal useful information according to the human requirements, but Image Mining still require more development especially in the area of web images. We know that today's world is digital world and we have use digital data such as video, audio, images etc. in various fields for various purposes. In present scenario, image plays a vital role in every aspect of business such as business images, satellite images, and medical images and so on. Image mining is challenging field which extends traditional data mining from structured data to unstructured data such image data. The main aim of this paper is to present a survey of the various techniques used for image mining applications.

Keywords: Image Mining, Data Mining, image Retrieval, Image Indexing, Object Recognition, Image Classification.

I. INTRODUCTION

Image Mining deals with the extraction of image patterns from a large collection of images. In Image Mining, the goal is the discovery of image patterns that are significant in a given collection of image. Image Mining deals with extraction of knowledge, image data relationship and other required patterns and uses ideas from image processing, image retrieval and machine learning, databases .The focus of image mining is on the extraction of knowledge patterns from a large collection of images. While there seems to be some overlap between image mining and content-based retrieval (since both deal with large collections of images), the problem of retrieving relevant images. In image mining, the goal is to discover image patterns that are significant in a given collection of images and the related alphanumeric data. The fundamental challenge in image mining is to reveal out the knowledge relating to the images from the web pages.

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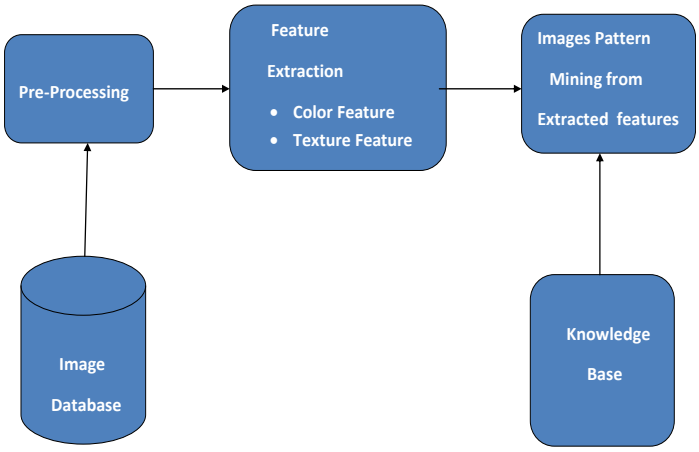

Figure 1.1 Imagine Mining Process

1.1 Preprocessing

In image data, the spatial segmentation can be done at region application. It can be automatic or manual and should be approximate enough to yield features that can reasonably capture the image content.

2. Feature Extraction and Transformation

Color, edges, shape, and texture are the common image attributes that are used to extract features of mining. Feature extraction based on these attributes at the global or the local level. There are obvious trade-offs between global and local descriptors. Global descriptors are generally easy to compute, provide a good representation, but they tend to integrate and therefore are often unable to discover subtle patterns or changes in shape. Local descriptors, on the other hand, tend to generate more elaborate representations and can yield useful results even when part of the underlying attribute.

II. IMAGE MINING VS. DATA MINING

The most common misconception of image mining is that image mining is nothing more than just applying existing data mining algorithms on images. This is certainly not true because there are important differences between relational databases versus image databases. The following are some of these differences:

(a) Absolute versus relative value. In relational databases, the data value are semantically meaningful. For example, age is 37is well understood. However, in image databases, the data value themselves may not be significant unless the context supports them. For example, a grey scale value of 48 could appear darker than a grey scale value of 88 ifthe surrounding context pixels values are all very bright.

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(b) Spatial information (Independent versus dependent position):Another important difference between relational databases and image databases is that the implicit spatial information is critical for interpretation of image contents but there is no such requirement in relational databases

(c) Unique versus multiple interpretations: A third important difference deals with characteristics of having multiple interpretations for the same visual patterns A new class of discovery algorithms is require to consider to the special needs in mining useful patterns from images.[1]

III. IMAGE MINING FRAMEWORKS

At the moment, a couple types of frameworks work extremely well:

(a) Function-Driven Structure (b) Information-Driven image Frameworks [6].

3.1 Function-driven frameworks

Several image mining systems have been developed for different applications. The majority of existing image mining system architectures fall under the function-driven image mining framework because they are organized according to module functionality. This system comprises of two modules: (1) A data acquisition, preprocessing and archiving system which is responsible for the extraction of image information, storage of raw images, and retrieval of image, and(2) an image mining system, which enables the users to explore image meaning and detect relevant events.

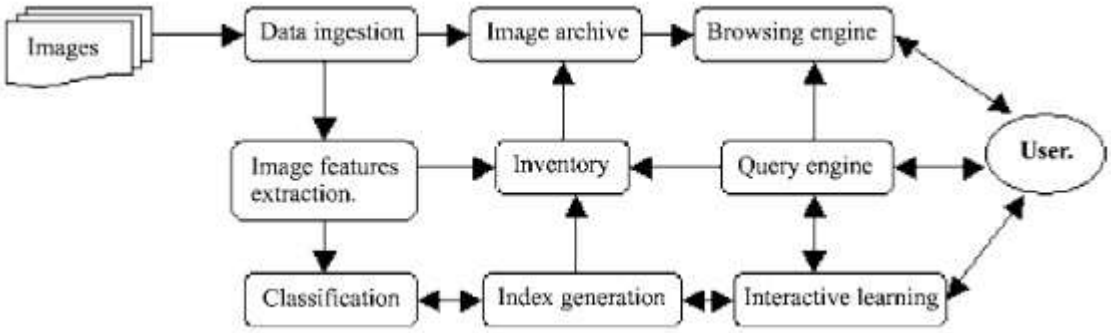

Figure 3.1 Functional architecture of a satellite mining system

3.2 Information-driven frameworks

While the function-driven framework serves the purpose of organizing and clarifying the different roles and tasks to be performed in image mining, it fails to emphasize the different levels of information representation necessary for image data before meaningful mining can take place. Zhang

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et al. (2001) proposes an information-driven framework that aims to highlight the role of information at various levels of representation.

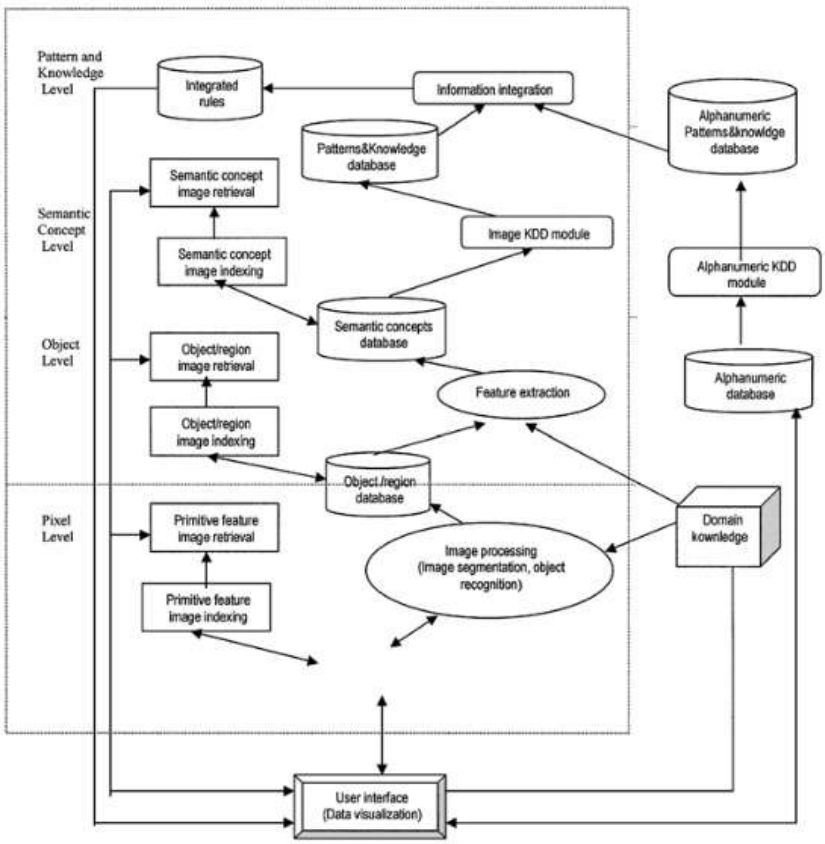

Figure 3.2 Functional architecture of a satellite mining system

A lot of current image mining process architectures come under this function-driven image mining framework. These descriptions are usually entirely application-oriented and also the framework has been arranged In line with the module performance. While the function-driven framework provides the goal of setting up and clarifying the various roles and duties to become carried out throughout image mining, that fails to emphasize the various amounts of Information representation needed for image facts prior to meaningful mining usually takes location [2].

IV. NEED OF IMAGE MINING

Images, if analyzed, can reveal useful information towards the human users. Image mining refers to the extraction regarding implicit knowledge, image data relationship, or other designs not explicitly stored inside images. Image mining is over just an extendable of data mining to image sector.

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V. IMAGE MINING TECHNIQUES

Image mining includes object recognition, image indexing and retrieval, image classification and clustering, association rules mining, and neural network.

5.1 Object Recognition

Using object models which might be known a priori, an object recognition technique finds objects in actuality from an image. Machine learning and purposeful information extraction can simply be realized when some objects have been identified and recognized through machine. The object recognition problem might be refer to as any supervised labelling problem according to models of known items i. e. given a target image containing a number interesting objects and a collection of labels corresponding to a collection of models known to technique, what is object recognition to assign correct product labels to regions, or a collection of regions, in the image[2].

5.2 Image Retrieval

Image mining requires that images be retrieved according to some requirement specifications. The requirement specifications can be classified into three levels of increasing complexity:

(a) Level 1 comprises low level features of such as color, texture, shape or the spatial location of image elements.

(b) Level 2 comprises image retrieval by derived or logical features like objects of a given type or individual objects or persons.

(c) Level 3 comprises high level features of image.

5.3 Text based Image Retrieval

The images are indexed and retrieved based on the descriptions such as their size, type, date and time of capture, identify of owner, keywords description of the image. This is often called description based or text based image retrieval process. The text based descriptions of the images are typed manually for each image by human descriptors, because the automatic generation of keywords for the images is difficult without visual information and feature extraction. Based on these contents, desirable image features can be mined and used as index. The keyword from dictionary of the images and on the basis of these keywords searches the requested images. Image came in the form of text stores in the data dictionary and here finds the keywords are available in the data dictionary then it shows the number of specific images,if data not find then it shows a message the word does not match. The user's has given input text the images are displayed based on their relevance feedback.

5.4 Query Based Image Retrieval

The query image can be extracting the visual features and can be compared to find matches with the indices of the images stored in the database and these features are used to retrieve the similar images from the image database. In the comparing of two images, resemblance of the visual features of the query image is measured with the features of each image. The similarities of two images are measured

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by computing the distance between the feature vectors of two images the retrieval system returns the k images. Several image characteristics have been used to index images for content based image retrieval system. Query gives to this system with an image and then search is based upon search algorithms which vary according to its application; result images must all share elements. Image which is already existed may be supplied by user or taken from stored Database.

5.5 Image Indexing

To further improve image retrieval rate, there is require of image data base using a fast and useful indexing scheme. A couple of main approaches are usually: reducing dimensionality or indexing high dimensional info. Other proposed indexing schemes concentrate on specific image features including color, shape and texture features.

Image indexing techniques are of two types:

1. Textual (manual)
2. Content-based (automated)

5.6 Textual

It is very simple techniques; keeping in mind the user approach keywords are given for a specific image. These includes

- Caption indexing
- Keyword additions
- Standard content titles, Classification, etc

The difficulty with this indexing is that it is

- Labor intensive
- More subjected to inter indexer consistency difficulties than indexing of text
- Of-ness, thing-ness, about-ness ambiguities

5.7 Content-based

In this technique images are indexed based on their content like color, shape, direction and texture etc. This kind of indexing is taken care by software itself, algorithms are arised which can distinguished the color, shape, textures etc. The image retrieved through this technique is known as Content Based Image Retrieval(CBIR).Research and development issues in CBIR cover a range of topics, many shared with ordinary image processing and information retrieval. Some of the most important are:

- understanding image users requirements and information-finding behavior
- recognition of suitable ways of explaining image content
- retrieving such features from unprocessed images
- provide storage area for large image databases
- combine query and stored images in a way that reflects human similarity

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Discrimination.

- efficiently accessstored images by content
- providing usable human interfaces to CBIR

5.8 Image Classification

In supervised classification technique, as input a collection of labelled (Pre-classified)images are given, and here the problem is to label a newly Encountered, yet unlabeled images. Typically, the given Labelled (training) images are used to do the machine learning of the class description which in turn is use to label a new Image.

5.9 Image Clustering

In unsupervised classification (or image clustering), the problem is always to group a given assortment of unlabeled images straight into Meaningful clusters based on the image content with not a priori knowledge. Clustering is often more advantage for minimizing the searching time period of images inside database. There are a variety of clustering methods: hierarchal, partitioning, density-based, grid based and fuzzy clustering methods.

5.10 Association rules mining

Association rule mining generates rules who have support and confidence greater than
some user specific minimum support in addition to minimum confidence thresholds. A normal association rule mining algorithm works within two steps. The 1st step finds all substantial item sets that match the minimum support constraint. The second move generates rules from each of the large item sets that match the minimum confidence constraint.

5.11 Neural network

Neural Networks are computational systems made up of simple processing units called neurons which are usually organized into layers with fully or partially connections. The main task associated with a neuron is to receive the activation values from its neighbours(the output of other neurons), compute an output based on its weighted input parameters and send that output to its neighbours.

VI. IMAGE MINING APPLICATIONS

Image mining is use in various fields. Different applications of image are;

- In medical for diagnose diseases(e.g. Brain tumour)
- Satellite Cloud Imagery (e.g. Detecting copying unauthorized image on internet)
- In Natural scene recognition
- In Space research
- In Remote sensing
- In Detection of wild plant(e.g. egeria detection)
- In Agriculture field
- In industrial work

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- In educational field

Image Mining Real-World Application [8]:It involves satellite images. Satellite images area significant source of information. One useful request of satellite images is usually to examine the walkways and trends of forest fires over the years, thereby enabling fire-fighters to get a Better understanding of the behaviour of like forest fires so as to combat these that will fire effectively. This is aim for the satellite image mining application. To achieve this, following is required:

1. An efficient as well as effective spatial clustering technique for large-scale multi-resolution incremental clustering which might be adaptable in vibrant environment;
2. An image indexing scheme depending on cluster-related semantic concepts to obtain high-level image retrieval within the satellite image database;
3. Fire cluster information to find out any spatial as well as temporal trends as well as patterns of fire development in terms of scale, area, time duration and location.

VII. EXISTING TECHNIQUES OF IMAGE MINING

Besides investigating suitable frameworks for image mining, early image miners attempted to use existing techniques to mine image information. The image mining techniques include object recognition, image retrieval, image classification, image clustering, association rules mining, and neural network. We will explain techniques and how they have been applied to image mining in the following subsections: To perform Image Mining techniques select a collection of images belonging to the same

Figure 5.1 Example of images

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VIII. IMAGE MINING ISSUES

Image mining research remains in their infancy and many issues continue to be solved. Particularly, for image mining research to progress to a fresh height, the pursuing issues need to be investigated.

Issues

(a) Propose new representation schemes for visual patterns that are able to encode sufficient contextual information to allow for meaningful extraction of useful visual characteristics

(b) Devise efficient content-based image indexing and retrieval techniques to facilitate fast and effective access in large image repository.

(c) Design semantically powerful query languages for image databases;

(d) Explore new discovery techniques that take into account the unique characteristics of image data;

(e) Incorporate new visualization techniques for the visualization of image patterns.

(f) Central key issue in image mining is how to pre-process image sets so as to represent in form that supports the application of data mining.

(g) Image pattern representation: How can we represent the image pattern such that the contextual information, spatial information, and important image characteristics are retained in the representation scheme?

(h) Image features selection:Which are the important images features to be used in the mining process so that the discovered patterns are meaningful visually?

(i) Image pattern visualization:How to mined patterns to the user in a visually-rich environment?

IX. IMAGE MINING REAL-WORLD APPLICATION

In this section, we describe a real-world application of image mining involving satellite images. Satellite images are an important source of information. One useful application of satellite images is to examine the paths and trends of forest fires over the years, there by enabling fire fighters to have a better understanding of the behavior of such forest fires in order to combat these fires effectively. This is our aim in the satellite image mining application. To achieve this, we need:

1. An efficient and effective spatial clustering technique for large-scale multi-resolution incremental clustering that is adaptable in dynamic environment;

2. An image indexing scheme based on cluster-related semantic concepts to achieve high-level image retrieval in the satellite image database;

3. Fire cluster information to discover any spatial and temporal trends and patterns offire development in terms of scale, area, time duration and location. The mining of fire patterns from satellite images involves the following 6 steps which corresponds to the information-driven framework level:

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1.Image processing. In the lowest pixel level, image processing technique (simple thresh-olding technique) is used to extract the spatial location information off ire spots. The spatial location of afire spot is represented by its altitude and longitude in the map. Such spatial information is stored in the Hot Spot database.

2.Database integration.The commercial satellite typically generates 2 to 3 images of a specified location every day and the extracted fire locations of each image, that is, the latitude and longitude, is stored in individual table of the HotSpot database. Thus, it is necessary for us to carry out database integration before trying to mine the image information over a longer time interval, say a week, a month or a year.

3.Spatial clustering.

Once the integration is completed, we perform spatial clustering. We use FASTCiD), an efficient clustering method that we have recently developed for large dynamic spatial databases. The cluster label of each fire spot is obtained after this clustering process.

4.Semantic cluster concept generation FASTCiD allows us to automatically obtain the information regarding the spatial layout, the area and the density of a specific cluster. Based on these information, we are able to define a few semantic cluster concepts, such as center cluster, left cluster, dense cluster, sparse cluster, big cluster, small cluster and so on.

5.Semantic concept image indexing and retrieval. After the generation of cluster semantic concepts, semantic concept indexing of HotSpot images is built to support high-level image retrieval based on these semantic concepts. Examples of such image retrieval are: retrieval all the HotSpot images which have dense cluster in the center of the image", and "retrieval all the HotSpot images in which the clusters located in the left and lower corners are all small ones".

6.Trends and patterns mining. Finally, it is desirable to produce some spatial and temporal trends and patterns of the forest fire. To this end, we explore the fire cluster information to discover any spatial and temporal trends and patterns of fire development in terms of scale, area, time duration and location. These trends and patterns are potentially useful for better understanding of the forest fires behavior.

X. CONCLUSION

This paper compared many of the proposed techniques in image mining .image Mining is the advanced field of Data Mining technique. The main objective of the Image Mining is to remove the data loss and extracting the meaningful information to the human expected needs. These all techniques have their own advantages and disadvantages. The Main goal of image mining is the discovery of techniques are being generated and many area left for the future enhancement and this study of review is found that still few more methods needed to

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REFERENCES

[1]. Prabhjeet kaur and Kamaljit Kaur ***"****Review of Different image Existing Image Mining Techniques"* in International Journal of Advanced Research in Computer Science and Software Engineering, *Volume 4, issue 6*,June 2014.

[2]. Vaibhavi and S. Shukla and Jayvala "*A Survey on image mining, its techniques and application"* in international journal of Computer Applications, *Volume 133 –No.9*, January 2016.

[3]. A. Hema an d E. Annasaro "*A Survey in need of image mining techniques"* in International Journal of Advanced Research in Computer and Communication Engineering. *Vol. 2, Issue 2*,February 2013.

[4]. WYNNE HSU and MONG LI LEE and JI ZHAND "*Image Mining: Trends and Developments"*,In Journal of Intelligent Information system, Jan 31,2002.