www.ijecs.in
International Journal Of Engineering And Computer Science ISSN:2319-7242
Volume 2 Issue 1 Jan 2013 Page No. 251-258

Similarity Analysis Of Images Using Content Based Image Retrieval System

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Abstract

The content based image retrieval (CBIR) is one of the digital image processing system. Most of the available image search tools are based on textual explanation of images. In these tools, images are manually annotated with keywords and then retrieved using text-based search means. This method would not produce promising results. The goal of CBIR is to extract visual features and display the required image. This paper aims to introduce the problems and challenges concerned with the design and the creation of CBIR systems, using SBIR. With the help of the existing methods, a possible solution how to design and implement a task specific descriptor, which can handle the informational gap among a sketch and a colored image, making an opportunity for the efficient search hereby. The results show that the sketch-based system allows users a shrewd access to search-tools. This technology can be used in several applications such as digital libraries, crime prevention, and photo sharing sites. Such a system has great value in apprehending suspects and identifying victims in forensics and law enforcement. A possible application is matching a forensic sketch to a gallery of mug shot images. This paper focus on retrieval of images based on the visual content of the query picture, which demands on the quite wide methodology spectrum on the area of the image processing.

Keywords: Content based, histogram, retrieval, query, database.

Introduction:

Image is representing a two-dimensional picture. A digital image is composed of pixels, and information about brightness of the image and RGB triples are used to encode color information. Effective retrieval of desired image in large image database is done automatically by extracting the features from the images using processing methods. By considering the shades, colors and relationship between them, it characterizes and analyses the picture which cannot be perceived by human eye [1].It also deals with bitmapped graphics and any changes can be identified minutely analyzing the image.

1. Retrieval of image and its information

Text based image retrieval involves annotating the image with keywords, and use text based database management systems to retrieve the images. It is very efficient for simple and small image databases, since just few hundreds of keywords can describe the whole database. Subsequently, several large leaps in development of processor, memory and storage made the size of image databases grow considerably [2]. As the image database and image size grow, there will be more images having different contents and the images having rich contents cannot be described by only several Semantic keywords. The demand of labor on annotating the images has risen

noticeably [3]. In this paper, we have focused on a perfect retrieval system. However, in practice, we need to model the read process in both syntactic and semantic to extract useful information. These challenges also exist in Image Retrieval. The Image Retrieval, if we apply the same technique, which is used in Indexing and searching a large image database by means of keywords, and are time-consuming and inefficient. In order to resolve this we use CBIR. Images can be retrieved from large databases using this CBIR system.

2. Content Based Image Retrieval

Content-based image retrieval also known as query by image content. Content based means that the search will study the actual information of image. During earlier experiments automatic retrieval of images from a database is were by color and shape features. The features used for retrieval can be either primitive or semantic, but the extraction process must be chiefly automatically. Semantic extraction can be done automatically and accurately, but image retrieval systems cannot be expected to find all exact images. They should select the most similar images to let the user choose the desired images. The number of images of retrieved set can be reduced by applying similarity measure that measures the perceptual similarity as proposed in this paper.

A typical CBIR system consists of three major components and the variations of them depend on the features used.

i. Feature extraction – Examine raw image data to extract feature specific information.

ii. Feature storage – Offer efficient storage for the extracted information, also help to improve searching speed.

Iii.Similarity measure – Measure the difference between images for determining the significance between images.

3. Content Based Image Retrieval using color

Retrieving image based on color similarity is achieved by computing a color histogram for each image that identifies the proportion of pixels within images holding precise values. Current research is attempting to segment color proportion by region and by spatial relationship among several color region [11].

i.Area of matching – Count the area or number of pixels having same or similar colors.

ii.Color distance – Distance between colors, usually in a perceptually uniform color space. Closer between matched colors means more similar.

iii. Spatial distribution – Usually used while combining color with other features such as texture and shape [4].

In a distinct color similarity measure, area of matching is usually counted as the similarity color distance is used to control the matching between colors and to adjust the similarity. In conventional color image retrieval system, the most straight forward approach is to use color histogram approaches [1][12]. However, histograms have a limitation that the feature space is fixed, compactness of the description is restricted, because histograms will not miss out non-existed colors. One argument that we can use a lower resolution histogram to develop the compactness but it is a trade-off between density and accuracy.

4. JPEG visual descriptors

The shape often carries semantic information follows from the reality that many characteristic objects can be visually recognized solely from their shapes [5]. JPEG has defined a set of standard descriptors for description and storage of the most commonly used features. This makes the extracted features more available. In JPEG visual standard, to represent different color features, and a Dominant Color Descriptor (DCD) is used.

Review Of Literature:

In the existing methods image retrieving from large image database can be done by following ways.

Method 1.

Automatic Image Annotation and Retrieval using Cross Media Relevance Models and Libraries have traditionally used manual image annotation for indexing, then later retrieving their image collections. However, manual image annotation is a costly and huge intensive procedure, hence there has been great interest in coming up with automatic ways to retrieve images based on content. Here, we propose an

automatic approach to annotating and retrieving images based on a training set of images. It let us to derive these probabilities in a natural way. Experiments show that the annotation performance of this cross-media relevance model is almost six times as good (in terms of mean precision) than a model based on word-blob co-occurrence model and twice as good as a state of the art model derived from machine translation. This approach shows the usefulness of using formal information retrieval models for the task of image annotation and retrieval.

Method 2.

This is a Concept Based Query where in it presents a probabilistic query expansion model based on a similarity that was constructed automatically. A similarity thesaurus reflects domain knowledge about the particular collection from which it is constructed. We address the two important issues with query expansion i.e. the selection and the weighting of additional search terms. In contrast to earlier methods, the queries are expanded by adding those terms that are most similar to the notion of the query, rather than selecting terms that are similar to the query terms. The experiments show that this kind of query expansion results in a notable upgrading in the retrieval effectiveness when measured using both recall-precision and usefulness [7].

Method 3.

Query System Bridging is another method uses semantic gap for large image databases. They have proposed a novel system called HISA for organizing very large image databases. HISA implements the first known data structure to obtain both the ontological knowledge and visual features for effective and efficient retrieval of images by either keywords, image examples, or both. HISA employs automatic image annotation technique, ontology analysis and statistical analysis of domain knowledge to pre-compile the data structure. Using these techniques, HISA is able to bridge the gap among the image semantics and the visual features, therefore providing more user-friendly and high performance queries. This demonstrate the novel data structure employed by HISA, the query algorithms, and the pre-computation process [6][5].

Method 4.

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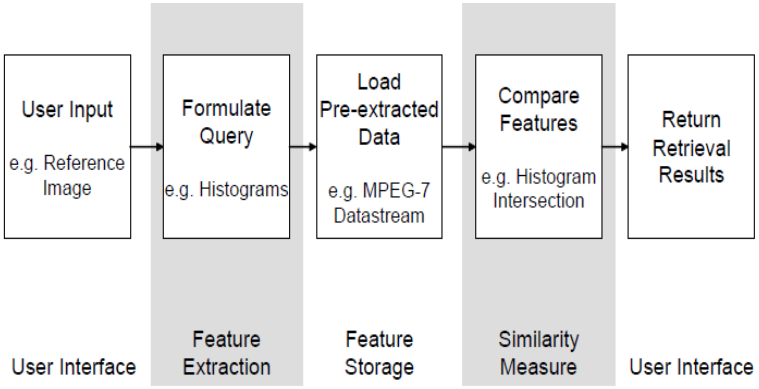
Ontology-Based Query Expansion Widget for information Retrieval- In this method an ontology-based query expansion widget utilizes the ontologism and is published in the ONKI Ontology Service. The widget can be integrated into a web page, e.g. a search system of a museum catalogue, enhancing the page by providing query expansion functionality [7][8].

Method 5.

Detecting image purpose in World-Wide Web documents- The number of World-Wide Web (WWW) documents available to users of the Internet is increasing at an rapid rate. Therefore, it is becoming increasingly important to develop systems that aid users in searching, altering, and retrieving information from the Internet. At present, only a few prototype systems catalog and index images in Web documents are available. To improve the cataloging and indexing of images on the Web, this mechanism is developed a prototype rule-based system that detects the content images in Web documents [9]. Content images are images that are associated with the main content of Web documents, as opposed to a multitude of other images that exist in Web documents for dissimilar purposes, such as decorative, advertisement and symbol images. This method presents a system that uses decision tree learning for automated rule induction for the content image detection system. The system uses visual features, text-related features and the document context of images in concert for fast and effective content image detection in Web documents.

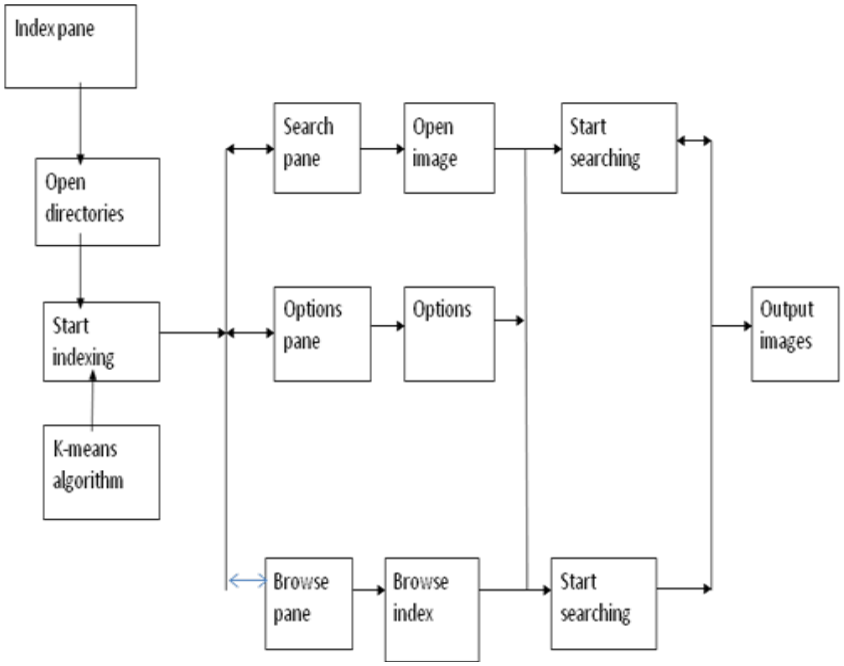
Proposed System And Architecture:

Content Based Image Retrieval (CBIR) is an automatic process to search relevant images based on user input. The input could be parameters, sketches or example images. A typical CBIR process first extracts the image features and store them efficiently. Then it compares with images from the database and returns the results. Feature extraction and similarity measure are very dependent on the features used. In each feature, there would be more than one demonstration. Among these representations, histogram is the most commonly used technique to describe features



Figure(1): Flow of a typical CBIR process

Fig 1. and 2. describes steps and the flow of a typical CBIR process although content based methods are efficient, they cannot always match user's expectation [16][17].



Figure(2): Detailed fow of CBIT events

Implementation:

1.Method

Step1: consider k objects and database of n objects as input.

Step2: Find mean of objects means i.e., calculate the mean value of the objects for each cluster.

Step3: After finding the mean, collect objects, which are in between the mean.

step4: Compare the k objects with the objects in database, until the similar image is found.

step5: Finally, A set of k clusters that minimizes the squared-error criterion.

In this paper, we have used the packages of Apache Company in order to attain the clustering. The built packages of Apache Company are as follows.

In order to monitor the time remaining for the indexing to be done we have used the progress bar. It is an important module of our project as it tells us the exact time taken or indexing.

2. Indexing Panel

Indexing the whole set of images using K-means Clustering algorithm. Indexing is done using an implementation of the Document Builder Interface. A simple approach is to use the Document Builder Factory, which creates

Document Builder instances for all available features as well as popular combinations of features (e.g. all JPEG features or all avail-able features).

3. Search Panel

Central part of Searching is the so called "semantic description panel". It allows the user to define semantic objects like agents, places, events and times which are saved on exit for reusing them the next time starting Annotation. These semantic objects can also be imported from an existing JPEG file to allow exchange of objects between users and editing and creating those objects in a user-preferred tool. Semantic objects can be used for creating the description by dragging and dropping them onto the blue panel with the mouse. After dropping all the needed objects onto the blue panel the user can interconnect these objects by drawing relations (visualized by arrows) between them using the middle mouse button. The directed graph, which is generated through these user interactions with Caliph, can be saved as part of an JPEG description[13][14].

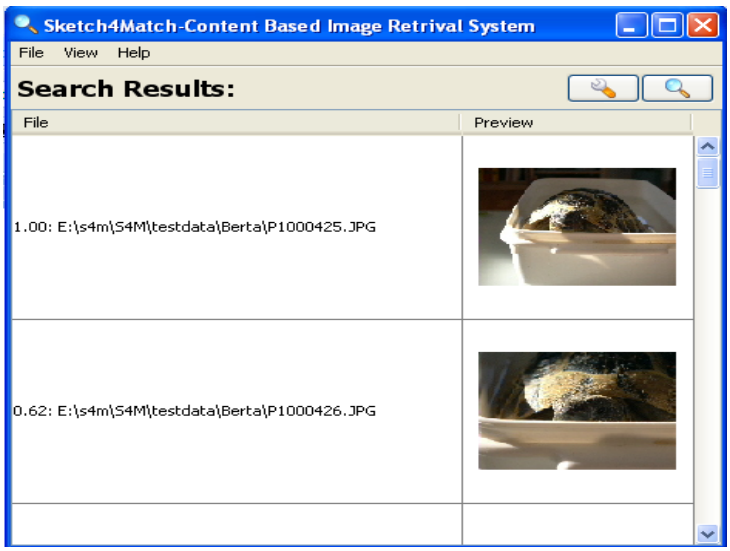
Different from recently published generative and discriminative modeling approaches for image annotation, the work represents a new dimension because it relies on searching in a very large collection of images with textual descriptions. The approach has three main steps: a search process, a mining process, and a filtering process. In fig (2)A large number of real-world images have been used to test the method and promising results are reported.

Since most images posted on the Web are not indexed semantically, e.g., by keywords, "concept-based image retrieval" has depended on low-level signatures. The "Automatic Semantic Annotation of Real World Web Images" by R.C.F. Wong and C.H.C. Leung addresses this "semantic gap" with a novel method for automatic semantic annotation aimed at retrieving appropriate images in response to user-generated queries about the image content[10][11].

4. Browse panel

In the browse panel, we have two jSpinner objects, among which one is used to show the total number of indexed image files. The other jSpinner object is used to view the indexed image files one after other in the jTextField object. The image obtained in the jTextField object can be searched directly instead of using. search panel.This is shown in fig.(3)

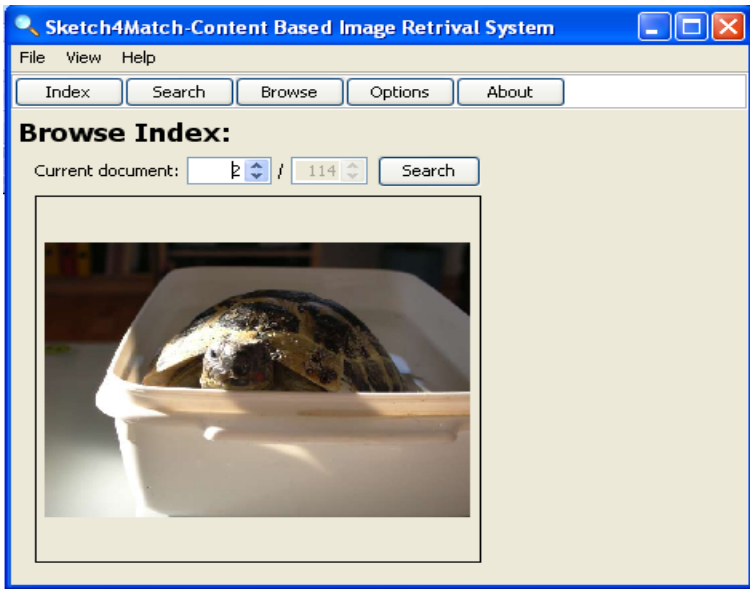
DCT (Discrete Cosine Transform).



Figure(3): search process of images

Step 1**:** The resulting sets of DCT coefficients are zigzag-scanned and the first

Step 2**:** Few coefficients are nonlinearly quantized to form the descriptor. This diplays all the images which are similar to the input image and displays how much it is similar to the input image.



Figure(4): No.of images it has considered i.e; browsed

Table 1:Defines the whole process

Input image	Image found In database	Similarity content
Tortoise	yes	1.00
ball	yes	0.83
apple	yes	1.00
mango	no	—
lion	yes	0.7
pegion	no	—
parrot	yes	0.63
egg	yes	0.94
pen	yes	1.00

As shown in table 1 ,it is shown that the images are searched from the database,if present,retrieve the image as the outcome of the process.

Conclusion:

Among the objectives of this project performed to design, implement and test a sketch-based image retrieval system. Two main aspects were taken into account. The retrieval process has to be unconventional and highly interactive. The robustness of the method is essential in some degree of noise, which might also be in case of simple images. The drawn image without modification cannot be compared with color image, or its edge representation. Alternatively, a distance transform step was introduced. At the tests, the effectiveness of Text Based Image

Retrieval System and the dynamically parameterized Content Based Image Retrieval System implementation was compared. It was examined with more databases. In our experience, the Content Based Image Retrieval System in more cases was much better than the Text based retrieval. However, the situation is not so simple. The edge histogram descriptor can mainly look better for information poor sketches, while in other case better results can be achieved for more detailed. With the categorization of retrieval response a bigger decision possibility was given to the user on that way, he can choose from more groups of results. Finally, we got successful by showing the similarity content of the image in large databases.

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