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Real Time Retrieval of Information Based on Image

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Abstract— The real-time retrieval of information based on image is an interface, especially design for people who makes spelling mistakes or the users who doesn't know what to type to obtain the desired result. With the help of this system, the user can upload the image captured and stored in the system, about which he/she wishes to know more about, or take a picture on the go to retrieve the desired information about it. Some features are very tough to describe with text, particular textures and complex shapes cannot be illustrated by querying an input as a word or phrase. The required images are digitized and stored in the database of the system. These images have name corresponding to them, also stored in the database, which is used to retrieve the required information.

Key words: image based search, retrieval of information, similarity comparison, visual content description

I. Introduction

People currently looks for image using search engine which grabs information based on the user's input in textual form. A problem with the existing method is that, sometimes, the user doesn't know the spelling of the keyword they want to enter (Cacography) or what the right keyword is, that they should enter into the search engine to get the desired result. The people may want to know more information about something they saw (an image), about which they don't know anything, then it will be very difficult for that person to understand what is the right keyword to type as input to get information about it.

Due to the fact that web-based image search engines are blind to the actual content of images, the result of querying for a specific object is often cluttered with irrelevant data. Alternatively, much research has been done on content based image retrieval (CBIR). Nevertheless, most CBIR systems require a user to provide one or more query images. In [1] the user provides an image, and selects the "blob" in that image that represents the object of interest. Although quite flexible, this system is burdensome on the user. Similarly, in [2] the system requires several images from a user, which it uses as a training set to build a classifier using AdaBoost. This again requires the user to be in possession of example images. These approaches, however, make no attempt in removing out groups of images that are irrelevant to the search query, nor re-ranking the search results.

This is why this paper proposed a slightly different type of software for the cacographers (fig. 1) and other users where the user can upload the image as an input and the system will return the information related to the image that are similar to the image uploaded.

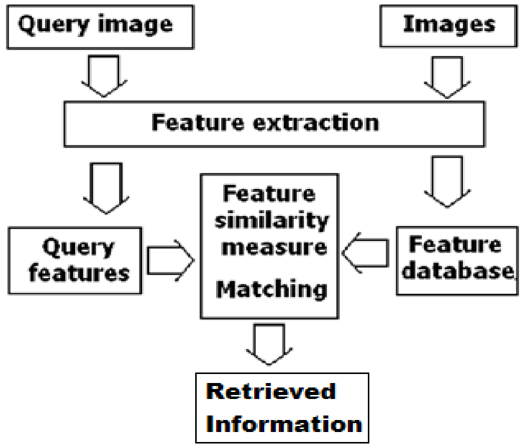

Fig. 1: Overview of the System

The User can upload the image which server's as an input image. The image present in the Database is selected by the system. Visual Content Description includes the description of the both the images. System generates the common feature vectors for both images (i.e. the user input image and the Database image) based on which Similarity Comparison takes place. The system then generates the Keyword (phrase). This keyword is then used to obtain the desired result (information retrieval).

II. Literature Survey

In the current technology, the acquisition, transmission, storing, and modifications are allowed on the large collections of images [5]. With the increase in popularity of the network and development of multimedia technologies, users are not satisfied with the traditional information retrieval techniques.

The term Content-based image retrieval was introduced in 1992, when it was used by T. Kato to define experiments into automatic retrieval of images from a database, based on the colors and shapes present. Since then, this term has been used to describe the working of retrieving desired images from a large collection on the basis of syntactical image feature vectors [6]. The techniques, tools and algorithms that are used originate from fields such as statistics, signal processing, computer vision and pattern recognition.

So nowadays, the Image Based Content Retrieval is becoming a source of exact and fast retrieval. Image Based content Retrieval is a technique which uses visual features of image such as color, shape, size, texture, etc. to search user required image from large image database according to user's requests in the form of a input image. Images are retrieved based on the similarity in features where features of the query specification are compared with features from the image database to determine which images match similarly with given features. So far, the only way of searching these collections was based on keyword indexing or by browsing. Literature survey is most important for understanding and gaining much more knowledge about specific area of a subject. In this paper we survey some technical aspects of current content-based image retrieval systems and tried to develop an efficient way to search information using image as input. With the large development of the Internet and the presence of image capturing devices such as digital cameras, image scanners, the size of the image collection is increasing rapidly, therefore searching using image as input can be thought of as an efficient way for information retrieval.

III. EXISTING SYSTEM

There are various existing systems used for retrieval of related images or information for the input image which are as given below:

A. Object-Based Image Retrieval using the Statistical Structure of Images:

It follows a new Bayesian approach to object-based image retrieval with relevance feedback. Using a Bayesian classifier, it does a windowed scan over images for the objects of interest and then ranks positive sub-images and the entire image is returned to the user with the positive regions highlighted. Then the user labels the received image as positive and negative that is used by second Bayesian classifier to eliminate difficult false positives. Images that contain sub-images that pass both classifiers are then returned to the user ranked by the product of the posterior probabilities estimated by each classifier.

B. Searching the Web with Mobile Images for Location Recognition:

It follows an approach to recognize location from mobile devices using image-based web search.. It uses a hybrid image and keyword search technique that first performs an image-based search over images and links to their source web pages in a bootstrap database that indexes only a small fraction of the web and a simple frequency-based procedure was employed to extract relevant keywords from these web pages. These keywords can be submitted to an existing text-based search engine (e.g. Google) that indexes a much larger portion of the web. The resulting image set is then filtered to retain images close to the original query.

In both the above mentioned existing systems, the system takes as input an image and returns only the related or similar images as output. It doesn't provide any information about the query image which is a need in the today's world.

We have another system with similar output as our system but with slight difference in the process of obtaining it which is as mentioned below.

C. Image-Based Search Engine for Art Exhibition Gallery:

The Image-Based Search Engine, especially design for art gallery, which uses Image-Based Search Engine in which the user uploads an image to retrieve the information about the art itself. The arts are digitized and stored in the system's database and has a corresponding name with the relevant information. The Image-Based Search Engine compares the two images pixel by pixel to look for similarities.

In this system, the image comparison is done by comparing pixels values of the two images which makes the processing very slow which is very annoying for the user. Thus here in this project, we focus on a more accurate process which works efficiently and quickly (real time).

IV. SYSTEM IMPLEMENTATION

The block diagram of the system, as shown in Fig. 2, is divided into 5 different blocks which includes user interface, image processing, similarity comparison, keyword extraction and information retrieval as shown below:

A. User Interface:

It is the first stage of the system. This is the interface between the user and the query provided by him/ her. The user takes a photo about which he/she is willing to find more about. This photo or any previously captured or stored image can be used as an input for obtaining information corresponding to the uploaded image using image matching techniques baased on feature. Thus from a user interface, users can specify an image about which he/she is eager to know more about by a very simplified action-uploading the photo of the object desired. Attributes tht are going to be stored with respect to the user is the input image and the user's IP Address.

B. Image Processing:

In this module, the image specified by the user is processed with respect to various factors like shape, color, etc. and finally a feature vector is generated that is given to the Similarity Comparator which compares it with the feature vectors of the database images.

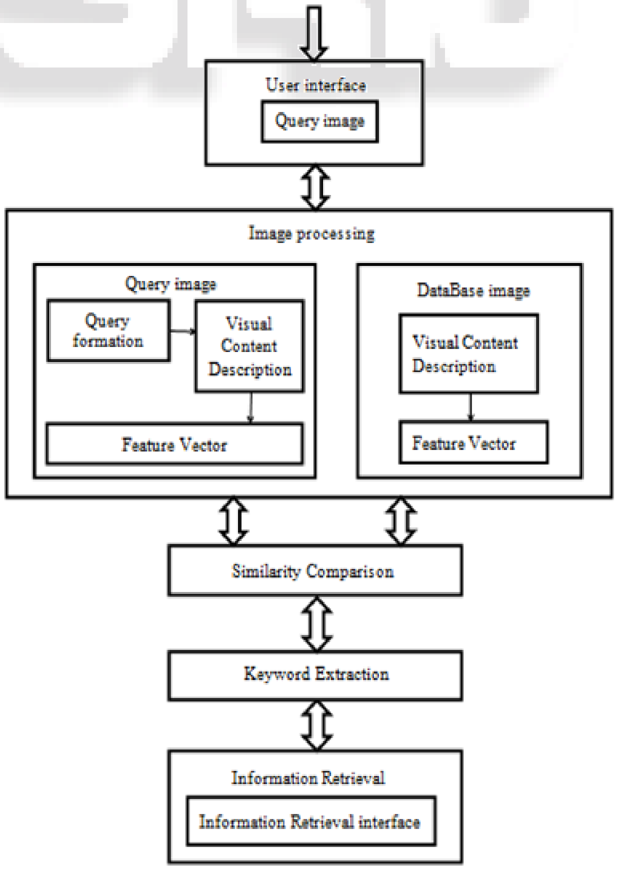

Fig. 2: Block Diagram

For e.g., if we talk about the color in an image, color is basically a combination of three colors: Red, Green and Blue, which forms a color space (Fig. 3). [7] RGB colors are called primary colors and are additive. By varying their combinations, other colors can be obtained. The representation of the HSV space (Fig. 3) is derived from the RGB space cube, with the main diagonal of the RGB model, as the vertical axis in HSV.

The HSV color space can be derived from the RGB color space through linear or non-linear transformation:

$$H = \cos^{-1}\{\frac{\frac{1}{2}[(R - G) + (R - B)]}{\sqrt{(R - G)2 + (R - B)(G - B)}}\}$$

$$S = 1 - \frac{3[\min(R, G, B)]}{V}$$

$$V = \frac{1}{3}(R + G + B)$$

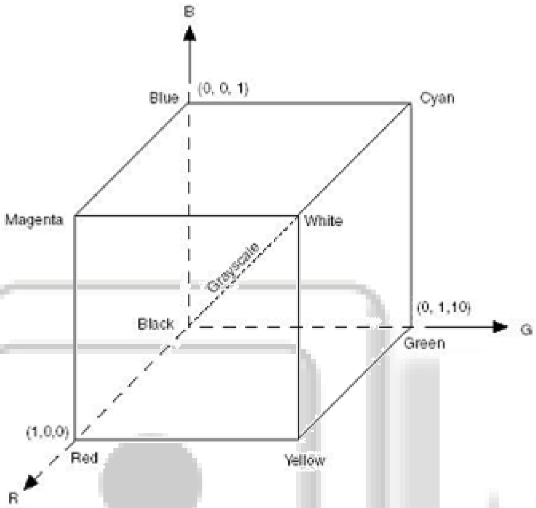

Fig. 3(a): The RGB color space [8]

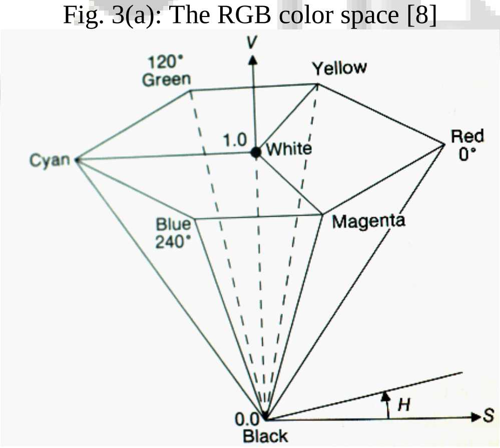

Fig. 3(b): The HSV color space [9]

Basically, a query is formed for the retrieval of the required features of the image. Based on the query formed, extraction of the required features from the image that is taken as input is accomplished. This is the visual content description of that image. Visual descriptors are the descriptions of the features of the contents in images that is seen, or applications or algorithms that generate such descriptions. They define basic characteristics such as the shape, color, motion, or texture, among others.

This is then followed by forming a vector based on features, required for comparison, from all the extracted features to obtain an image similar to the image queried. In pattern recognition, feature vector is an n-dimensional vector of numerical features that represent some type of object. Many algorithms in these systems need a numerical representation of objects, because such representations furnish processing and statistical analysis.

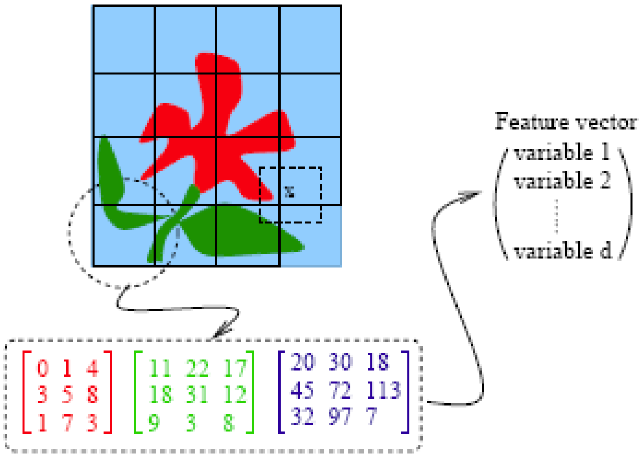

Fig. 4: Example of feature vector [10]

Feature vectors are equivalent to the vectors of explanatory variables used in statistical procedures. Feature vectors are generally combined with the weights using a dot product to construct a linear predictor function which is used to determine a score for making a prediction. In Mathematical terms, Let {V(x, y); x = 1, 2. . . X, y = 1, 2. . . Y} be a two-dimensional image pixel array. For color images V(x, y) denotes the color value at pixel (x, y) i.e., V(x, y) = {VR(x, y), VG(x, y), VB(x, y)}. For black and white images, V(x, y) denotes the grayscale intensity value of pixel (x, y).For an input image I, we find image M from the image database in such a way that distance between corresponding feature vectors is less than defined threshold t, i.e.,

$$D\ (Feature\ (I), Feature\ (M) \leq t$$

C. *Result Operation:*

In the next step, the two feature vectors are compared, i.e., the feature vector of the query image and the database images and an image similar to the queried image is detected. For this comparison, an algorithm is used which is based on image distance measures. An image distance measure compares the similarity of these two images in terms of distance between their feature vectors. For example a distance of 0 signifies an exact match with the input image, with respect to the dimensions that were considered. A value greater than 0 indicates various degrees of similarities between the images. Then the phrase corresponding to the matched image in the system's database is supplied to the information retrieval unit.

For the two given images I1 and I2 with size ‘m’ x ‘n’, we have:

$$I_1 = rand\ (m, n)$$

$$I_2 = rand\ (m, n)$$

Then we can calculate the two image distance value as:

$$D = \sqrt{\sum_{i=1}^{i=m} \sum_{j=1}^{j=n} [I_1(i,j) - I_2(i,j)]^2}$$

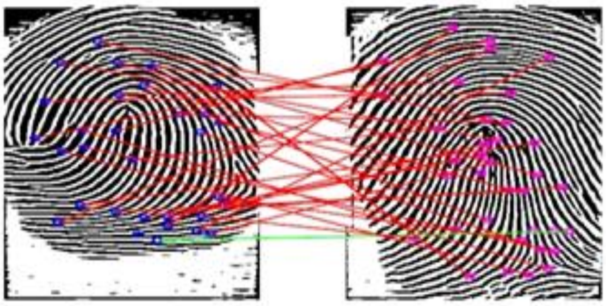

Fig. 5(a): query image

In fig. 5(a), the query image and one of the database image is compared based on their feature vectors. As a result, the system gets a value not so close to zero, thus considering it to be different from the query image.

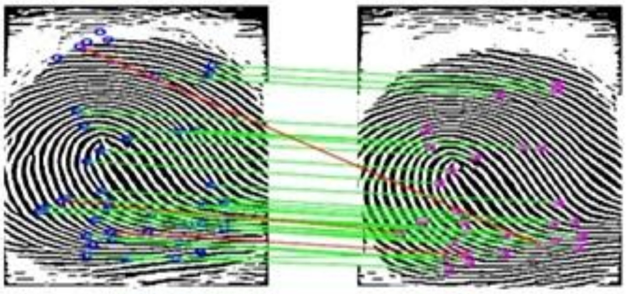

Fig. 5(b): Comparison

Fig. 5: Example of comparison of two images

Similarly, in fig. 5(b), the query image and another database image are compared based on their feature vectors. As a result, the system gets a value very close to zero, thus considering it to be similar to the query image. Thus it gives as output the keyword corresponding to this database image.

D. Information Retrieval:

In the last stage, retrieval of the desired information is achieved by making use of an existing text based search engine (e.g. Google). The keyword or phrase associated with the matched image is given as a query to the existing texted based search engine that results in obtaining the required information.

V. Result

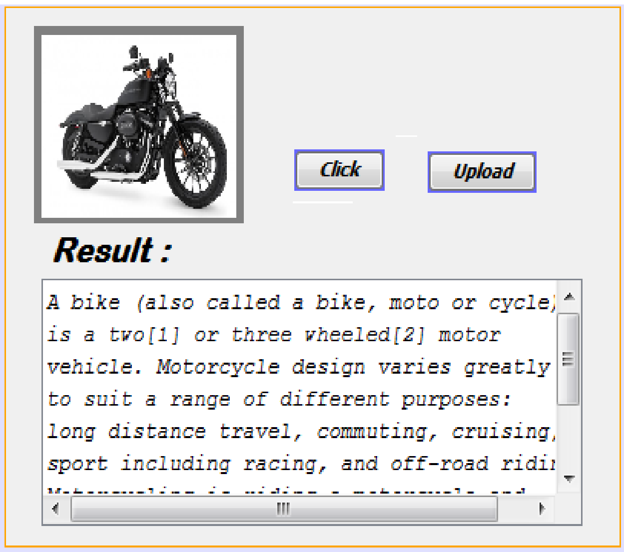

Fig. 6: Output of the system

The final result of the system will be all the relevant information about the uploaded image. The user will upload the image of which he/she needs information. The system will compare the uploaded image with the images in the database. The comparison will be carried out by feature extraction of both the images. The information about the image will provide general and up to date information in real time. The system will return the output sufficiently and quickly to affect the environment at that time.

VI. Conclusion

The software application is designed to extract visual properties of input image and database images and then performing similarity comparison on them. This will give a result in the form of a keyword (phrase), used to retrieve information corresponding to the input image. The software application is based on real time system.

In future, we will try to extend the algorithm:

1) To find more relevant images in comparison to the uploaded image if the user wants
2) To rank the images according to the similarity features.

VII. Acknowledgment

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