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Content Based Image Retrieval using SVM, NN and KNN Classification

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Abstract: The CBIR tends to index and retrieve images based on their visual content. CBIR avoid many evils connected with conservative ways of retrieve images by keywords. Thus, a rising interest in the area of CBIR has been known in current years. The arrangement of a CBIR system mainly depends on the particular image illustration and similarity matching function working. The CBIR tends to index and retrieve images based on their visual content. CBIR avoids many problems associated with traditional ways of retrieving images by keywords. Thus, a growing interest in the area of CBIR has been established in recent years. The performance of a CBIR system mainly depends on the particular image representation and similarity matching function employed. So a new CBIR system is proposed which will provide accurate results as compare to previous developed systems. Soft system will be used in this system. Based Image recovery system which evaluates the similarity of each image in its data accumulate to a query image in terms of various visual features and return the image with desired range of similarity. To develop and put into practice an efficient feature extraction NN and SVM to extract features according to data set using Auto calculate the feature weight by neural network. The precision and recall graph in gui according to the retrieved contents of the images from the datasets. To Apply back propagation or feed forward algorithm for neural network classification. To calculate cross relationship and apply weakening model for feature matching.

Keywords: CBIR, KNN, ABIR, precision, Recall etc.

I. INTRODUCTION

As the use and processing of digital images increased now days, researchers are persistently developing improved access methods to retrieve images from a large database. Generally, image retrieval procedures can be approximately divided into two approaches:

1. Annotation-based image retrieval (ABIR)
2. Content-based image retrieval (CBIR).

In ABIR, images are often annotated by keywords. Although ABIR potentially offers the most accurate information when images are well-named or annotated, it still has some drawbacks such as: the manual image annotation is time-consuming, human annotation is subjective, and some images could not be annotated because it is difficult to describe their content with words. The CBIR tends to index and retrieve images based on their visual content. CBIR avoids many problems associated with traditional ways of retrieving images by keywords. Thus, a growing interest in the area of CBIR has been established in recent years. The performance of a CBIR system mainly depends on the particular image representation and similarity matching function employed [1].CBIR or Content Based Image Retrieval is the retrieval of images based on visual features such as colour, texture and shape [2]. Reasons for its development are that in many large image databases, traditional methods of image indexing have proven to be insufficient, laborious, and extremely time consuming. These old methods of image indexing, ranging from storing an image in the database and associating it with a keyword or number, to associating it with a categorized description, have become obsolete. This is not *CBIR*. In CBIR, each image that is stored in the database has its features extracted and compared to the features of the query image. It involves two steps [3]:

- Feature Extraction: The first step in the process is extracting image features to a distinguishable extent.
- Matching: The second step involves matching these features to yield a result that is visually similar.

II. PRINCIPLE OF CBIR

Content-based retrieval uses the contents of images to represent and access the images. A typical content-based retrieval system is divided into off-line feature extraction and online image retrieval. A conceptual framework for content-based image retrieval is illustrated in Figure 1.1 [4]. In off-line stage, the system automatically extracts visual attributes (color, shape, texture, and spatial information) of each image in the database based on its pixel values and stores them in a different database within the system called a feature database. The feature data (also known as image signature) for each of the visual attributes of each image is very much smaller in size compared to the image data, thus the feature database contains an abstraction (compact form) of the images in the image database. One advantage of a signature over the original pixel values is the significant compression of image representation. However, a more important reason for using the signature is to gain an improved correlation between image representation and visual semantics [4]. In on-line image retrieval, the user can submit a query example to the retrieval system in search of desired images. The system represents this example with a feature

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vector. The distances (i.e., similarities) between the feature vectors of the query example and those of the media in the feature database are then computed and ranked. Retrieval is conducted by applying an indexing scheme to provide an efficient way of searching the image database. Finally, the system ranks the search results and then returns the results that are most similar to the query examples. If the user is not satisfied with the search results, he can provide relevance feedback to the retrieval system, which contains a mechanism to learn the user's information needs.

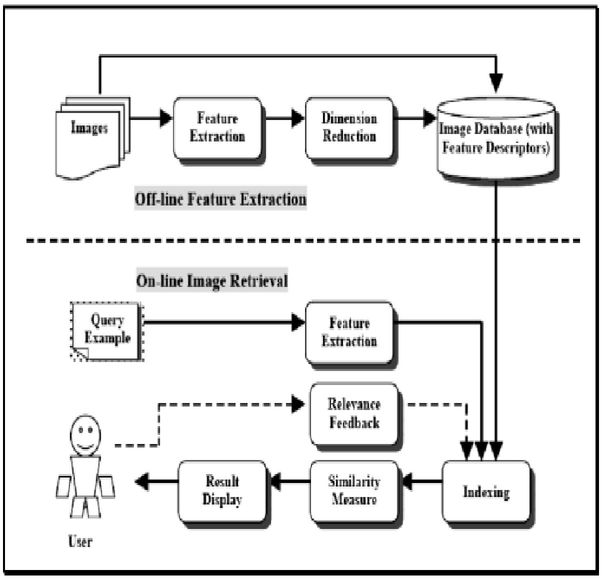

Figure 1: A Conceptual Framework for Content-Based Image Retrieval

III. METHODS OF REPRESENTATION

The main method of representing colour information of images in CBIR systems is through colour histograms. A colour histogram is a type of bar graph, where each bar represents a particular colour of the colour space being used. In MatLab for example you can get a colour histogram of an image in the RGB or HSV colour space. The bars in a colour histogram are referred to as bins and they represent the x-axis. The number of bins depends on the number of colours there are in an image. The y-axis denotes the number of pixels there are in each bin. In other words how many pixels in an image are of a particular colour. An example of a colour histogram in the HSV colour space can be seen with the following image:

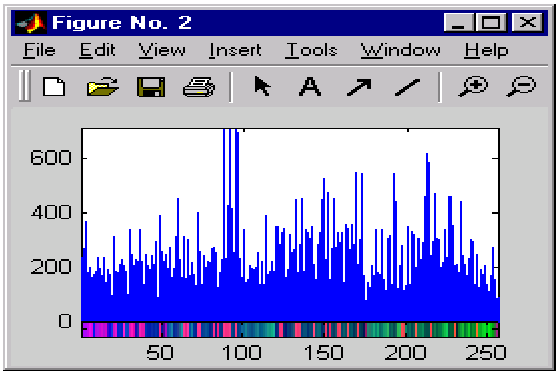

Figure 2: Sample Image and its Corresponding Histogram[5]

To view a histogram numerically one has to look at the colour map or the numeric representation of each bin.

IV. PLANNING OF WORK

We are proposing a technique for Content based image retrieval. The step by step methodology for the research process consists of preprocessing the image with suitable technique if the image is not clear or it require further enhancement. It increases the quality of the image. The next step consists of representation of an image into something that is more meaningful and easier to analyze. Then a feature extraction algorithm is implemented to extract suitable feature according to the data set available using soft computing techniques.

The proposed Steps for the work is given below:
Step 1: Create the dataset to store the features of the color images.
Step 2: Read the query image that has to be tested with
queryImage = imread(fullfile(pathstr, strcat(name, ext)));
Step 3: To resize the query image and apply the color color Auto Correlogram to identify the color of the image:
queryImage = imresize(queryImage, [384 256]);
hsvHist = hsvHistogram(queryImage);
autoCorrelogram = colorAutoCorrelogram(queryImage);
color_moments = colorMoments(queryImage);
Step 4: choose the different distances that has to be applied i.e.
L1
L2
manhattan
Chebychev
Cosine
Correlation
Spearman
Relative Deviation
Step 5: Choose the local and global extraction of the images.
Step 6: Load the dataset to test the query image.
Step 7: Apply the regression model and Neural Network to extract the features of the query image.
n = 2.6;
nbrOfNodes = 8;
nbrOfEpochs = 800;

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Step 8: Calculate the precision and recall value with respect to the query image.
Step 9 : find the feature weight with NN.
Step 10: Calculate the confusion matrix with :

```
opt = confMatPlot('defaultOpt');
opt.className = {
   'Africa', 'Beach', 'Monuments', ...
   'Buses', 'Dinosaurs', 'Elephants', ...
   'Flowers', 'Horses', 'Mountains', ...
   'Food'
   };
opt.mode = 'both';
figure('Name', 'Confusion Matrix');
confMatPlot(cmat, opt);
xlabel('Confusion Matrix');
```

Step 11 : Repeat step 2 to 10 on multiple image.
Step 12. Stop

V. RESULT

The different results are calculated with the help of above algorithm. The snap short of the results are given below:

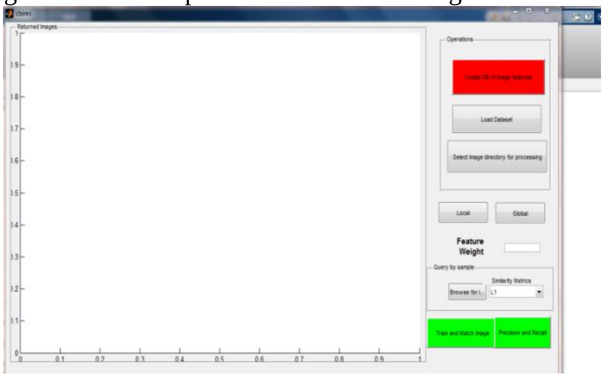

Figure 1: Input window

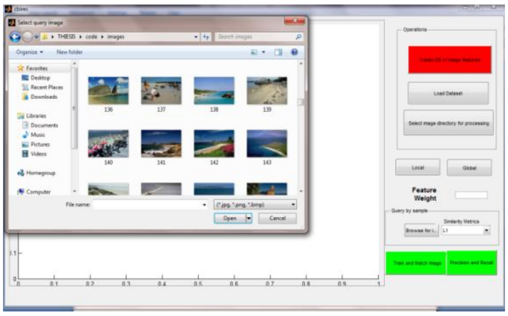

Figure 2: Browse the query image

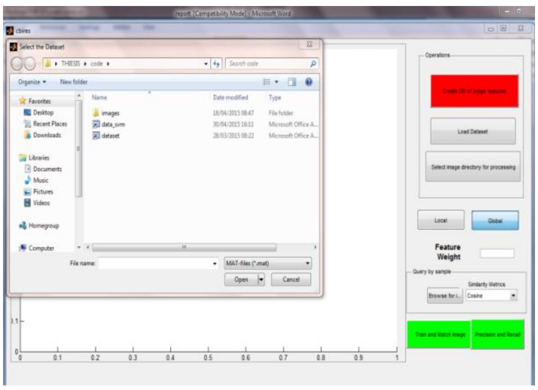

Figure 4: Browse the dataset

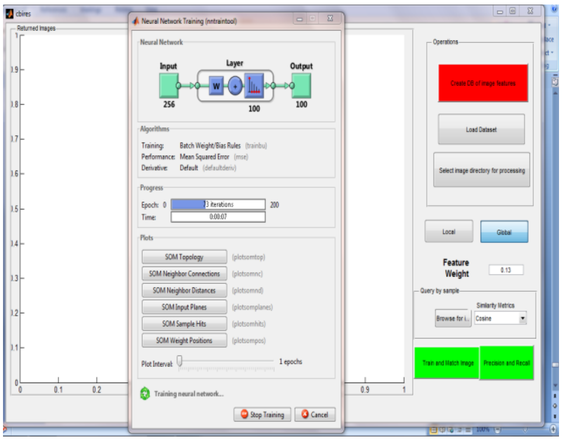

Figure 5: NN processing of the dataset

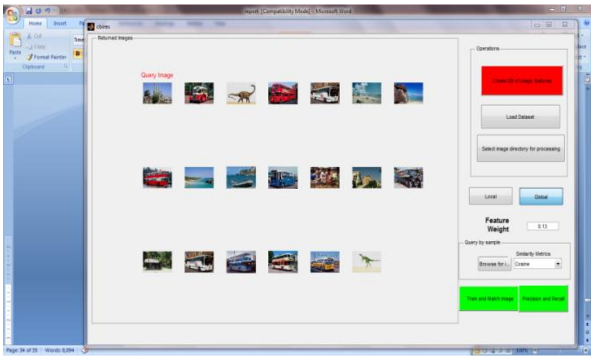

Figure 6: output result of the dataset

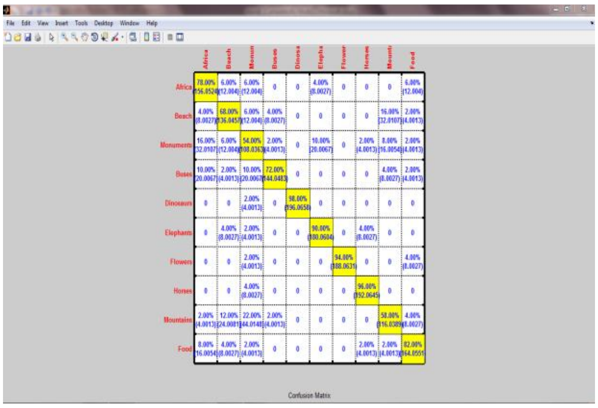

Figure 7: confusion matrix of output result of the dataset

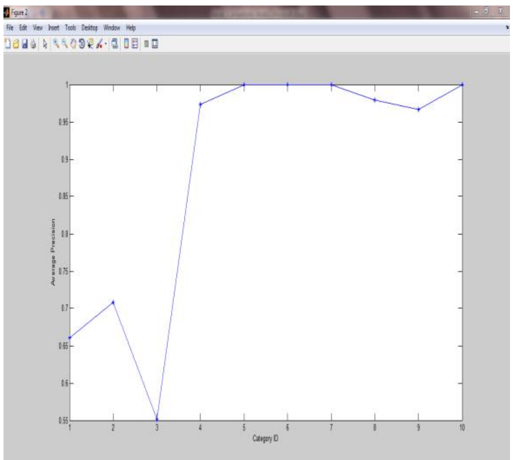

Figure 8: Precision of output result of the dataset

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