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IMPROVED META DATA MODEL WITH RELATIVE SMOOTHNESS FACTOR FOR EFFICIENT SEARCH

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Abstract: This paper represents the improved meta-data search model for efficient content based image retrieval. This paper includes brief information of following improved features i.e. dominant color and relative smoothness and other features like color histogram and edge histogram all together. This approach shows a step by step approach to get the accurate relevant results (images) from the database using meta-data. To achieve this goal the work also included the DWT (discrete wavelet transform) algorithm for the better results.

Keywords: Content Based Image Retrieval, Meta-data, Color Histogram, Relative Smoothness, Combine Features, Image Feature Extraction.

INTRODUCTION

Image processing is always an interesting and attractive major field for the researchers, now a days image searching through internet or image retrieval through database is quite a major field. Since last some years CBIR has become one of the powerful areas of interest for researchers to find visually similar images from existing databases. Here in the same manner but with some improvements and by adding some features we introduce an efficient metadata search model for accurate results. Many CBIR systems do not have the all features to find the result efficiently and accurately. This paper includes relative smoothness factor as a new element with other features to improve and to make the efficient search from the data sources[2]. The following are some features by which similarity can be measure of images:

a) Dominant Color is the term given to those colors in the image which are most frequent and shown as high peaks in the color histogram.

b) Relative Smoothness is texture analysis of each decomposed image carried out by calculating following if σ is the standard deviation; Relative smoothness is given by [2]:

$$R = 1 - \frac{1}{1+\sigma^2} \quad \text{..... [i]}$$

c) Many new features like entropy, smoothness, skewness, etc are coming in to light day to day for enhancement the CBIR field.

RELATED WORK

The majority of the early systems of 1980s would have been using systems such as IBM's Query by Image Content (QBIC) for the purpose of content based image retrieval. Definitely the commercial QBIC is well known system to us. It is not easy task to name & compare all such systems. Some of these are Candid, Photobook3 and NETRA. Simple color and texture characteristics are used by these systems for describing the image contents.

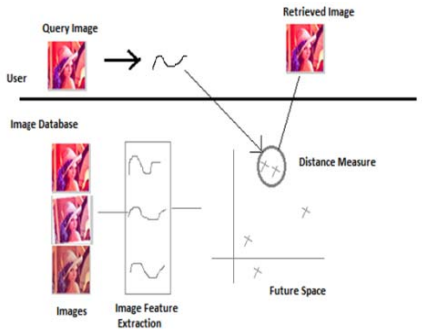

Figure 1. The CBIR process

Existing CBIR Systems

There are some existing CBIR systems those are based somehow on meta search and other features calculation like: BLOBWORLD is developed by UC Berkeley Computer Vision Group. It divides the pictures into regions by using EM-algorithm (Expectation-Maximization) based on the color and texture properties of the pixels [6]. NETRA is tool that segmented the image into many homogeneous regions in order to find the features and it is basically developed by University of California at Santa Barbara in their Electrical and Computer Engineering department[5,6]. PicSOM is developed by Laboratory of Computer and Information Science, Helsinki University of Technology. Picture is categorised into 5 regions. For each region, tincture and appearance properties are used.

PROPOSED METHODOLOGY ALGORITHM

This paper proposed a wavelet - based approach for CBIR. Also histograms are used for tincture characteristics retreival for CBIR, and these tincture and edge histogram characteristics are joined to provide fine retrieval efficiency. This model completes the whole process in the following steps:-

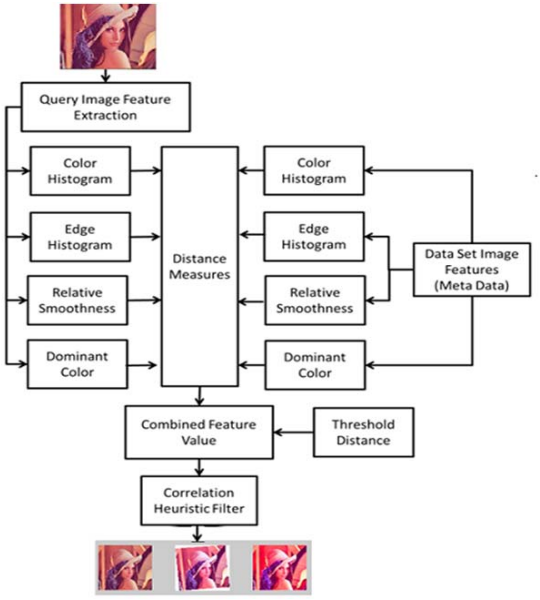

Figure 2. Flowchart for Meta Search Process

Input Query Image

In this step a pop up window will open and take input query image from any data source. In Figure 3, there is an input query image i.e. a girl image taking from the database.

Now the process will calculate the features of the input image and compare with preloaded features from dataset that is mat files and after comparing all the features this will generate the results as well.

Figure 3. Pop-up window and Sample Query Image

FEATURES CALCULATION

After inputting the image various features will apply step by step like color histogram, edge histogram, relevant smoothness, combined features and then the outcome will compare with the respected feature calculation feature and calculate the distance between the features[1, 4]. Figure 5 shows the results after calculating the Relative smoothness factor whereas Figure 6 shows the graphical representation between the images and parametric distance.

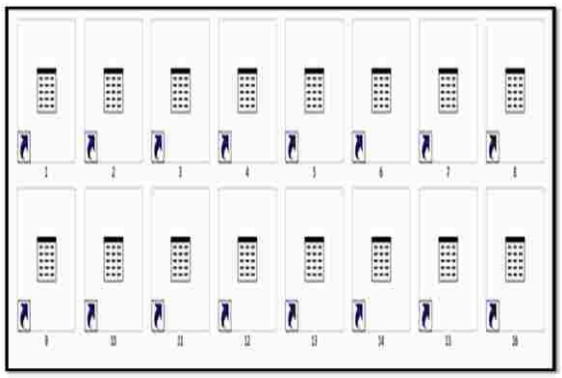

Figure 4. Matlab data files storing the feature values

The above figure 4. shows the matlab data files in which features are stored and these features will compare with the query image one by one and those features are very near to the input query image feature will be consider as result.

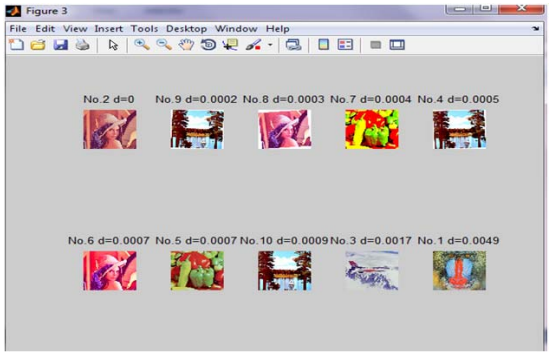

Figure 5. Result after edge Relative Smoothness

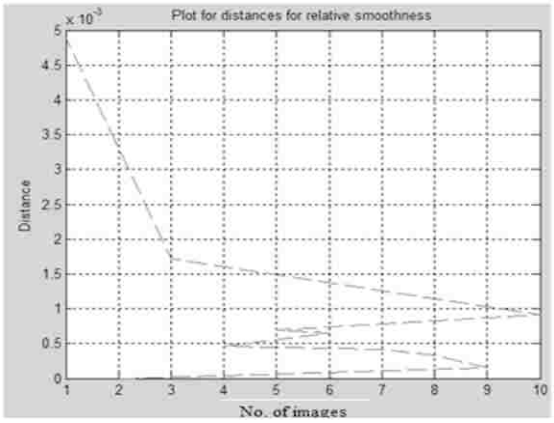

Figure 6. Image versus parametric distance plot for relative smoothness

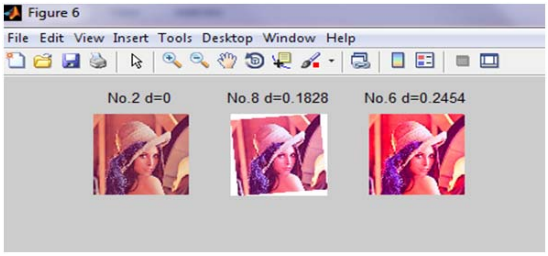

Figure 7. Search Result for Combined Features

These are the finally filtered result using the correlation heuristic. It is clearly visible that now the search result contains only the relevant images not others.

It is possible because among the very less distant images in the combined feature search we have correlated the query image with the sorted result. If a satisfactory correlation does not occur then that particular image can be discarded from the final results. So now the results are completely filtered [8].

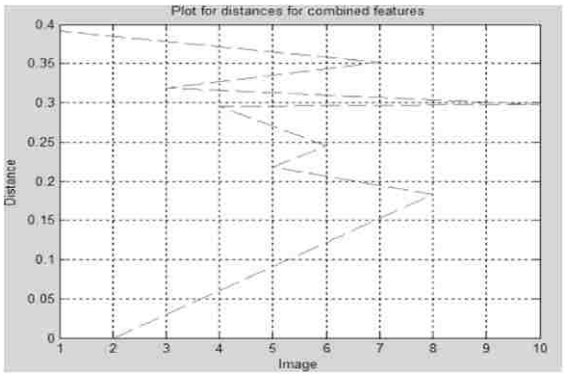

Figure 8. Image versus parametric distance plot for combined features

RESULTS ANALYSIS

The MATLAB V7.4 used as a simulation tool, this is very strong and effective tool for image processing. Features of images can be calculated using MATLAB and kept in (*.m) files. Many results are based on MATLAB figures in this thesis. The dataset of features are stored in form of MATLAB data files (*.m) format. This work used many predefined functions for feature calculation like histograms calculation and for distance calculation we have DWT, Cosine distance and other functions [5,6].

FINAL RESULT

To perform the search in the data based search application is performed on the basis of data and the information provided about the picture. So a picture which does not have the full information of what it has does not comes in the output. Commonly all data searches are efficient in this area but when it comes to the picture search it is not fully provided that the picture which does not have all the information comes in the output or not. To want to have the picture in the output it should not search on the basis of its full information but rely on the characteristics of the picture also. So we focus to search the picture on the basis of the characteristics retrieved from the picture and make the comparison with the already stored characteristics of present pictures in the

dataset. We are giving brief description of all the procedure. Firstly all characteristics of the stored pictures in the database are formulasied. As early as new picture is summed up in the database its characteristics are formulaised and stored as MATLAB text document [7] now query image Figure 9 (a) can be browsed or provided as data image. This picture can be same as that provided to us or not. Figure 9 (b) shows result.

Figure 9. (a) Query Image, (b) Result only for Combined Features for Query Image

CONCLUSION AND FUTURE WORK

This paper presents the image search technique on the basis of their content. The methodology contains various features to do the efficient search i.e. color, edges, relative smoothness and dominant colors in the histogram. The results after simulation shows the images those are very close to query image with respect to their features and all the irrelevant images can be removed by correlation matching heuristic.

In future, the features of this concept can be implemented in medical field in order to get the accurate and efficient results. Some challenges have been seen that enhanced quality of images can be improve the efficiency of the result, the meta data also needs the efficient storage with good indexing to do this scheme efficiently and in less time.

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