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INVESTIGATING RETRIEVAL OF IMAGES USING LOW LEVEL FEATURES

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ABSTRACT

The combination of these content-based features is needed for better retrieval of image according to the application. The main test of CBIR framework is to decide the specific/surmised matching image of database to the query image. Over the most recent two decades, CBIR frameworks have been enhanced a lot. In any case, there still stay a few issues which have not been addressed agreeably. Most importantly issue is of semantic gap, which exist between low level feature portrayal of images and the genuine visual view of the image. The similarity between two images (spoken to by their feature esteems) will characterize by a similarity measure. Choice of similarity metrics will have coordinate effect on the execution of content-based image retrieval. A CBIR using multistage retrieval strategy is proposed here to deal with these issues. Low level features of an image can be local and global. In this paper the A computer system having Pentium IV, 2.8 GHz processor and 1 GB RAM is used for conducting experiments. This system has been actualized in MATLAB.

Keywords: Images, retrieval, low, level, CBIR

1. INTRODUCTION

The first is that a lot of human work for manual comment is required. The second section is incorrect because of the subjectivity of human observation. To beat the above disadvantages of text-based retrieval of images, CBIR was presented and has turned into the dominating technology. CBIR is a strategy that uses the visual contents to search the images recorded in large scale image databases according to users' interests. Since 1990s, this research area has been one of generally active and rapid developing controls. Early work on image retrieval can be traced back to the late 1970s. Since 1979, the application potential of image database management strategies has attracted the attention of researchers from numerous orders. The early procedures were not generally based on visual features however on the textual annotation of images. At the end of the day, images were first annotated with text and then searched using a text-based approach from traditional database management systems. In the early 1990s, it was generally recognized that a more productive and natural way to speak to and record visual information would be based on properties that are characteristic in the actual images. Researchers from the communities of computer vision, database management, human-computer interface, and information retrieval were attracted to this field. Since 1997, the quantity of research publications on the strategies of visual information extraction, organization, indexing, query interaction, and database management has increased massively. Similarly, large quantities of academic and commercial retrieval systems have been created by colleges, government organizations, companies, and hospitals.

2. LITERATURE REVIEW

Mehwish Rehman, Muhammad Iqbal, Muhammad Sharif and Mudassar Raza (2012) Content-Based image retrieval framework (CBIR):- CBIR is otherwise called Query by Image Content; it is the utilization of computer vision strategies to the image retrieval issue. The essential objective of the CBIR framework is to develop important depictions of physical credits from images to encourage proficient and viable retrieval. The "content" can be colors, textures, shapes or whatever other data that can be gotten from the image itself

Rehman M.H (2012) texture features is separated utilizing invariant Gabor Descriptor from the image and closeness measure Canberra remove was connected for retrieval of images. The Brodatz texture database and Food database were utilized for experimentation.

Hatice (2012) color and texture features are removed utilizing color moment and co-occurrence histogram separately and comparability measure relationship separate measure is utilized. For diminishing the semantic gap in CBIR they utilized SVM and closest neighbor look. The Follicular Lymphoma and Neuroblastoma database were utilized for experimentation. The database contains images of in excess of one sickness. This CBIR framework is created for microscopic images.

Lijun Zhao and Jiakui Tang (2010) look at changed visual feature blends in retrieval experiments. They portray those exclusive low-level features for CBIR can't accomplish a satisfactory estimation execution, since the user's high-level semantics can't be effectively communicated by low-level features. So as to decrease the gap between client question idea and low-level features in CBIR, a multi-round relevance feedback (RF) methodology based on both Support vector machine (SVM) and feature comparability is received to meet the client's prerequisite. This usage can enhance the execution by expanding the quantity of feedback.

Prof. SharvariTamane, (2008) proposed another framework for image retrieval utilizing abnormal state features which is based on removing low level features, for example, color, shape and texture features and talk them into abnormal state semantic features utilizing fluffy creation rules, with the assistance of image mining strategy. Principle preferred standpoint of his proposed strategy is the likelihood of retrieval utilizing abnormal state semantic features.

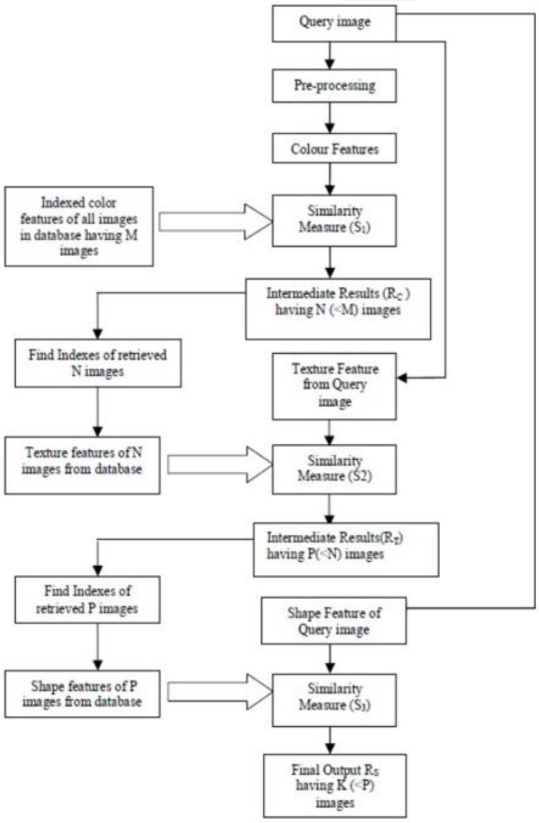

Figure 1: Proposed Model of Image Retrieval

3. PROPOSED METHODOLOGY

These approaches anyway will in general have less accuracy as all intermediate outcomes are formed by searching the entire database freely based on a particular feature. This approach also takes high computation time as it requires searching of database on numerous occasions and further combination and ranking of the intermediate outcomes. Apart from this, it is also not proficient to compare the combined feature vector of various feature spaces immediately and produce the final outcome without delivering intermediate outcomes. Since various feature spaces contain various values of feature and each feature has distinctive relative importance for retrieval.

To deal with aforementioned issues, another plan for image retrieval is proposed in this chapter. To record images in database, global features based on color and texture is computed. These features are combined with contour-based shape feature to form a solitary feature vector to be ordered in the database. At the point when a query image is introduced to the system, the retrieval of similar images happens in stages based on color, texture and shape similarity individually. The intermediate outcomes consequently delivered act as a contribution to the following stage for example the yield images of each stage act as database for next stage thereby lessening the quantity of images to be compared at each stage. This approach also eliminates the prerequisite of combination and normalization methods needed for discovering final similarity score.

An image database contains a wide variety of images yet images which are relevant to the query may be not many. To more readily meet the user's goal, the proposed system performs search in relevant images as it were. This is not quite the same as traditional CBIR systems which searches the entire database for each feature. Relevance of the images is first established by comparing their color feature. Search based on texture and shape features is performed uniquely on the images which have color similarity with query image. This approach decreases the variety of database by eliminating irrelevant images at each stage so that low level features can all the more likely speak to the semantic of images. Investigations have indicated that the system delivered the ideal outcomes with greater accuracy.

3.1 Experiment on Dataset - 1

The performance of the proposed multistage retrieval model is tested using Corel database downloaded from http://wang.ist.psu.edu/docs/related/. The corel image gallery contains 1000 natural images having 100 images of 10 categories, which incorporate African people, Beaches, Building, Buses, Dinosaurs, Elephant, Flower, Horses, Mountains and Foods separately. Example images from each of these categories are appeared in Figure 2.

Figure2: Example images representing each category of Corel database

Figure 3 shows the example run of our system. Image in the upper left corner is the query image and rests of the 20 images are the recovered outcome in response to query image. Since values of N, P and K affect the accuracy of our system. In general N ought to be set equal to the quantity of images in the database which are relevant to the query image. We haves taken these values as 100, 50 and 20. The values of N and P can be set equal for filtering the images based on both color and texture feature.

Figure 3: Retrieval results for an example query

In addition to this, adaptability of the system is additionally increased by giving the option of manual setting to the user. Figure 4shows the retrieval aftereffects of each stage with value of N, P and K set to 10, 8 and 5 individually. Obviously irrelevant images are filtered at each stage thereby narrowing down the search range which makes low level features to more readily speak to the user purpose. The proposed system has been tested using default option for calculating the average precision of various categories. A recovered image is said to be relevant on the off chance that it belongs to the same category as query image. Present system is evaluated by taking each image in each category as the query image. Retrieval aftereffects of each of these images are used to calculate the average precision and average recall for that category with number of yield images (L) set as 20. Evaluation results from proposed system and other five models are appeared. It is seen that our technique has preferable average precision over all different strategies in each category aside from the category of Buses. Anyway average precision in this category can also be improved by admirably setting the values of N, P and K in our model. Better outcomes are mainly because of refinement of the search cycle in relevant area of the database

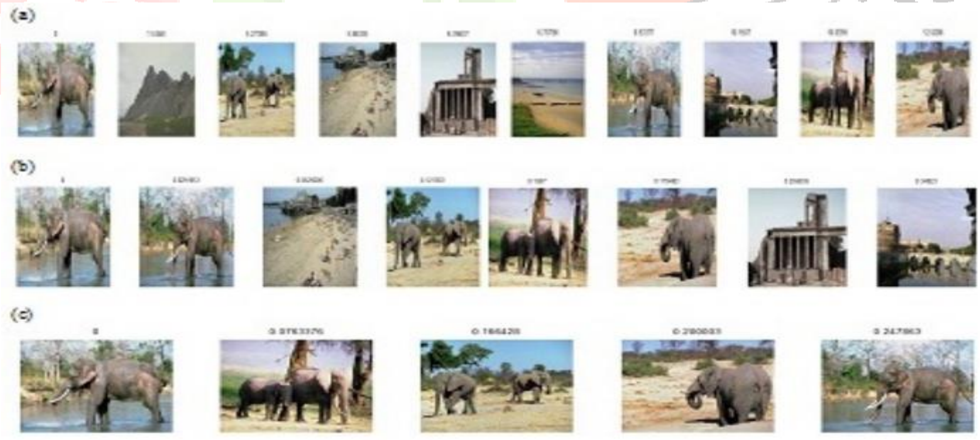

Figure 4: Intermediate results for each stage (a) Result of first stage (R_C) with N=10 (b) Result of second stage (R_T) with P= 8 (c) Final result of system (R_S) with K = 5

Figures 3 and 4 shows the performance evaluation of proposed model and different models as far as average precision and average recall individually with L varying from 20 to 100 experimental outcomes reveal that current model is significantly superior to different models. The outcomes are better as the proposed conspire performing search in only the relevant area of the database.

4. RESULT AND ANALYSIS

Traditional CBIR systems search all images in the database autonomously for each feature space being used. Leave n alone the total number of images in the dataset and f signifies the quantity of feature spaces used for indexing image in the database. At that point Computation time T of the system can be generally estimated as:

$$T \geq f \times n \ (1)$$

For example, if the total number of images in the database are 1000 and the system utilize three feature spaces for color, texture and shape then the estimated computation time T will be greater than equal to 3000 (for example 3 × 1000) units of time.

In contrast to traditional systems, computation time of the proposed system relies on the values of parameters N, P and K. The current system searches all images in the database only in the primary stage and the quantity of images decreases progressively in later stages relying upon the value of N, P and K. The computation time T of the proposed system can be estimated as

$$T \geq n + N + P \ (2)$$

Presently, if n = 1000, N=100 and P=50, the overall estimated computation time T will be greater than equal to 1150 (for example 1000 + 100+ 50) units. In general, the average computation time of the proposed system is 1.5 times lesser than the traditional systems.

4.1 Experimental Results

This section gives the experimental evaluation of present technique. A computer system having Pentium IV, 2.8 GHz processor and 1 GB RAM is used for conducting experiments. This system has been actualized in MATLAB.

Table 1: Average Precision of different models

Category ID	Class	Proposed Model	ElAlami (2011)	Chuen et al. (2009)	Wang et al. (2011)	Jhanwar et al. (2004)	Huang and Dai (2003)
1	Africa	0.748	0.703	0.683	0.720	0.453	0.424
2	Beaches	0.582	0.561	0.540	0.400	0.398	0.446
3	Buildings	0.621	0.571	0.562	0.600	0.374	0.411
4	Buses	0.802	0.876	0.888	0.500	0.741	0.852
5	Dinosaurs	1.000	0.987	0.992	0.950	0.915	0.587
6	Elephants	0.751	0.675	0.658	0.600	0.304	0.426
7	Flowers	0.923	0.914	0.891	0.800	0.852	0.898
8	Horses	0.896	0.834	0.803	0.630	0.568	0.589
9	Mountains	0.561	0.536	0.522	0.300	0.293	0.268
10	Food	0.803	0.741	0.733	0.400	0.369	0.427
Average		0.769	0.739	0.727	0.590	0.527	0.533

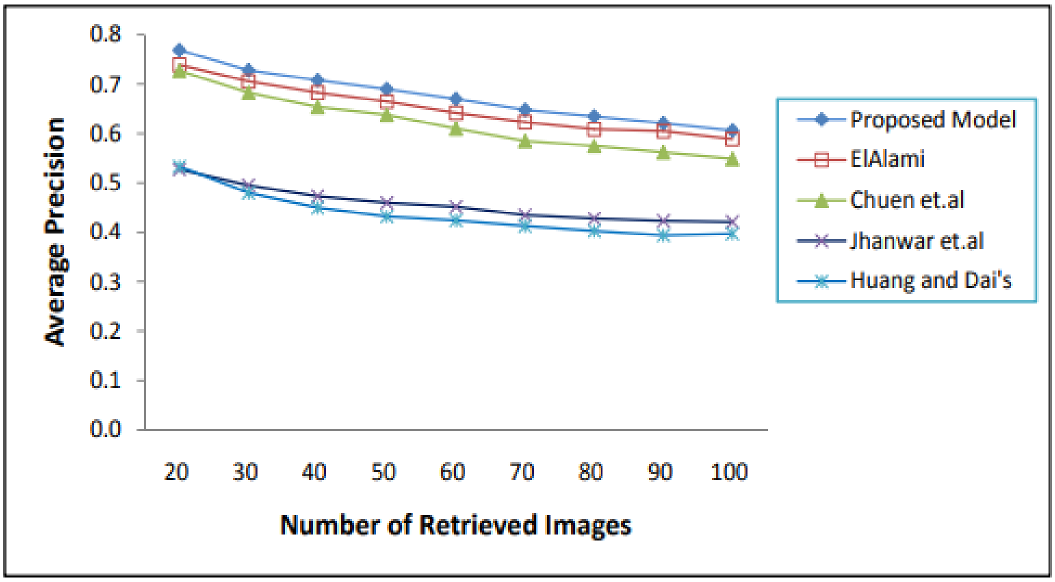

Figure 5: Comparison of Average Precision among different models

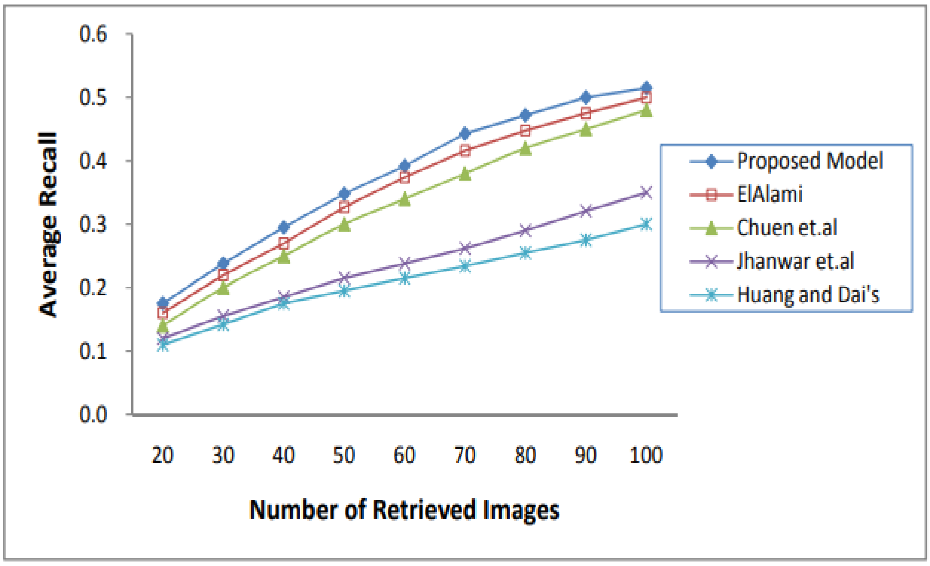

Figure 6: Comparison of Average Recall among different models

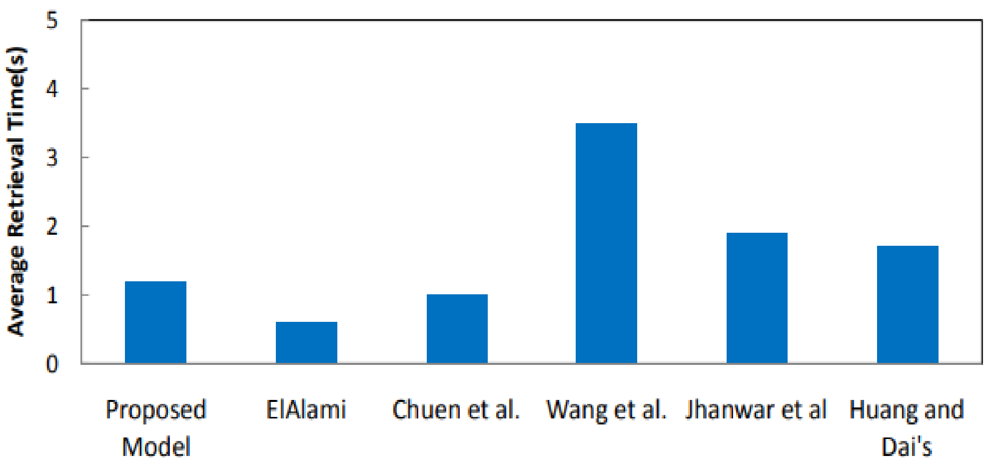

Figure7: Comparison of Average Retrieval Time among different models on Corel Database

Figure 7 shows the comparison of the average retrieval time for recovering 20 images for all models. Experimental outcomes show that retrieval time of proposed model on the Corel database of 1000 images is 1.25 sec. which is not exactly is somewhat greater than rest of the four plans. The reason for this is that the proposed model consumes a great deal of time in choosing the images for making the database for intermediate stages. This cycle includes re-requesting and indexing of images.

5. CONCLUSION

A CBIR using multistage retrieval strategy is proposed here to deal with these issues. Low level features of an image can be local and global. Global features are extracted using entire image and local features are extracted from a local region or part of image. Local features based CBIR systems are called Region Based Image Retrieval systems (RBIR). Accuracy of a RBIR system is higher than corresponding global CBIR in general. The traditional RBIR systems face the issue of exact query formulation and higher response time. In addition, relative locations of various objects ought to also be considered for increasing the retrieval accuracy. To deal with these issues region code-based retrieval conspires is proposed in this postulation. Local Binary Pattern (LBP) based descriptors are effective in analysing and classifying texture of an image. The traditional LBP is delicate to commotion and have restricted discrimination capability of recognizing diverse texture structures. For improving the LBP and increasing the classification accuracy a more robust framework LBP named as Local Structure Pattern (LSP) have been proposed here.

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