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A Novel Content Based Image Retrieval Using Variance Color Moment

Richard Singh Samuel F[1], Caroline Viola Stella Mary M[2]
PG Scholar, IT, Francis Xavier Engineering College, Tirunelveli, India[1]
HOD, IT, Francis Xavier Engineering College, Tirunelveli, India[2]

Abstract- Today, as the creation and digitization of images and image retrieval have become easier, huge image databases have become more popular. The area of retrieve images based on the visual content of the query picture intensified recently, which demands on the quite wide methodology spectrum on the area of image processing. Content Based Image Retrieval (CBIR) has therefore evolved into necessity. Due to the increased garbage value it is very important to design a CBIR system to retrieve images from the database in a very efficient manner. In this paper we are going to propose a color image retrieval method based on the primitives of color moments. All the primitives are used as features and each class mean is merged into a single class mean. The distance between the input query image mean with the corresponding database images are calculated by using SAD method. The analysis results proved that the CBIR using our new method has the better performance than the existing method.

Keywords: Content Based Image Retrieval, Primitives of Color Moments

I. INTRODUCTION

Image database management and retrieval has been an active research area since 1970's. The earliest use of the term content-based image retrieval in the literature seems to have been by Kato [1992], to describe his experiments into automatic retrieval of images from a database by colour and shape feature. The term has since been widely used to describe the process of retrieving desired images from a large collection on the basis of features (such as colour, texture and shape) that can be automatically extracted from the images themselves [13].Large image databases which are used in many application areas such as satellite imaging, and biometric databases, Crime prevention, The military, Intellectual property, Architectural and engineering design, Fashion and interior design, Journalism and advertising, Medical diagnosis ,Geographical information and remote sensing systems ,Cultural heritage, Education and training, Home entertainment, Web searching. Where it is important to maintain a high degree of precision. Manual annotation becomes difficult to maintain both time and cost-wise, with the growth in the number of images.

CBIR systems retrieves features from the raw images themselves and calculate an association measure between the query image and database images based on these features. Because of the high demand for searching image databases of ever-growing size, CBIR is becoming very popular. We need to develop an efficient system for retrieving images since speed and precision are important.

Many CBIR systems have been developed like query techniques, semantic retrieval, segmentation; edge, boundary, region, color, texture, and shape based feature extraction retrieval, but the problem of retrieving images on the basis of their pixel content remains largely unsolved. Potential uses for CBIR System is CBIR systems images automatically indexed by summarizing their visual features. A feature that can capture a certain visual property of an image either globally for the entire image or locally for regions or objects .Commonly used features in CBIR systems are color, texture and shape. Mapping the image pixels into the feature space is known as feature extraction which is a major function in any CBIR system. These extracted features are used to represent images for searching, indexing and browsing images in an image database. Use of feature space is more effective in terms of storage and computation. In general, Feature space is represented as a feature vector in CBIR systems. The similarity between images can be determined through features which are represented as vector.

The distance between the query image and stored images is determined through similarity measure. After that images are ordered according to the distance are retrieved. Visual indexing techniques can be categorized into two groups. Pixel domain and compressed domain techniques. Pixel domain techniques are used to index visual features such as color, texture and shape [9]. We have considered color feature which is extracted in Pixel domain.

A. Color moments origin Primitives

The first order (mean), the second order (Variance) and the third order (skewness) color moments have been proved to be efficient in representing color distribution of images [12].

The first three moments are defined as:

$$u_i = \frac{1}{N}\sum_{j=1}^{N} f_{ij}$$

$$\sigma_i = \sqrt{\frac{1}{N}\sum_{j=1}^{N}(f_{ij} - u_i)^2}$$

$$s_i = \sqrt[3]{\frac{1}{N}\sum_{j=1}^{N}(f_{ij} - u_i)^3}$$

Where f_{ij} is the value of the i-th color component of the image pixel j, and N is the number of pixels in the image.

II. Methodology: Color Image Reclamation

Content-based image retrieval (CBIR) is a new but widely adopted method for finding images from vast image databases. Here images are indexed on the basis of low-level features, such as color, texture, and shape that can automatically be derived from the visual content of the images. In CBIR, we propose an efficient approach for image retrieval based on color feature. Similar to most CBIR systems, we need to index images by retrieve their features in an offline process. We then submit a query image and find similar images to that query based on a matching criterion. We first start with feature extraction. Figure1 represents proposed scheme architecture for this step. Firstly a database is prepared for different type of images. After this, analysis is performed on database. Analysis represents assessment of different descriptors used in this approach. Database is indexed according to values of different images. On the basis of measures the database is arranged. When a user query is submitted for similarity matching, the step of analysis and feature selection is repeated as performed with image database. The value of query image is compared with the values of different images stored in database. The images having closest values compared to query image color values are extracted from database by this result.

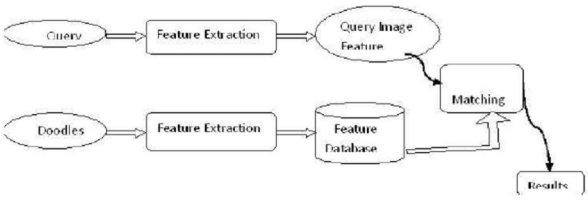

Fig 1: Proposed system Structural design

From the above figure, when a query image is submitted for image retrieval, its color features are extracted and matching operation is performed between query image features and the image features stored in database. The result close to the query image is then retrieved from the database.

A. Algorithm for proposed Scheme

- Access the image from database in the workspace.
  - o Convert the size of the image for [256, 256].
- Divide database images into 4 classes.
  - o Calculate color moment (Variance) of each segment of the image.
- Group each segment means into a single mean.
  - o Store the means of database images into MAT file.
- Load the Query image.
  - o Apply the procedure 2-6 to find mean of test image.
  - o Determine the Sum of Absolute Differences (SAD) of query image with stored feature of database.
  - o Sort the Sum of Absolute Differences (SAD) values to perform indexing.
- Display the result on GUI.

B. Resemblance Evaluations

Eight similarity measurements have been proposed. In this work, we use Sum-of-Absolute Differences (SAD).It has been reported by researchers that this method is the most effective and efficient. Equation given below defines SAD respectively [2].

III. Experiment Results &Analysis

The System was tested with Wang Database contains 1000 images from the Corel image database. The Images can be divided into 10 classes based on their content namely Africans and villages, Beaches, Buildings, Buses, Dinosaurs, Animals, Flowers, Horses, Food and Natural scenes with JPEG format which used in a general purpose image database for experimentation. All the categories are used for retrieval. These images are stored with size 256x256 and each image is represented with RGB color space.

To measure retrieval effectiveness for an image retrieval system, precision and recall values are used the ratio of relevant retrieved images to the total number of retrieved images (precision) and the ratio of retrieved relevant images to the total number of relevant images in the database (Recall). Table1 summarizes the experiment results compared with the existing local histogram method.

Precision = relevant Hits/ all hits
Recall = relevant hits / expected hits

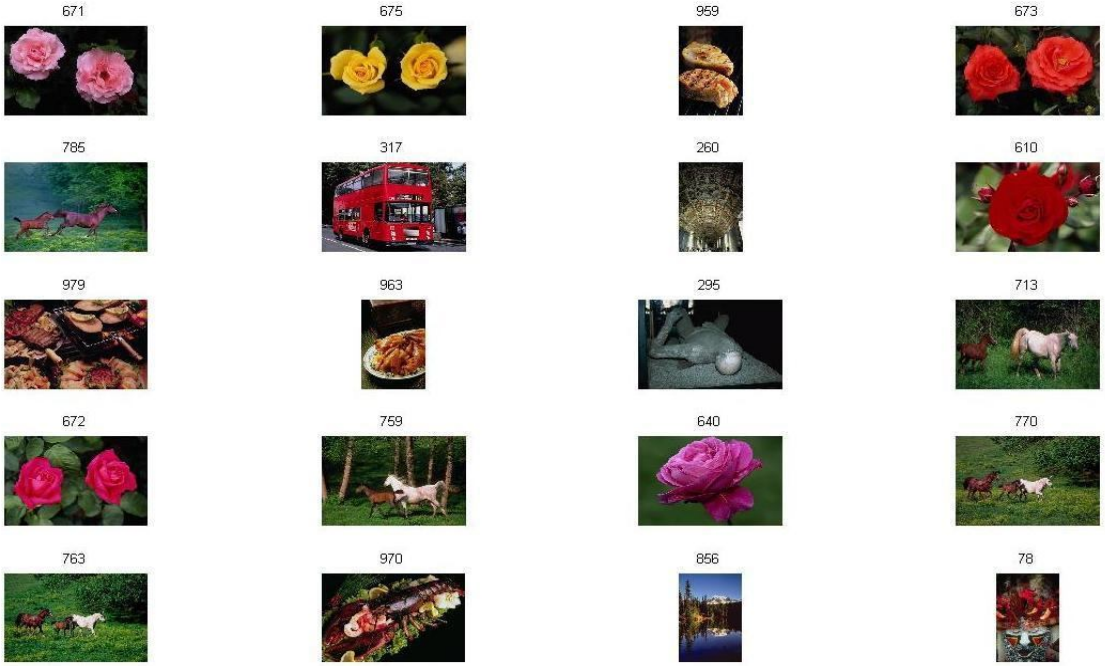

Fig. 2: Image Retrieval Results for Query image

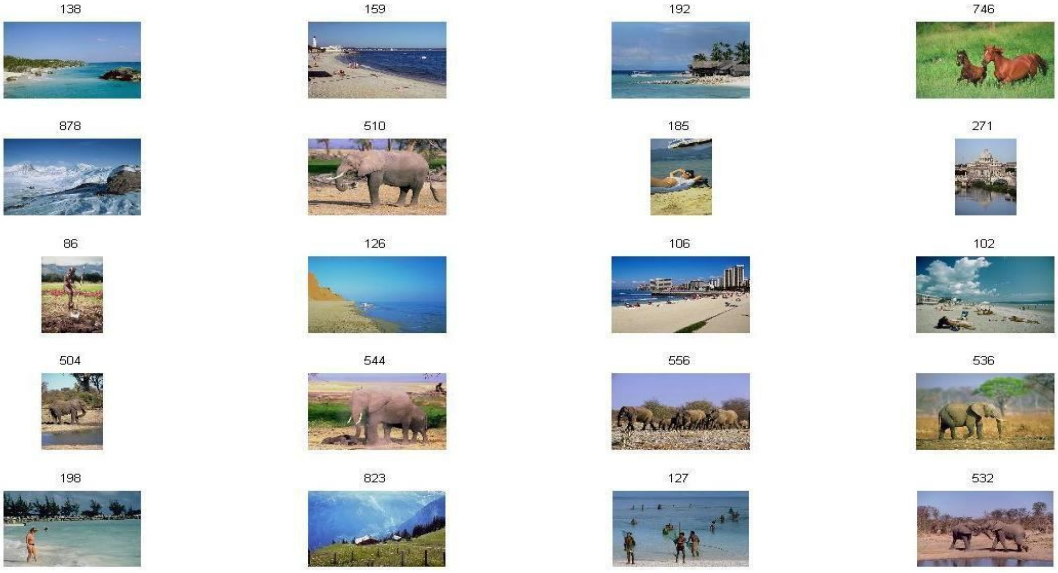

Fig. 3: Image Retrieval Results for Query image

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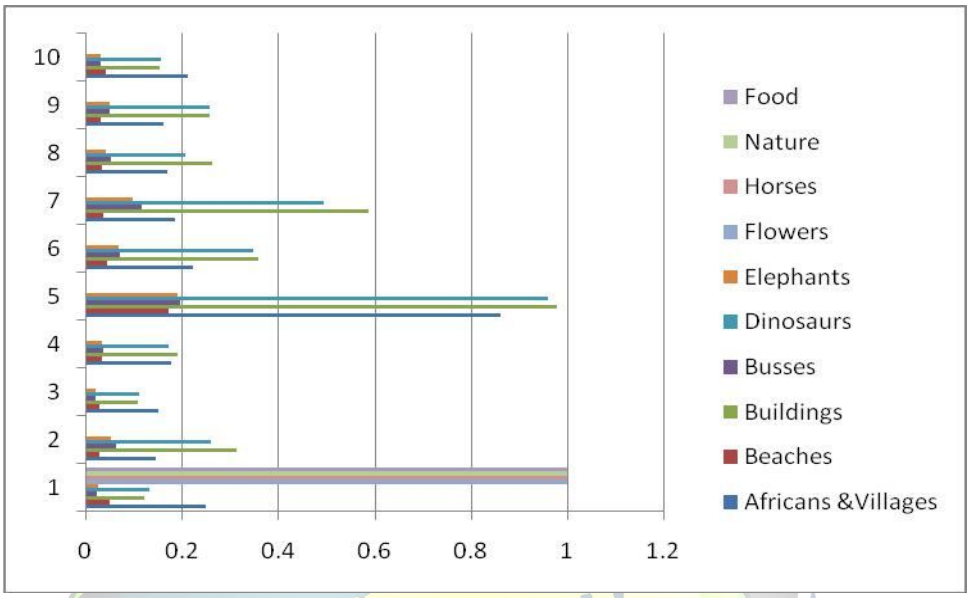

Fig. 4: Comparison chart Local Histogram & Mean Segment and Proposed Method Precision values

IV. CONCLUSION

Among the objectives this paper, a CBIR method has been proposed which uses the color moments and this method gives higher average precision and recall. Different color descriptors for content-based image retrieval were done in experimental manner for different comparisons. Two Main Aspects Color histograms and color moments are considered for extraction. The retrieval efficiency of the color descriptors was experiment zed by means of recall and precision. In most of the images categories color moment's shows better performance than the local histogram technique.

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