Design And Development of A Feature-Extraction-Based Content-Based Image Retrieval System

Kamlesh Kumar Rai[1], Mr.Anil Malviya[2], Prof. C. K. Tiwari[3]
[1]Dept of CS,
[2]Assistant Professor,
[3]Associate Professor,
[1, 2, 3] Patel College of Science & Technology, Indore

Abstract- *Content-based picture retrieval from vast resources has recently gained popularity in a variety of issues. This thesis introduces the Contend-based image retrieval system, which combines colour, shape, and texture as visual cues to characterize the content of an image region. Our contribution is in three directions. To begin, use the Gray-level co-event matrix to extract texture information from randomly created sections segregated from an image after segmentation, increasing framework viability. Second, to speed up retrieval and similarity computation, database pictures are segmented, and the separated regions are grouped by component vectors using the Retrieval method. This operation is conducted independently prior to query handling; hence, in order to answer a question, our framework does not need to search through the whole database photos; rather, just a few hopeful images are necessary to search for image similarities. Third, to improve our system's recovery accuracy, combine the content-based features extracted from picture locales with global features separated from the entire image, such as texture using GLCM, shape using Fourier Descriptor, and colour using Domain Colour Descriptor.*

Keywords- Image Retrieval, Image Database, Fourier Descriptor, Image Search, Feature Extraction.

I. INTRODUCTION

Content based image retrieval has been an active research area in computer vision and image processing. In CBIR system it can search, browse and navigate similar images from large image databases based on visual content of the images. Visual content of an image can be described formally in terms of color, texture and shape features. Traditional CBIR system makes use of these features to index and retrieval similar images from the database. Some of the existing popular CBIR systems are QBIC, Simplicity and Visual-seek.

CBIR FRAMEWORK

Content-based image retrieval uses the visual contents of an image such as color, shape and texture, and a spatial layout to represent an index on image. In typical content-based image retrieval systems (Figure 1.1), the visual contents of the images in the database are extracted and described by the multi-dimensional features vectors database. The feature vectors of the images in the database form a feature database. To retrieve the images, users provide the retrieval system with example images or sketched figures. This system then changes these examples into its internal representation of feature vectors. The similarities /distances between the features Vectors of the query example or sketch and those of the images in the database are then calculated and retrieval is performed with the aid of an indexing schemes.

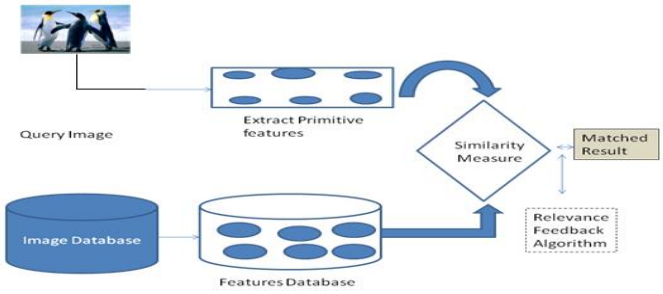


Figure 1: A Conceptual Framework for content-based image retrieval system

1.2CBIR CONCEPT -

The visual contents of the images in the database are extracted and described by the multi-dimensional feature vectors. A feature vector of the images in the database forms a feature database. The system then changes these examples into its internal representation of feature vectors.

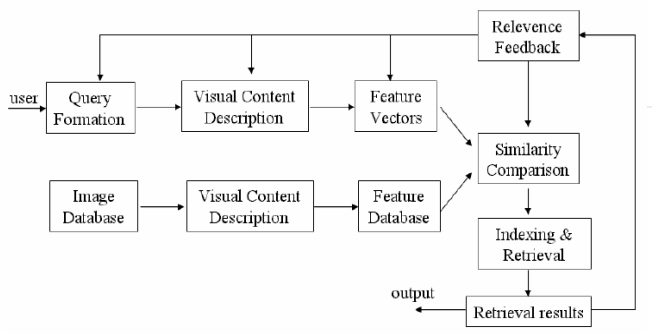


Figure 2: Content based image retrieval system

II. LITERATURE REVIEW

A number of general-purpose image search engines have been developed. In the commercial domain, QBIC [2] is one of the earliest systems. Recently, a additional systems have been developed such as Ritendra Datta [14], F. Long, H. Zhang [8], R. C. Veltkamp [13], and Bell Laboratory Dipankar Hazra [12]. In the academic domain, MIT Photo-book [4] is one of the earliest systems. Columbia Visual-seek and Web-seek [17], Y. D. Chun, [20] are some of the recent well known systems.

The Existing general-purpose CBIR systems roughly fall into three categories depending on the approach to extract signatures: histogram, color layout, and region-based search. There are also systems that combine retrieval results from individual algorithms by a weighted sum matching metric [14], or other merging schemes [21].

After extracting signatures, the next step is to determine a comparisons rule that is including querying scheme and the definition of a similarity measure in between images. For most image retrieval systems that query is specified by an image to be matched. We refer to this as global search since similarity is based on the overall properties of images. In contrast there are also "partial search" querying a system that retrieve results based on a particular region in an image [10].

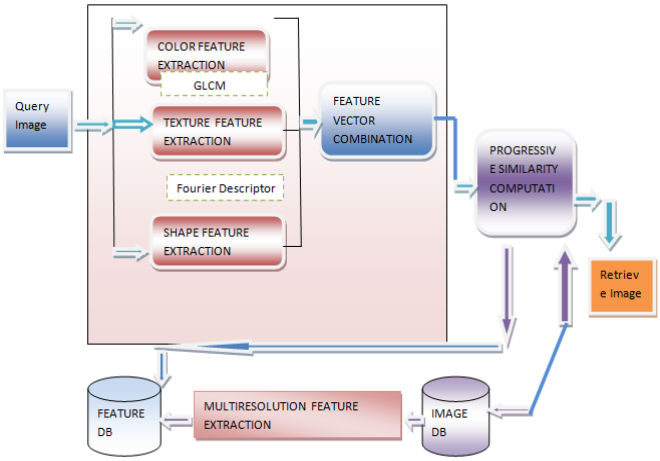
The color histogram serves as an effective representation of the color content of an image if the color pattern is unique compared with the rest of a data set. These color histogram is easy to compute and effective in characterizing both the global and local distribution of colors in an images.

III. PROBLEM FORMULATION

a) Feature extraction (Visual content description): How to extract low level features from an image and store in logical database.
b) Similarity measure: How to design a similarity measure algorithm?
c) User interface: How to design a mathematically description of a query, how to select a feature subset for a specific query?
d) Retrieval: How to retrieve the relevant images for a given query images according to similarity measure
e) Evaluation: How to evaluate the performance of a CBIR system?

From all these point we have to work on Image Retrieval based on content because existing system are having less accuracy according to literature survey.

IV. PROPOSED WORK



V. SIMULATION AND RESULT

5.1 WANG DATABASE

The database we used in our evaluation is WANG database [17]. The WANG database is a subset of the Corel database of 1000 images, which have been manually selected to be a database of 10 classes of 100 images each.

Figure 4: Example Images from each of the 10 Classes of WANG Database

The images are subdivided into 10 classes, such that it is almost sure that a user wants to find the other images from a class if the query is from one of these 10 classes. This is a major advantage of this database because due to the given classification it is possible to evaluate retrieval results. The images are of size 384 × 256 or 256 × 384 pixels, Figure 4shows 10 sample images in each image class. This database was used extensively to test many CBIR systems [17] because the size of the database and the availability of class information allows for performance evaluation as can be seen in the following sections. This database was created by the group of professor Wang from the Pennsylvania State University and is available for download [23]. This database was also used for classification experiments.

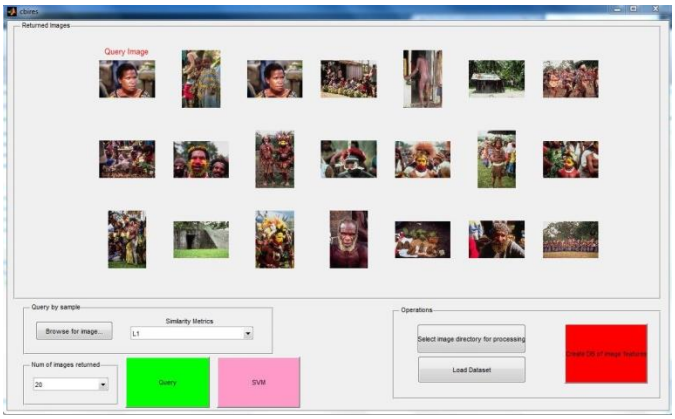
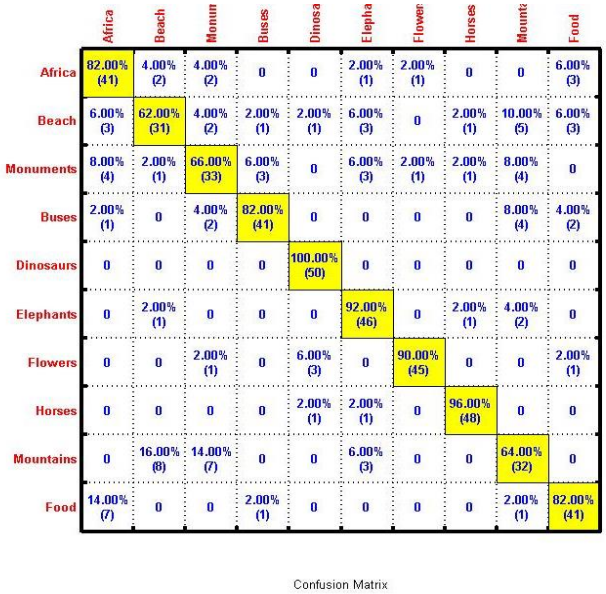


Figure5:Image Retrieval for Query 1 – Africans



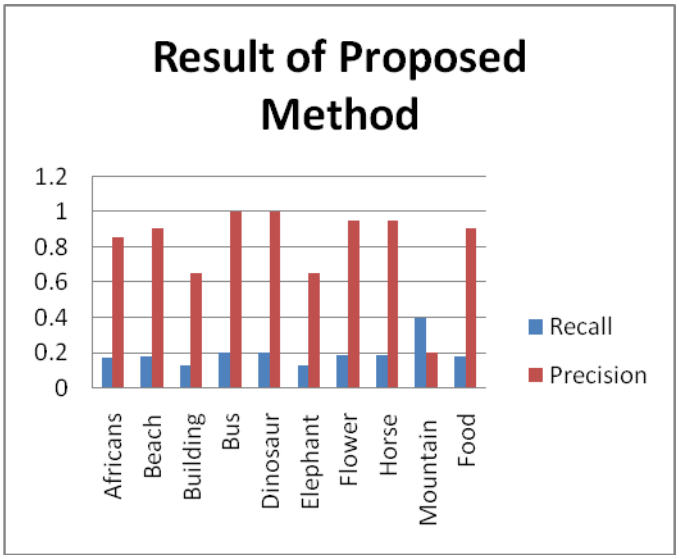


Figure 6: Graphical representation of Precision and Recall

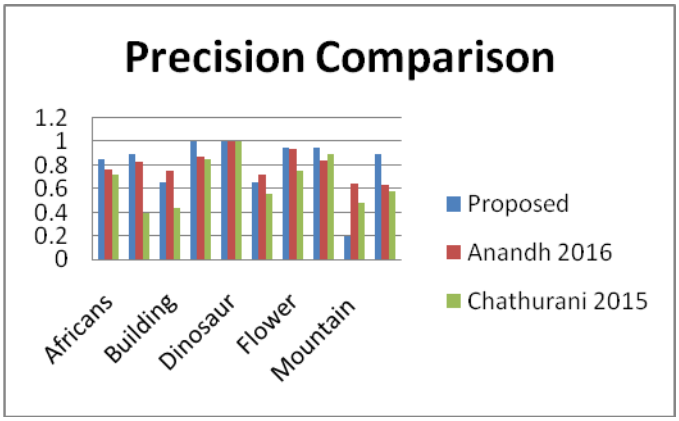


Figure 4.13: Graphical representation of Precision Comparison

VI. CONCLUSION

According to the simulation and values of precision, it is clearly indicated that our proposed method provides better results than existing retrieval methods for the same database. Content based image retrieval is a challenging method of capturing relevant images from a large image storage space. Although this area has been explored for decades, no technique has achieved the accuracy of human visual perception in distinguishing images. Whatever the size and content of the image database is, a human being can easily recognize images of same category.

They have increased the effectiveness of the CBIR system by estimating texture features from an image region after segmentation instead of using the average value of group of pixels or blocks through the segmentation process. The performance of our algorithm has been shown to perform better compared to a number of recent systems such as Wang system and histogram based system CBIR.

Our proposed system, have good retrieval results and high precession/recall values. According to our simulation results, the CBIR system can be used as the first option in our retrieval system, since it gives accepted results and avoids the complex computations of the segmentation process and region comparison that are present in the other system, which can be used next to further improve the retrieval results in case of not satisfying the user.

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