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Image Retreival Based On Colour, Texture And Shape Analysis Using Genetic Algorithm

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ABSTRACT :

The project presents the image retrieval based on its contents shape and texture analysis. The need for efficient content-based image retrieval has increased tremendously in many application areas such as biomedicine, military and web image classification and searching. For texture analysis, GLCM in hue and saturation color space is used. It provides the rules that gray scale of a pair of pixels appears in a certain distance away in a certain direction. The retrieval system has implemented for evaluating performance between shape and texture features. This system will be enhanced the texture analysis with lifting wavelet filters for increasing the retrieval accuracy.

Keywords – Image contents, HSV color space, coocurrence matrix, Kmeans clustering.

I-INTRODUCTION

Image retrieval techniques are useful in many image-processing applications. Content-based image retrieval systems work with whole images The main principles of automatic image and searching is based on comparison of the query. General techniques for image retrieval are color, texture and shape. These techniques are applied to get an image from the image database. They are not concerned with the various resolutions of the images, size and spatial color distribution. Hence all these methods are not appropriate to the art image retrieval. Moreover shape based retrievals are useful only in the limited domain. The content and metadata based system gives images using an effective image retrieval technique. Many other image retrieval systems use global features like color, shape and texture. But the prior results say there are too many false positives while using those global features to search for similar images.Hence we give the new view of image retrieval system using both content and metadata. Several reviews of the literature on image retrieval have been published, from a variety of different viewpoints.

The main principles of automatic image similarity matching for database retrieval, emphasizing the difficulty of expressing this in terms of automatically generated features. Eakins proposes a framework for image retrieval, classifying image queries into a series of levels, and discussing the extent to which advances in technology are likely to meet users' needs at each level.

In prior methods of an image retrieval involved with an algorithm of principal component analysis, which extracts the spatial features like covariance, Eigen vectors and Eigen faces.It has the drawbacks of low discriminatory

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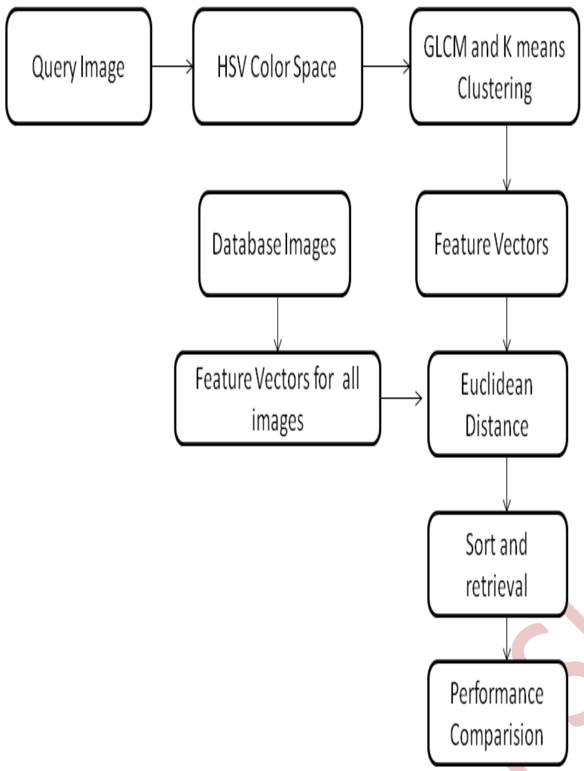
power and high computational load. Second method involved local binary pattern.

II-SYSTEM MODELS



In contrast to the text-based approach of the systems described in section above, CBIR operates on a totally different principle, retrieving stored images from a collection by comparing features automatically extracted from the images themselves. The commonest features used are mathematical measures of color, texture or shape; hence virtually all-current CBIR systems, whether commercial or experimental, operate at level . A typical system that allows users to formulate queries by submitting an example of the type of image being sought, though some offer alternatives such as selection from a palette or sketch input. The system then identifies those stored images whose feature values match those of the query most closely, and displays thumbnails of these images on the screen.

III-HSV COLOR SPACE

Several methods for retrieving images on the basis of color similarity have been described in the literature, but most are variations on the same basic idea. Each image added to the collection is analyzed to compute a *color histogram,* which shows the proportion of pixels of each color within the image. The color histogram for each image is then stored in the database. At search time, the user can either specify the desired proportion of each color (75% olive green and 25% red, for example), or submit an example image from which a color histogram is calculated. Either way, the matching process then retrieves those images whose color histograms match those of the query most closely. The matching technique most commonly used, histogram intersection, was first developed by Swain and Ballard. Variants of this technique are now used in a high proportion of current CBIR systems. Methods of improving on Swain and Ballard's original technique include the use of cumulative color HSV colour space matches people's visual feeling better than RGB colour space and other colour spaces; additionally

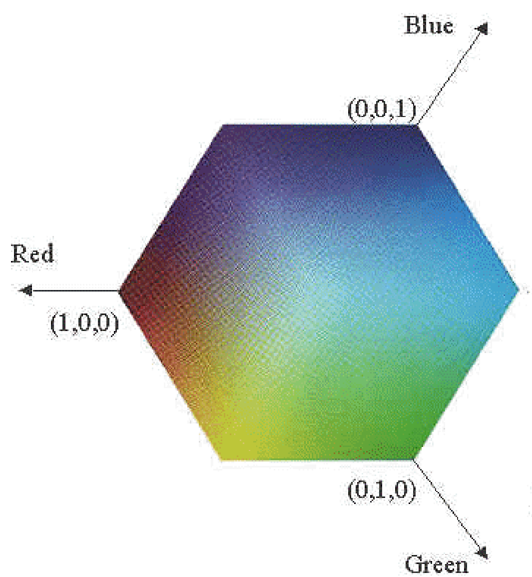


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Figure: RGB color model

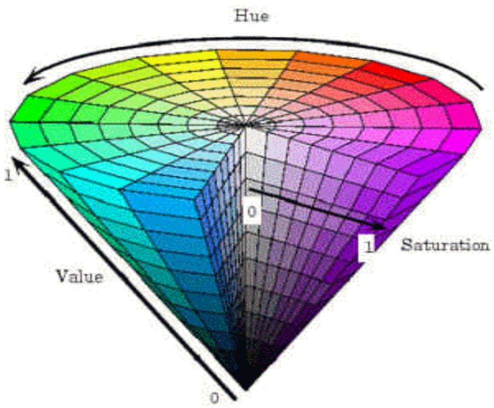

Figure: HSV color model

Histograms,combining histogram intersection with some element of spatial matching,and the use of region-based color querying.The results from some of these systems can look quite impressive.The luminance and chrominance

Variety can be detected more effectively in HSV colour space, especially in the outdoor scenes. For these reasons, HSV colour space is chosen to distinguish luminance (V) from chrominance (H and S). It is based on the simple idea that, shadows change the brightness of the background, but do not really affect the chrominance and saturation in HSV colour space. The pixels are confirmed as shadows when the result of both the two conditions.

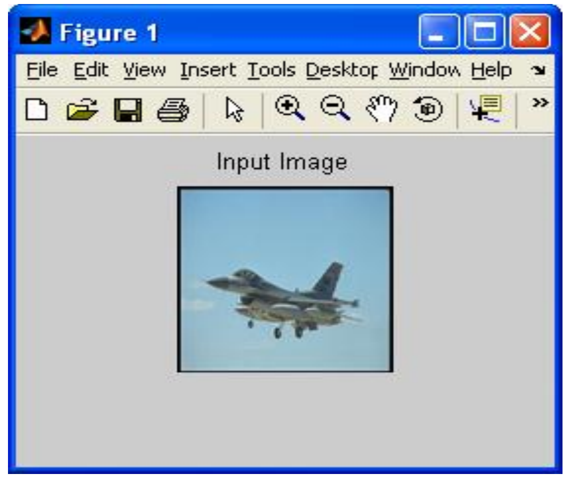

Figure: Input Image

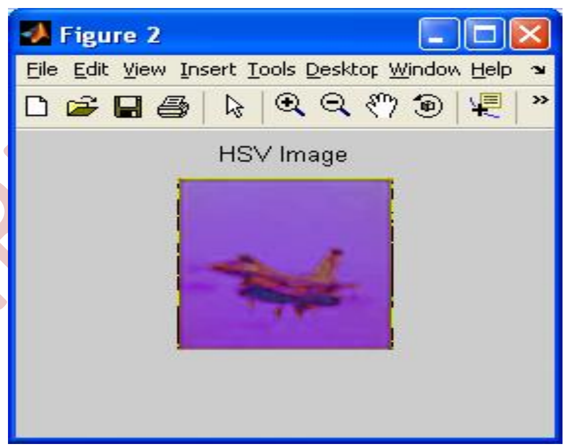

Figure: HSV Image

IV - GLCM PROCESS

A Co-occurrence Matrix (COM) is square matrices of relative frequencies P (i, j, d, Θ) with which two neighbouring pixels separated by distance d at orientation _ occur in the image, one with gray level i and the other with gray level j . A COM is therefore a square matrix that has the size of the largest pixel value in the image and presents the relative frequency distributions of gray levels and describe how often one gray level will appear in a

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specified spatial relationship to another gray level within each image region.

In this work the co-occurrence features energy and entropy which can easily differentiate non-homogeneous region from homogeneous region are considered. Energy is called angular Second Moment. It is a measure the homogeneousness of the image and can be calculated from the normalized COM. It is a suitable measure for detection of disorder in texture image. Higher values for this feature mean that less changes in the image amplitude or intensity result in a much sparser COM. The energy is formulated by the following equation:

$$J=\sum\sum P(i,j)^2$$

Entropy gives a measure of complexity of the image. Complex textures tend to have higher entropy. Entropy is represented by the following equation:

$$S=-\sum\sum P(i,j)\log[P(i,j)]$$

The value of energy and entropy are high for homogeneous regions and low for non-homogeneous regions.

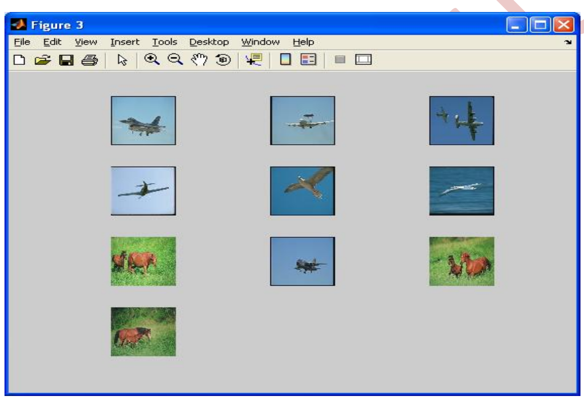
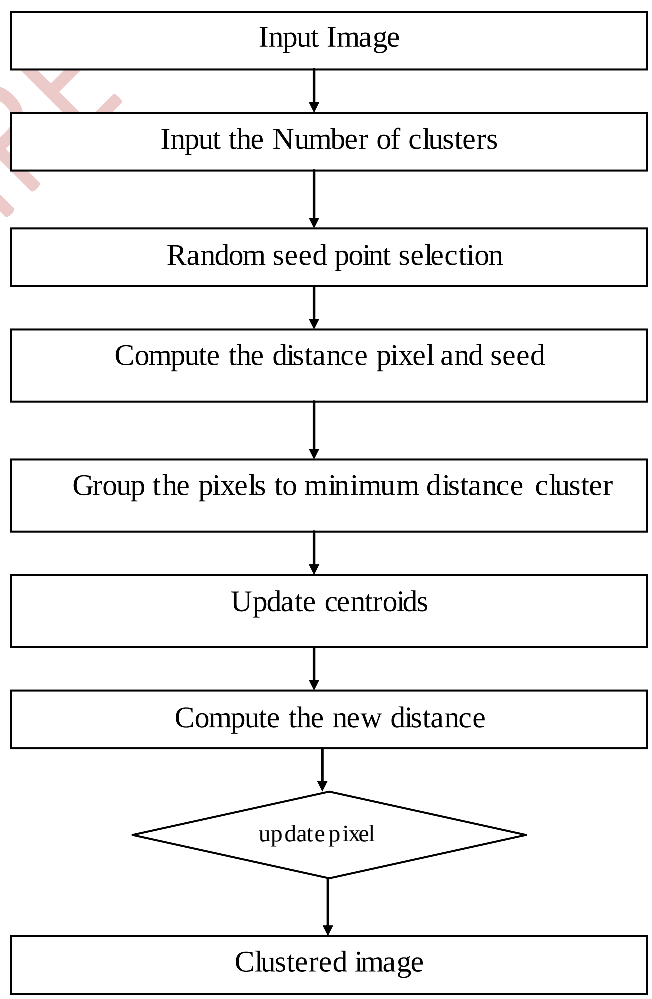


Figure: GLCM Retrieved Images

V- CLUSTERING TECHNIQUE

Segmentation is the process of partitioning a digital image into multiple segments (sets of pixels, also known as super pixels). The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze. Image segmentation is typically used to locate objects and boundaries (lines, curves, etc.) in images. Clusters include groups with small distances among the cluster members, dense areas of the data space, intervals or particular statistical distributions.The appropriate clustering algorithm and parameter settings depend on the individual data set and intended use of the results. Cluster analysis as such is not an automatic task, but an iterative process of knowledge discovery or interactive multi-objective optimization that involves trial and failure. It will often be necessary to modify data preprocessing and model parameters until the result achieves the desired properties.



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VI - RESULT ANALYSIS

The project presented the image retrieval technique based on image contents shape and texture features. Here, the color histogram features are analyzed based on glcm which used effectively to describe the color features. It provides the rules that gray scale of a pair of pixels appears in a certain distance away in a certain direction. The shape of image was analyzed by clustering model which was compared with glcm based retrieval. Finally, a practical result proved that the better retrieval performance obtained for maximum test images based on shape features compared to texture features. The system can be further enhanced by analyzing pattern using wavelet filters.

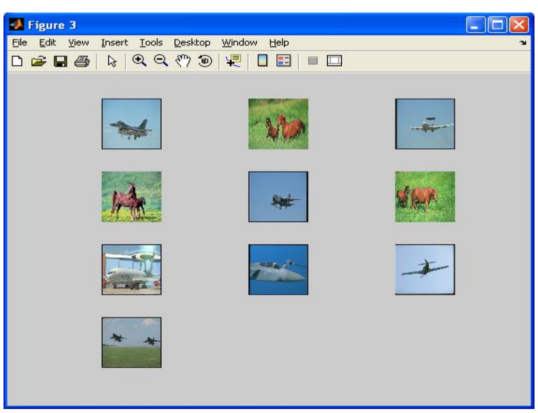

Figure : Shape feature output

VII - CONCLUSION

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