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CONTENT BASED IMAGE RETRIEVAL SYSTEM USING IMAGE CLASSIFICATION

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ABSTRACT---The efficient technique for image retrieval is Content Based Image Retrieval (CBIR) which retrieves images using image content. The image content is known as color, texture, shape and spatial information. Color feature is secure and liberates to rotation, translation and scale changes. The proposed CBIR system have a fused feature of 3*3 block color histogram and color co-occurrence matrix. The multidimensional indexing is used after the process of extracting color and spatial feature and stored the values of Hue, Saturation, Value, Color Histogram and Color co-occurrence matrix with the images for increasing retrieval speed. Further the Feature Matching algorithm is used to sort the similar images. Applying classification is used to reduce the images in the search space. So the images are classified and fixed numbers of images are to be retrieved.

KEYWORDS----CBIR, Color Histogram, Color Co-occurrence Matrix, Euclidean distance, K-NN algorithm

I. INTRODUCTION

Images are widely used nowadays. Image retrieval employs vital role in Military affairs, education, medical science, agriculture etc., Image retrieval can be classified as context based image retrieval and content based image retrieval. Searching of images using keywords and text which is called context based image retrieval, won't give better result instead of image content. The image contents are color, texture, shape and spatial information. Three stages of Image retrieval (Figure 1) are,

1. Feature extraction from image database and query image.
2. Feature Matching Process and sorting the images in the database.
3. Classifying the images in database and fixed number of images are to be retrieved.

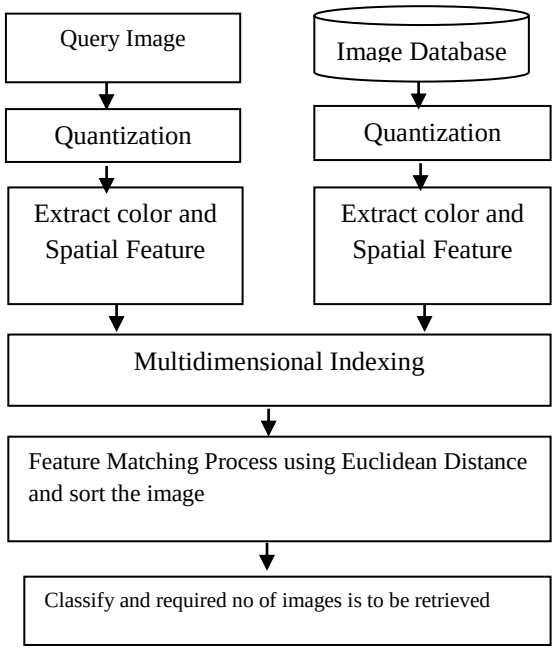

Figure 1: CBIR Architecture

Color Histogram and Color Co-occurrence Matrix are used to extract color and spatial feature from query image and images in image database.

The multidimensional indexing is used after the process of extracting color and spatial feature and stored the values of Hue, Saturation, Value, Color Histogram and Color co-occurrence matrix with the images for increasing retrieval speed. Further the Feature Matching algorithm is used to sort the similar images. Applying classification is used to reduce the images in the search space. So the images are classified and fixed numbers of images are to be retrieved.

The rest of the paper is organized as follows. Review of the literature summarized in Section 2. In Section 3, the methods of feature extraction are to be summarized. Multidimensional indexing explained in Section 4. In Section 5, feature matching process is proposed. Image Classification is explained in Section 6. Conclusions are proposed in Section 7. In Section 8, provide the list of references.

II. REVIEW OF LITERATURE

Content Based Image Retrieval (CBIR) System is accessing image in an effective way [1]. The traditional way is retrieved image using annotated text . The CBIR is retrieved the similar images using image contents [2], which include color, shape, texture and spatial information of objects etc., . CBIR employs in many areas including military affairs, medical science, education, architectural design etc. CBIR system includes QBIC [3], Photobook [4], VisualSEEk [5], Virage [6], Netra [7] and SIMPLIcity [8] etc.

Histogram is the most commonly used technique to describe features of image [13]. Shape [10], texture [11] and spatial features [12] etc. were implemented to improve the CBIR. Because of the simplicity and robustness, color is the most effective feature. Color histograms are used to extract color feature [13]. HSV color space is used to represent color for better human visual perception [14, 15]. Color co_occurrence matrix is used for HSV color space [9]. Images can be retrieved quickly and accurately by using fused low-level features [13]. The SR-Tree [18] enhances the disjoint among regions which improves the performance on nearest neighbor queries. The SR-Tree is the best multi dimensional indexing structure among the SS-tree, the R*-Tree and the K-D-B –Tree. K-NN is considered one of the simplest machine learning algorithms [19], to classify the images.

III. FEATURE EXTRACTION

The image features are extracted using histogram and color co-occurrence matrix. Before extracting, the image is quantized. This is the process of reducing number of bins that the similar colors are put in to same bin.

3.1 Color Histogram

Color histogram is a graphical representation of color distribution in the image. There are two types of color histograms namely Global color histogram and Local color histogram. A Global Color Histogram represents one whole image convert into a single color histogram.

A Local Color Histogram divides an image into blocks and each block convert into color histogram. By observation, 3*3 block color histogram (Figure 3 and 4) is retrieve more similar images than global color histogram from the human visual perception [13].There are two types of division in 3*3 block color histogram.

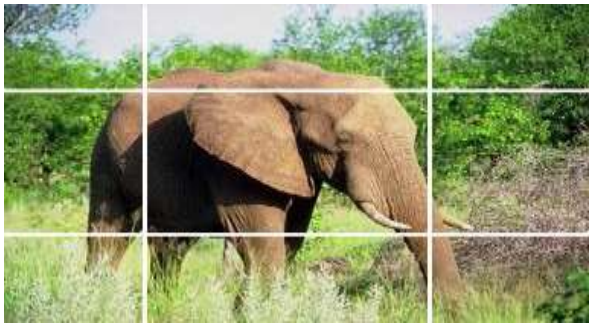

Figure 3: Equally divided and same weight given for each division

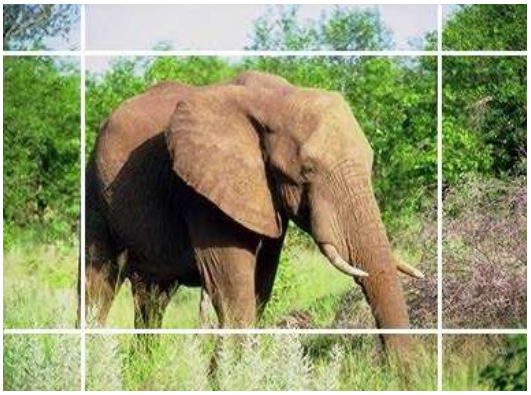

Figure 4: Unequally divided and double the weight given for center division

The proposed CBIR is using unequally divided and double the weight given for center division.

3.2 Color co-occurrence Matrix

The first step is converting the images from RGB to HSV. Then the Color Co-occurrence Matrix is formulated.

Color co-occurrence matrix (CCM) includes three dimensional matrix where the first dimension and second dimension contain colors of any pair and the spatial distance between them along the third dimension. CCM is simplified to represent the number of color pairs between adjacent pixels in the image. For each pixel in the image, 4-neighbors (horizontal and vertical neighbors) are accounted [16]. The CCM is used to extract spatial feature in this proposed CBIR.

IV. IMAGE INDEXING

Indexing is used to reduce the time required for query operation. It will minimize the time of average case and also the worst case. It also supports dynamic insertion and deletion. For applying this technique to the huge databases, we need to efficiently create multi dimensional index structures, supporting nearest neighbor query. SR-Tree performed most efficiently among other similarity indexing structure. The Proposed CBIR system is using SR-Tree algorithm after the process of extracting color and spatial feature and stored the values of Hue, Saturation, Value, Color Histogram and Color co-occurrence matrix with the images.

V. FEATURE MATCHING PROCESS

The Feature matching process is used to find the identical images. The following steps are used for sorting the images in the image database.

Step 1: Similarity measures between image used as query and the images in database using Euclidean distance of Weighted 3*3 block color histogram (EDwbch(Ii)).

Step 2: Similarity measures between image used as query and the images in database using Euclidean distance of Color Co-occurrence Matrix of HSV of a pixel (EDccm(Ii)).

Step 3: Images stored in the database are sorted using the addition of distance value from step 1 and step 2 (EDwbch(Ii) + EDccm(Ii)).

Then the database images are sorted by using the above distance value.

VI. IMAGE CLASSIFICATION

KNN is known as K-Nearest Neighbor algorithm is a supervised machine learning method, which classifies the data. The classifier can be classified a set of data in order to

discover which elements are from the set of data. The purpose of this algorithm is classified new object based training samples and attributes. KNN algorithm classifies query image to relevant image in image database. KNN algorithm finds the distance between training vector and test vector.

VII. CONCLUSION

The proposed CBIR system is used color and spatial feature. The 3*3 block color histogram is used to extract color feature and color co-occurrence matrix is used to extract spatial feature. After feature extraction, the images are indexed by using hue, saturation, value, color histogram and color co-occurrence matrix values for improving the speed of retrieval. The feature matching process is used Euclidean distance. Then the image classified using K-NN algorithm. It has a weakness in distance calculations because classification and retrieval results are delayed until all distance computations between the input image and all images are finished in the search space. The future work is going to verify the classification of images done before feature extraction is increased the retrieval speed or not. Based on result the system is to be rearranged.

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