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Smart Image Search Android application using Reverse Image Search

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***Abstract* — As the propagation of digital data in video and image form has increased, in this paper we are addressing an efficient technique for locating and finding the relevant information from the image using color and shape based image segmentation. Reverse image search is a content-based image retrieval query technique that involves providing a sample image to the CBIR system on which it will then base its search upon. This technique allows the user to select an input image A and then get all images in the provided database, normalize them to the same pre-defined size, extract the features, calculate the distance using Euclidean distance method from the features of A and show them in order of less distant to most distant by saving it in similarity based on RGB database. The objective of the proposed reverse image search methodology is to match query image to an arbitrary collection of images with low computational cost and enhanced retrieval accuracy. In the proposed system an effective and efficient retrieval methods are based on color (spectral) information with spatial (position/distribution) information followed by shape based image segmentation, and is expected to be more consistent (i.e. tolerant to differences) than comparing pixel by pixel or the average of the whole image. The retrieval results are improved by using shape-based image retrieval as filters to eliminate false hits or combined with other descriptors to discriminate shapes on the accumulated result from the above algorithm. The results are obtained by comparing reference image with the images in the pool of database by changing contrast, brightness, orientation and cropping different regions of images. This application could successfully help to organize a large collection of digital photography when many repeated shots have been taken or when the photographer have taken many shots of the same subject with small adjustments on the camera. Also it can help in weather forecast by allowing user to determine the current weather condition i.e. whether the sky is clear, sunny, cloudy, rainy etc. Thick high clouds can be detected using threshold tests which rely on brightness temperature in infrared & water vapor bands.**

***Keywords*— Image; CBIR; color & shape based image segmentation; Euclidean distance; digital photography; weather forecast.**

I. INTRODUCTION

The World Wide Web contains a huge amount of digital information. The process of retrieving desired images from a large collection of images is of great importance in computer vision. Its application in almost every field is increasing for the ease and convenience of users. CBIR is of great importance in the medical field. Doctors have to access large amounts of images every day. These images being kept in large databases require a quick and efficient method to deal with them [1]. People have developed their own databases where they have kept thousands of images [2]. Journalism is another field of life in which image saving and retrieving is of great importance. Journalists need to search images by new techniques that give more efficient and accurate results [3]. There are also certain websites that share photos. It gives ease to the user of the application to store their images and others to access and view the available images. Flickr and Google Picasa are sites where photo sharing can be done. Different methods have been developed to calculate these features in different ways. These image search engines retrieves the images based on the query image known as Content based image retrieval. In CBIR system, image features can be grouped in three main classes: color, texture and shape. In this paper we have integrated these features to provide better discrimination in the comparison process. Color is by far the most common visual feature used in CBIR, primarily because of the simplicity of extracting color information from images. A digital image in this context is a set of pixels which represents a color. The proposed paper begins with a review of color based image segmentation as an image descriptor which calculates the average value of pixels of a region in the input image as well as the images in the database is taken for color based comparison. Then describes features vector and how to compare them using Euclidean distance.

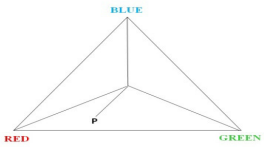

Fig. 1. Representation of the RGB features of an image

In the proposed system shape based image segmentation methods such as extracting boundaries of objects in an image by performing erosion and dilation on the images are done as filters to discriminate shape on the accumulated results from the previous color based segmentation method.

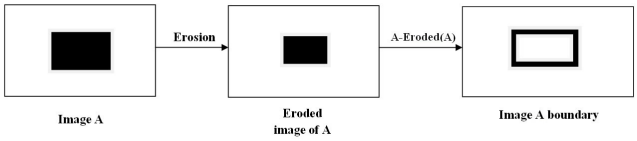

Fig. 2. Process of boundary extraction using Erosion

For searching the images based on query image many algorithms have been proposed which has been discussed in section III. Some possible findings and results are presented using the proposed reverse image search which is present in section IV.

II. NEED OF REVERSE IMAGE SEARCH

Reverse image search is used to search either data related to the query image or the images related to that image or exact images. Reverse image search allows users to discover content that is related to a specific sample image, popularity of an image, discover manipulated versions and derivative works. In the fig 3 architecture diagram of the proposed image retrieval system is given. The process initiates with giving an image as a query or input to the proposed image retrieval system by the user. The proposed algorithm for retrieval of desired images or images of interest also known as an Image Descriptor is applied on the query image given as an input to the system. The visual contents of query image are extracted by the image descriptor and stored in the vector form in a feature vector. Image descriptor is also applied on the a huge amount of sample images present in the database and visual contents of the images are extracted and stored in the vector form in the feature database. Algorithms are applied for similarity computations on the feature vector of the query image and feature dataset of the images in the database. After comparison similar and related images in the database are indexed based on the similarity computation for retrieval. As a result of similarity computation, the desired retrieved images are given as an output to the user.

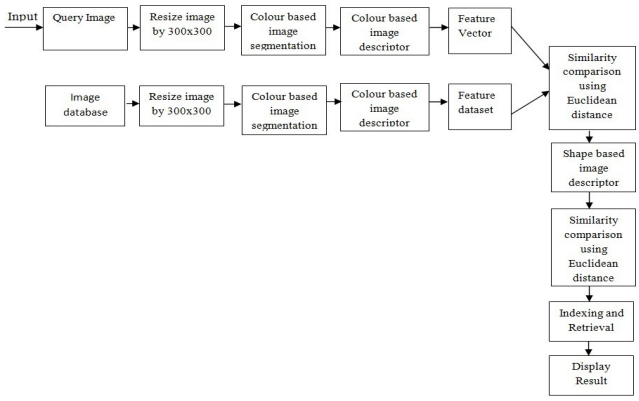

Fig. 3. Architecture diagram of proposed CBIR system

III. LITERATURE REVIEW

Shouhong Wan, Peiquan Jin and Lihua Yue, (2011) [5], presented color as the most intuitive features of the image which is one of the important characteristics of visual perception. The color feature is the most widely used visual features in image retrieval, particularly suitable for searching the image with specified color objects, such as retrieving brown elephants, red buses, and so on. Common representation of color features include color histogram, color moment and dominant color etc. Among them, the color histogram feature extraction and similarity calculation is simple, and it is insensitive to the image scale and rotation. But as there is change in brightness and contrast level of the image the color histogram fails to provide accurate results.

Abderrahim Khatabi, Amal Tmid, Ahmed Serhir and Hassan Silkan, (2014) [6], have addressed the use of visual content such as color, texture and shape to represent and index images. Among them, the shapes contain rich of information than the color or the texture. However, research based on the contents of the shape is more difficult than based on color or texture because of the diversity of forms and the natural occurrence of the transformations of shape such as deformation, invariant to scale and orientation which is not enough to differentiate an image from other based on features of its shape alone.

Sanjoy Kumar Saha; Amit Kumar Das and Bhabatosh Chanda, (2004) [7], concluded in their paper the idea of computing local texture based on blocks of 2X2 pixels of the intensity image and a fuzzy index to denote the presence of major colors. Based on the texture co-occurrence matrix, a few perceivable features have been proposed to reduce the comparison cost. They have also suggested the relevance and performance measure. Accordingly, their system is evaluated and the result indicates that the proposed features bear a strong potential towards the improvement of the performance but accuracy is not taken into concern.

S. Jhansi rani and V. Valli Kumari (2015) [8], have proposed an efficient CBIR system based on IHCBS technique to retrieve relevant images from image database for a given query image. In this method, when an image is queried, the system

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segments the image and extracts the features for the image and then computes the similarity measure between the extensive features of the query image and the feature existing in the feature database based on the KLD method. The implementation results illustrates that this type of image retrieval process effectively retrieves the images that are very close to the query image from the database when compared to the CBIR systems that is in existence. This could be visualized from the precision and recall plot, determined from the retrieval results.

IV. EXPERIMENT AND RESULT

To see the qualitative as well as quantitative performance of the proposed algorithm, some experiments are conducted on several type of images accumulated in a database. The effectiveness of the approach has been justified using different images. The results are computed qualitatively (visually) as well as quantitatively using quality measures.

For extracting features and calculating similarity measure in the proposed system a set of 40 test images have been used, shown below. Some of those images have similar objects on them (trees, sky, and grass) but meaning of the images is not considered, just patches of similar colors. Images are in different sizes and resolution. The 22 images on the first three rows are photos of objects, while the remaining 18 images in the second last and last row is of images from the first two rows distorted in scale, color, position, etc.

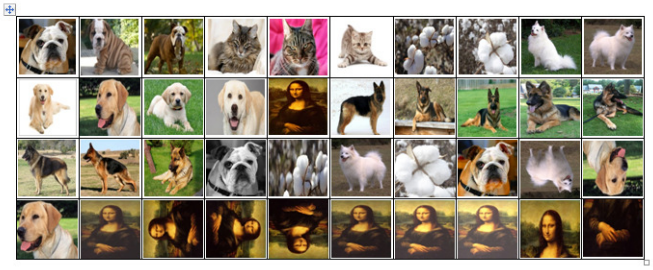

Fig. 4: Collection of different types of images in a database after performing image transformations on original images such as- change in contrast, brightness, cropping (upper region, lower region), and orientation (rotating by 90, 180, 270 degrees)

The proposed system for measuring similarity, has a GUI which allows the user to select a reference image **A** and then get all images in the same directory. The algorithm normalizes all the images in the same directory to the same size (300x300) followed by three important steps:

A. Color Based Image Segmentation

25 RGB triples of an image is taken as features, corresponding to the average of the RGB values on the 25 regions marked in the figure below. The image will be normalized to 300x300 pixels. No texture or variance feature will be stored, only the color averages. Each region has 30x30 pixels which will be represented by a 25x3 feature vector.

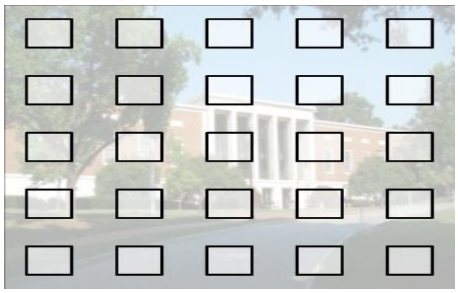

Fig. 5: Regions for similarity calculation

Algorithm

To calculate the Similarity measure between two images A and B each of the 25 regions of both the images is taken, followed by calculating the Euclidean distance between the regions and accumulate.

The Euclidean distance from A to A will be, by definition, zero. The upper bound (maximum possible distance between two images, using this similarity measure method) is calculated as 25*(Math.sqrt ((255-0)*(255-0) + (255-0)*(255-0) + (255-0)*(255-0))) or a little bit over 11041.

B. Shape Based Image Segmentation

After getting best 9 matches based on the above color based image segmentation approach next step is to find outer boundary of objects in all the images present in the database of compared images. This can be achieved by contrasting images, to easily threshold to get a binary image of the objects in all the images. Followed by extracting objects' boundary chain code.

Algorithm:

Boundary Extraction

Let A be an image matrix and B be structuring element

Steps to be followed:-

Convert the image into binary image.
Perform Erosion:
Erode binary Image A by structuring element B.
Subtraction:
Subtract the binary image A from the Eroded image.

C. To analyze the Boundary's Shape

Next step is to analyze the boundary's shape to deduce the form (circle, polygon etc). The curvature can be calculated in each point of the boundary chain and thus determining how many sharp angles (i.e high curvature values) are present in the shape. Several sharp angles highlights a polygon, none means a circle (constant curvature).

Algorithm:

Calculate the curvature of objects in the input image as well as all the 9 images extracted in STEP 1.
Based on the value of curvature of objects, compare the 9 images with the input image and segregate them according to their proximity. The output image having closest proximity to the input image is displayed first and rest of the images are displayed in the same fashion.

Some test runs of the proposed algorithm for similarity finder based on color based segmentation followed by shape based segmentation for reordering of images with the image data set are shown below. The first image in a row is the input reference image, and the other images in the row are the **best seven** matches which are shown (except for the match for the same image), then the **worst two** matches are shown as the result of similarity finder.

Fig. 6: Results of the test runs of the proposed algorithm using reference image A and images present in the database.

It can be referred from the results that the dissimilarity measure between two equal images is equal to zero. The algorithm performed quite acceptably, assigning a relatively low measure to the distorted versions when the originals were used as the references, as long as the distortion does not makes the versions very different and the colors are not changed much.

V. CONCLUSION

Image retrieval using color based and shape based segmentation methods are implemented in Eclipse Java EE IDE Version: Mars.1 Release (4.5.1) and different performance parameters have been evaluated and compared. In this thesis images distorted in scale, color, position, etc. have been considered for qualitative and quantitative analysis of the results of the test runs. The effectiveness of the approach has been justified using different images. Further the use of shape based segmentation for re ordering and filtering of images for hit and miss transform give better accuracy than using only color, histogram, texture, shape and hill climbing based content based image retrieval algorithms. The boundary of objects in images can be extracted easily by performing erosion and subtraction on images. The proper selection of color and shape based segmentation algorithm may help to organize the result and improve the accuracy of the image retrieval system. Different weights for different regions (e.g. central regions could be considered more important than edges), distance measure in other color space than RGB can be also implemented in this algorithm as an improvement to this system.

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REFERENCES

[1] Muller, W. Muller, S. Marchand-Maillet, and D. M. Squire, “Strategies for positive and negative relevance feedback in image retrieval”, International Conference on Pattern Recognition, volume 1 of Computer Vision and Image Analysis, pages 1043{1046, Barcelona, Spain, Sept. 2000a.

[2] Sun, H. Zhang, L. Zhang, and M. Li. “Myphotos a system for home photo management and processing”, In ACM Multimedia Confernce, Juan-les-Pins, France, Dec. 2002, pages 81-82.

[3] Wencheng H. Armitage and P. G. Enser. “Analysis of user need in image archives”, Journal of Information Science, Apr. 1997, 23(4):287-299.

[4] Sumaira Muhammad Hayat Khan, Dr.Ayyaz Hussain, Dr.Imad Fakhri Taha Alshaikhli. “Comparative study on Content-Based Image Retrieval (CBIR)”, International Conference on Advanced Computer Science Applications and Technologies, 2012.

[5] Shouhong Wan, Peiquan Jin and Lihua Yue. “An Effective Image Retrieval Technique Based on Color Perception”, Sixth International Conference on Image and Graphics, 2011.

[6] Abderrahim Khatabi, Amal Tmid, Ahmed Serhir and Hassan Silkan. “Content-Based shape retrieval (CBIR) using different shape descriptors”, April 2014.

[7] Sanjoy Kumar Saha; Amit Kumar Das and Bhabatosh Chanda. “CBIR using Perception based Texture and Colour Measures”, Proceedings of the 17th International Conference on Pattern Recognition (ICPR’04), 2004.

[8] S. Jhansi rani and V. Valli. “Improved Hill Climbing based segmentation (IHCBS) technique for CBIR system”, September 2015.

