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A REVIEW ON DIFFERENT TECHNIQUES OF IMAGE RETRIEVAL WITH FEATURE COMBINATIONS

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Abstract: -As the number of internet users are increasing day by day. So amount of data also increases, therefore fast response is desired by different users. So most of the researchers are working in relevant information retrieval. Keeping this goal in mind paper focus on image retrieval through different techniques. Here detail review of different image fetching or ranking techniques is study with their image features. Evaluation parameters are applied for checking the final output of the algorithms.

Keywords: Digital Image Processing, Information Extraction, feature extraction, Re-ranking.

I. INTRODUCTION

As services like Journalism, e-commerce, fashion design, graphics design, engineering, architecture, historical search, hospitals, etc. required image in order of make better understand of their content [1]. So different age as well as different category people is in need of the good collection of images as per their requirement. So Image retrieval system is required which can not only manage image in the database although retrieve relevant image as well. This automatic service is highly desired for today era.

Image collection required large amount of space. Beside space data structure of the image retrieval system is so efficient that searching time for an image is also very less.

Then finally design of relevant image as per the user query image base on the content retrieval is quit tough as pixel values give different Beside various applications of the image retrieval system organization of the image is required as values for the same image.

So efficiency of the system for image retrieval is increase by including a new dimension of searching as well that is text base image retrieval, where image is required to be save in the database with attach related information as this reduce the calculation complexity of the Image But attachment of wrong words well always gives wrong ranking. So some other approach is still required for this field that increases the efficiency of the system.

Text-Based and Content Based Image Retrieval (CBIR)

As image retrieval is done by two techniques first is text and other is content in case of text based retrieval bag of words are attach with the image. Now that bag of word contains information like keywords, heading, classifying

codes, etc [2]. This kind of retrieval is non-standardized as annotation of image is done by a human and as per his language annotation is done. One more issue is that text description is complex and common so image description is done that is totally base on personal views. This kind of image organization for large dataset is impractical where continuous surveillance images are coming one by one [3].

Searching of image retrieval is done by using content of image which is nothing except the visual features. As text based retrieval plays an important role in the image mining but to improve the accuracy of fetching image from database, content BIR is done. Here it is a technique which semantically matches the image features of the images in the database for clustering, ranking, etc [4].

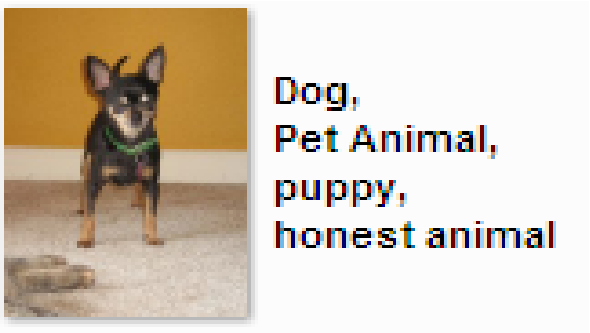

Fig.1 Image retrieval by text query

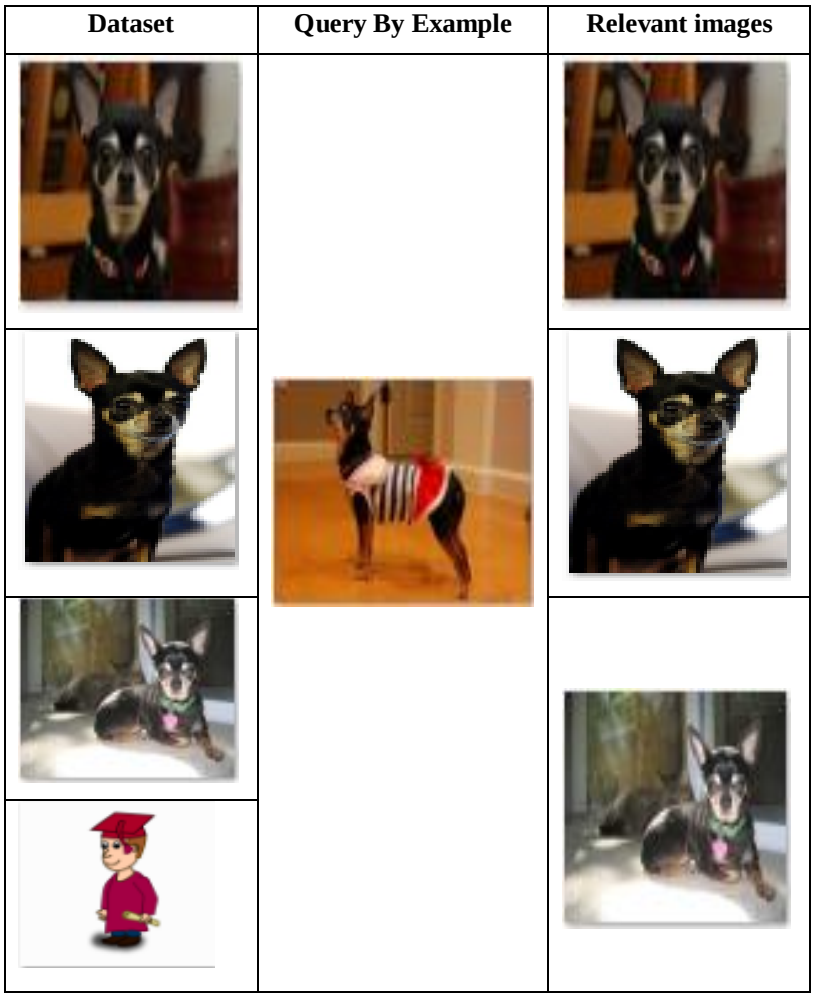

Fig. 2 Image retrieval by visual query

As human interaction is required to reduce by using text or annotation which is further improve by this CBIR, so this is the main goal of the work. The computer must be able to retrieve images from a database without any human assumption on specific domain (such as texture vs. non-texture, or indoor vs. outdoor).

Most major task in case of the content base retrieval is defying the rules for the comparison of image features or signatures to other images in the database. As feature comparison includes pixel values. As difference between the features is calculated for finding the relevancy as relevant images have less difference while irrelevant feature has high difference.

Fields of Application

Image retrieval based on content is highly utilized in large number of applications such as:

1). Advertising media where correlated images are desired.

2). Engineering design and architectural works where related images help in structure building.

3). Geographical information is shared between the users for the different research centers

4). In case of criminal searching police department also utilize image retrieval system for the face searching in the video or frame from the store database.

5). In case of designing the company logo it is desired to have unique logo so comparison of the similar logo is done.

6). In case of medical X-ray report are maintain for the study of different cases, so similar case have same prescription.

So above all many web search engines are developed for the relevant image retrieval for various other purposes such as presentation preparation, diagram correction, visual graphs, etc. Example of these web search engines are go ogle, yahoo, Alta Vista, etc.

II. Related Work

Simardeep Kaur et. al., [1] presented HSV based color space image retrieval method, based on the color distribution of the images. The performance of content based image retrieval using HSV color space is evaluated and then RGB and HSV model is compared. The CBIR using HSV color space scheme transfers each pixel of image to a quantized color and using the quantized color code to compare the images of database. This HSV values has a high recall and precision of retrieval, and is effectively used in content based image retrieval systems.

S. P. James [2] presented an image retrieval system (CBIR), using HSV color features, which can retrieve facial images from the extracted facial features. K-Means clustering technique is applied to the images are initially clustered into a group which has similar HSV color content. Then the chosen group is clustered using K-Means clustering algorithm. The experiment result is compared with Euclidean distance metric where the clustering technique produces accurate image retrieval and better classification of images.

In [3], the color feature is extracted from the joint histogram based on the combination of the hue and saturation and the texture feature is extracted using the GCLM feature. The k-means clustering is used to cluster the feature of the image. The ROC curve is drawn in order to evaluate the performance of the feature extraction. The chi-square is used to find the similarity between the two images. The evaluation results demonstrate the accuracy of the retrieval based on the precision and recall false positive and negative ratio. The ROC curve is used to compare the efficiency of the color, texture and the combination of both the color and the texture.

Iyad Aldasouqi and Mahmoud Hassan [4], proposed a fast algorithm for detecting human faces in color images using HSV color model without compromising the speed of detection. The algorithm is fast and can be used in some real-time applications.

Vadivel, A et. al., [5], did a detailed analysis of the properties of the HSV (Hue, Saturation and Intensity Value) color space, laid emphasis on the visual perception of the color of an image pixel with the variation in hue, saturation and intensity values of the pixel. Using the results of this analysis, they determined the relative importance of hue and intensity based on the saturation of a pixel and applied this concept in histogram generation for content-based image retrieval (CBIR) from large databases. In traditional histograms, each pixel contributes only to one component of the histogram. However, they proposed a method using soft decision that contributes to two components of a histogram for each pixel.

Shamik Sural et. al., [6] analyzed the properties of the HSV (Hue, Saturation and Value) color space with emphasis on the visual perception of the variation in Hue, Saturation and Intensity values of an image pixel. They extracted pixel features by either choosing the Hue or the Intensity as the dominant property based on the Saturation value of a pixel. The feature extraction method has been applied for both image segmentation as well as histogram generation applications – two distinct approaches to content based image retrieval (CBIR). The K-means clustering of features combines pixels with similar color for segmentation of the image into objects. The histogram retains a uniform color transition that enables them to do a window-based smoothing during retrieval.

Chun et. al., [8], proposed a content-based image retrieval method as its texture features, BDIP and BVLC moments of the value component image are adopted. The color and texture features are extracted in multiresolution wavelet domain and combined.

Young Deok et. al., [9] proposed block difference of inverse probabilities (BDIP) and block variation of local correlation coefficients (BVLC), for content-based image retrieval and then presented an image retrieval method based on the combination of BDIP and BVLC moments. Their presented retrieval method yields about 12% better performance in precision vs. recall.

Yu-Len Huang et. al. [10] presented a computer-aided diagnosis (CAD) system with textural features for classifying benign and malignant breast tumors on medical ultrasound systems. The proposed CAD system utilized facile textural features, i.e., block difference of inverse probabilities, block variation of local correlation coefficients and auto-covariance matrix, to identify breast tumor. The proposed system identifies breast tumors with a comparatively high accuracy.

Ying Ai Ju et. al., [11] proposed a face recognition method using local statistics of gradients and correlations. BDIP (block difference of inverse probabilities) is chosen as a local statistics of gradients and two types of BVLC (block variation of local correlation coefficients). The fused features of BDIP and BVLCs are more robust to variation of illumination and facial expression and so the proposed method yields good results. Many of the texture features have been developed so far during the past years. As per our literature survey over texture feature detection, we concluded that BDIP and BVLC were proposed recently and showed a better retrieval efficiency in various domains including content based image retrieval.

III. Techniques of Image Retrieval

Content-Based Retrieval

Because of the problems related to text-based searching of multimedia objects, an orthogonal approach of content-based data management began to attract attention in 1990s [16]. Its main objective is to allow searching in any data, exploiting the actual object content with no need of additional metadata. Inspired by cognitive psychology, the content-based retrieval is based on the evaluation of similarity between data objects, which is inherent to human recognition and learning [12]. The last two decades witnessed intensive research in this field, concerning the

extraction of information from the multimedia objects as well as the development of tools for efficient similarity-based searching.

Text Based Retrieval

Text-based searching in multimedia data has been studied since 1970 and was very popular in the beginnings of image retrieval [1, 14]. Mature text-retrieval technologies and user-friendly keyword-based query formulation are the strong aspects of this solution. On the other hand, the text based searching can only be applied for a limited scope of multimedia data sources and applications, where the text metadata is available and carries enough information to enable the retrieval.

IV. Image Features

As Image is collection or sequence of pixel and each pixel is treat as single value which is a kind of cell in a matrices. In order to identify an object in that image some features need to be maintained as different object have different feature to identify them which are explain as follows:

Color feature: Image is a matrix of light intensity values; these intensity values represent different kind of color. So to identify an object colure is an important feature, one important property of this feature is low computation cost.

Different Image files available in different color formats like images have different colure format ranging from RGB which stand for red, green, and blue. This is a three dimensional representation of a single image in which two dimensional matrix represent single color and collection of those matrix tends to third dimension. In order to make intensity calculation for each pixel gray format is use, which is a two dimension values range from 0 to 255. In case of binary format which is a black and white color matrix whose values are only 0 or 1. With the help of this color feature face has been detected efficiently in [8].

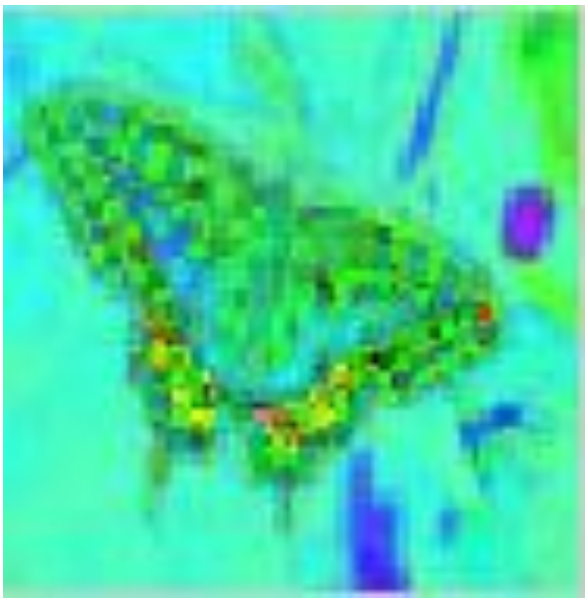

Fig. 3 Represent the HSV (Hue Saturation value) format of an image

Edge Feature: As image is a collection of intensity values, and with the sudden change in the values of an image one important feature arises as the Edge as shown in figure 4. This feature is use for different type of image object detection such as building on a scene, roads, etc [5]. There are many algorithm has been developed to effectively point out all the images of the image or frames which are Sobel, perwitt, canny, etc. out of these algorithms canny edge detection is one of the best algorithm to find all possible boundaries of an images.

Fig. 4 Represent Edge feature of an image.

Corner Feature: In order to stabilize the video frames in case of moving camera it require the difference between the two frames which are point out by the corner feature in the image or frame. So by finding the corner position of the two frames one can detect resize the window in original view. This feature is also use to find the angles as well as the distance between the object of the two different frames. As they represent point in the image so it is use to track the target object.

Fig.5 Represent the corner feature of an image with green point

Texture Feature: Texture is a degree of intensity difference of a surface which enumerates properties such as regularity and smoothness [1]. Compared to color space model, texture requires a processing step. The texture features on the basis of color are less sensitive to illumination changes as same as to edge features.

CCM: The statistical approach for image analysis based on the matrix of co-occurrence (CCM Co-occurrence Matrix) is widespread in many fields, alone or synergistically with other analysis, to evaluate the images morphology. This one, better known as "texture" (an innate property of all the virtual surfaces), gives information on the disposition of the structures and their relations with the environment.

V. Evaluation Parameters

NDCG [6, 12] as the performance evaluation measure.
The NDCG measure is computed as

$$NDCG@P = Z_P \sum_{i=1}^{P} \frac{2^{l(i)} - 1}{\log(i+1)} \quad (9)$$

Where P is the considered depth, $l(i)$ is the relevance level of the i -th image and ZP is a normalization constant that is chosen to let the optimal ranking's NDCG score to be 1.

Precision = true positives / (true positives+ false positives)

Recall = true positives / (true positives +false negatives)

F-score = 2 * Precision * Recall / (Precision + Recall)

In order to evaluate results there are many parameter such as accuracy, precision, recall, F-score, etc. Obtaining values can be put in the mention parameter formula to get better results.

VI. Conclusions

World Wide Web has necessitated the users to make use of automated tools to locate desired information resources and to follow. Web image re-ranking has been widely used to reduce the user searching time on the internet; its success mainly depend on the accuracy of image features similarities. This paper present utilizing of the various features in techniques like text based retrieval as well as content based retrieval for ranking the image. In few work both techniques are use together for better results. In future in order to improve the efficiency more features of images will be include.

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