Content Based Image Searching Methods and Applications: A Study

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Abstract— Content-based image retrieval (CBIR) is the process of searching for image based on features such as color, texture and shape in large databases. From the previous couple of years, Content based mostly Image Retrieval (CBIR) gained increasing attention from man of science. CBIR may be a system that uses visual features of image to go looking user needed image from giant image info and user's requests within the style of a question image. Necessary features of images are color, texture. Different image retrieval techniques using content are mentioned during this paper.

Key words: CBIR; color feature; texture feature shape feature

I. INTRODUCTION

For economical services altogether fields like government, academics, hospitals, crime bar, engineering, design, journalism, fashion and graphic style use images attributable to the recognition of those kinds of digital image database becomes immense information, and to look and retrieve needed image from the massive database becomes troublesome and time consuming to resolve these issues historically text-based retrieval is employed in an exceedingly ADP system for browsing, looking out and retrieving pictures from the massive database of digital images retrieval system is employed to look images, a user provides query terms of keyword and also the system can come images the same as the question.

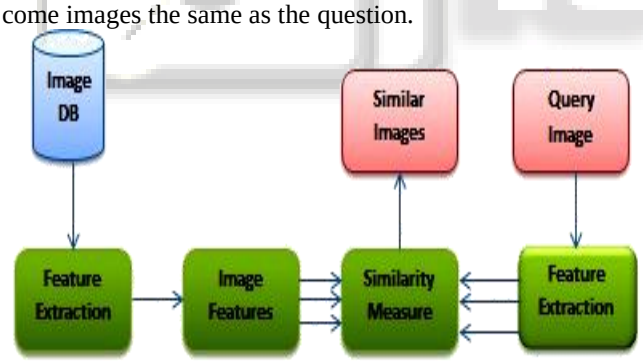

Fig 1: Architecture of CBIR system

In text primarily based image retrieval keywords, label, tag or the other data is associated with the image and exploitation this data image retrieval is performed. During this methodology query is entered in terms of text. But this system shows certain limitations. Annotations of every image within the information needs domain consultants United Nations agency add label or different data to the image. Use of various keywords for annotation of every image in terribly giant information may be a terribly time intense method. It is additionally necessary to use distinctive keyword for annotation of every image, therefore this can be a really complicated task. Text descriptions are typically incomplete as a result of they cannot depict difficult image features okay. Examples are texture images that can't be represented within the text. A language pair will occur once the user and also the domain professional uses a unique language.

Content-based image retrieval (CBIR) systems were introduced to deal with the issues related to text-based image retrieval to go looking and retrieve digital images CBIR uses content of the images. Content-based means the search analyses the contents of the image not the metadata like keywords or tags related to the image. Here the term content means those colors, shapes, textures or the other info that derived from the image. In CBIR systems input image is given and based on this query image feature matching, the most similar images from database are retrieved.

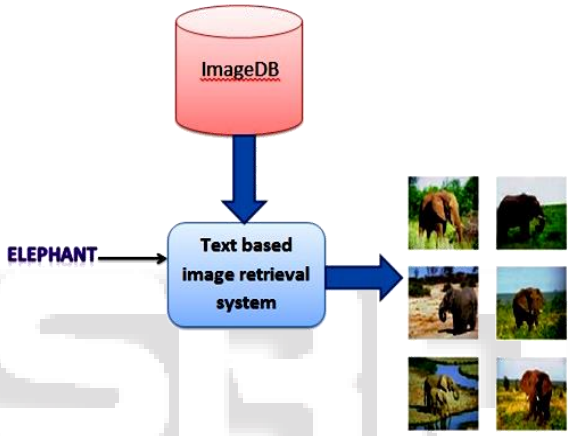

Fig. 2: Text based system for image retrieval

Feature extraction is the main task within the CBIR systems to retrieve the similar images from database. Similarity measures are used to calculate the difference between those image features.. Choice of similarity metrics includes a direct impact on the performance of content-based image retrieval. the sort of feature vectors elite determines the sort of measure that wont to compare their similarity. Euclidian distance is that the most typical metric used to live the distance between 2 points in multi-dimensional space. To represent a picture, in feature extraction features like color, texture or form from image area unit extracted and creates a feature vector for every image.

II. LITERATURE SURVEY

In the CBIR, features are most vital content for indexing and retrieval of the image. Color, shape and Texture are most vital features of image. The feature extracted are then type a vector and this vector are going to be used for indexing of particular image.

A. Color & Texture Features for CBIR

Biragle and Doye concentrate on color and texture features for content based image retrieval [7]. For improved retrieval performance they use the decomposition theme based on color planes in combination with histogram. For every plane 3 level decomposition performed. Every image divided into non-overlapping sub pictures and analyzed victimization

normal wavelet and histogram. Standard Wavelets used for texture feature extraction and color histogram for color feature extraction.

To create the feature vector initial level energy and computed variance of every sub-band is employed. Then to search out similarity between images geometer distance metric is used. The average % retrieval efficiency victimization this methodology is up to 75th. the most advantage of three-color plane wavelet decomposition is that it yields a large range of sub bands and which improves the retrieval accuracy.

B. CBIR using color, texture & shape feature:

Hiremath and Pujari presents a framework for combining information of 3 features like color, texture and form information to realize high retrieval efficiency [6]. The aim of this methodology is to capture local color and texture descriptors in an exceedingly segmentation framework of grids and form expressible in terms of invariant moments computed on the sting image. During this methodology, an image is divided into non overlapping tiles. These tiles are local color and texture descriptors for the image. This grid framework is extended across resolutions to capture totally different image details inside a similar size tiles. An identical procedure based on an adjacency matrix of a bipartite graph. For the query image and the target image tiles bipartite graph is constructed. The distances between tiles indicated in the edges of the bipartite graph .

Image similarity computation supported most similar highest priority (MSHP) principle. during this methodology initial and second order statistical moments of Gabor filter used to extract the feel feature, color moment used for the color feature extraction and Gradient vector flow fields(GVF) area unit accustomed extract the form of the item. In per resolution 52 features are computed for each image tile. This methodology permits to tile from query image is matched to any tile within the target image. The most advantage of this methodology is that it creates robust feature set for image retrieval.

C. CBIR using Feature Combination & relevance Feedback (RF):

Zhao and Tang, perform CBIR using optimal Feature Combination and RF [4]. During this approach the comparison of the retrieval performance using totally different combinations of features is done. The mixture is finished in 2 levels. First one is that the combination of color and texture features and therefore the alternative is that the combination of 2 textures extracted by 2 totally different texture feature extraction ways. By scrutiny totally different mixtures of visual features they select optimum combination of Gabor and wavelet rework texture features with the color moment color feature that encompasses a better retrieval performance. Retrieval is based on the similarity of visual features combination of query image and for the similarity measurement Euclidian distance methodology used.

User can select the relevant and irrelevant images from the retrieved image result. This feedback is provided as coaching set to the Support Vector Machine (SVM) classifier to train the SVM [5]. This approach target to attenuate the gap between low-level features illustration of images and also the user's high-level semantic ideas, for that it uses SVM supported RF (Relevance Feedback) to find out user's query concepts [6]. SVM and feature similarity based mostly relevance feedback using best feature combination improves the retrieval exactness. As variety of feedback will increase the retrieval accuracy improves correspondingly. However among the relevance feedback for identical output completely different users have different views relating to the similarity. Therefore it becomes complex method.

D. Semantic Image Retrieval by combining 3 Features:

To overcome the disadvantage of relevance feedback Singh, Dubey, Dixit and Gupta through an experiment evaluated 2 section techniques for the extraction of semantic data [2]. Within the 1st section feature info of images is formed. The feature info contains data regarding the color, shape and texture of the image. Within the feature extraction color histogram for the colour feature, for the texture feature coarseness, contrast, energy and directionality used and for the shape feature Zernike moments and edge used. Feature info is formed and stored consistent with the highest 3 values of the hue histogram cut back the processing time and reduce dataset.

In the second section, images that square measure relevant to the query image are retrieved. In reducing dataset feature matching is completed and extracts similar images to the question image considering color, texture and shape feature separately. For every feature set of images are obtained. Finally mix all the features that get in an exceedingly set of images and retrieve images that are semantically most just like the query image.

This technique retrieves images that are semantically similar with the query image and it improves the exactness and recall of the image retrieval system. It retrieves all the similar images supported the every feature individually therefore there's a no chance of missing relevant pictures; this can be the main advantage of this technique. This method is time consuming, because here similarity matching applied two times.

E. CBIR using Multiple SVM's Ensemble:

Yildizer, Balci, Hassan and Alhajj proposed efficient content-based image retrieval using Multiple Support Vector Machines Ensemble [1]. This paper aims to search out a good similarity live between the images. Similar images belong to predefined classes with close chances and to search out the class chances this approach uses Support Vector Regression (SVR) model. The main steps during this approach are 1st, Feature extraction: during this step before feature extraction resize the images and transform images from RGB data space to another space. Next apply Daubechies wavelet transformation several times to extract features from images. Second, Feature reduction: SVR ensemble constructs for feature reduction. It creates new low dimensional feature vectors in reduced size due to that distance calculation reduced. Third, construct a brand new SVR model to search out the class probability estimates of the test images. Fourth, query part: in this phase. Euclidian distance measure uses as distance live and return similar images having lowest distance. The main purpose of this CBIR technique is that to handle large image databases and by reducing the dimensionality of the feature vectors reduce the cost of distance measurements due to that the accuracy of the classifier increase. Average classification accuracy of this approach is 62 and average precision is 64th.

III. ANALYSIS

In the table Comparison of different CBIR techniques is given. It shows which features used in to the particular CBIR technique to extract the image info.

Paper name	Feature extraction method	Performance evaluation parameter	Advantages	Disadvantages
Colour & Texture Features for CBIR	Color histogram, Standard wavelet	Retrieval accuracy	Improves the retrieval accuracy	Insufficient feature set
CBIR using colour, texture & shape feature	Colour moment, Gabor filter, GVF	Retrieval efficiency	Create robust feature set	High semantic gap
CBIR Using Feature Combination & RF	Colour moment, Gabor, wavelet, co-occurrence matrix	Precision	Minimize the semantic gap using RF with SVM	It is time consuming to label negative examples
Semantic Image Retrieval by Combining Three eatures	Colour histogram, Tamura, Zernike moment & edge	Precision and recall	1.Reduce dataset 2. All similar images of related features are retrieved.	Similarity measurement and image retrieval perform two times so it increases calculations
CBIR using Multiple SVM's	Daubechies wavelet	Precision, classification accuracy	1.Narrow own search space 2.Handle large image database	Feature sets not sufficient

Table 1: Comparison Table

IV. APPLICATIONS

The CBIR methodologies can be apply in the following areas:

- Simple user searching for the image in the web
- Picture Recognition in Crime Prevention
- Geographical Information and Remote Sensing
- Medicine Diagnosis System
- Fashion Designing and Publishing
- Engineering Design

V. CONCLUSION

In this paper, surveyed about different techniques used for content based image search. And also an analysis is performed about these techniques. Studied about applications of the CBIR systems.

In future, tend to expect a lot of efficient technique for image retrieval that has high retrieval accuracy and precision.

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