Rank Based Image Retrieval Technique using Hue Saturation and Value (HSV) and Gray Level Co-occurrence Matrix (GLCM) Features

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Abstract **: Content based image retrieval is an effective approach to retrieve most similar images to the query from a large set of database.various contents are used as color ,tecture ,shape,sketch.In this work only color and texture are used with the extraction of HSV(Hue,Saturation and Value) and GLCM(Gray Level Co-occurrence Matrix) features. Euclidean Distance is calculated between the query image and database images. The ranking system is applied over the retrieved relevant and irrelevant images.**

Keywords: **content based image retrieval, Euclidean distance, ranking system.**

I. INTRODUCTION

With the event of the internet and the availableness of image capturing devices like digital cameras, image scanners, the scale of digital image assortment is increasing tremendously, it's vital to expeditiously store and retrieve pictures for various applications like fashion planning, crime interference, medical field, design, etc. For this purpose, several general purpose image retrieval systems are developed. they're text-based and content-based. the concept of text-based approach was originated at Seventies. In this approach the photographs area unit manually annotated by text descriptors, that area unit then employed by a management system to perform image retrieval. It have two disadvantages. the first disadvantage is that a substantial level of human labor is needed for manual annotation. The second is that the annotation quality thanks to the subjectiveness of human perception.To overcome the disadvantages in text-based retrieval system, content primarily based image retrieval (CBIR) was introduced within the early Eighties. In CBIR, pictures area unit indexed by their visual content, like color, texture, shapes. The CBIR chiefly consists of 2 steps. One is that the feature extraction and another one is that the similarity matching. In numerous paper authors have used completely different feature extraction technique relying upon the low level feature or high level feature. The distinction between the user's data want and therefore the image illustration is termed the linguistics gap in CBIR System. The system is claimed to be economical if this linguistics gap is minimum. Because the propagation of video and image information in digital type has increased , Content based

Image Retrieval (CBIR) has become a distinguished analysis topic, thus a very important drawback that must be addressed is quick retrieval of pictures from massive set of databases. to search out pictures that area unit perceptually the same as a query image. Image retrieval systems commit to search through a information. CBIR will greatly enhance the accuracy of the knowledge being retrieved and in many ways is more efficient to ancient text-based image looking. For describing image content, color, texture and shape options are used. Color is one of the most extensively used low-level visual options and is invariant to image size and orientation [1]. There area unit color bar chart, color correlogram as typical color options employed in CBIR with different data.Several objects in a picture will be distinguished entirely by their textures. Texture might describe the structural arrangement of a locality conjointly the relationship of the encircling regions and should also comprises some basic primitives. Shape feature has been extensively used for retrieval systems. we'll implement CBIR system that's supported dominant Color and Texture. CBIR is desirable as a result of an outsized quantity of network primarily based image search engines rely entirely on data and this produces a bunch of junk within the results. Additionally, having humans manually enter keywords for pictures during a massive information will be incompetent, high-priced and should not confine every keyword that describes the image.

II. RELATED WORK

In paper [2] author introduces a web image search reranking approach introduces an online image search reranking approach that explores multiple modalities in an exceedingly graph-based learning theme. The approach at the same time learns relevance scores, weights of modalities, and also the

distance metric and its scaling for every modality to check the performance of the planned approach, authors have conducted experiments on a dataset that contains 1,096 queries. The effectiveness of desegregation multiple modalities has been incontestable . It is incontestable that the planned approach not solely achieves higher average results however conjointly shows a lot of lustiness than the strategies that use solely a private modality. they need conjointly compared their planned with many existing reranking strategies, and results conjointly demonstrate the prevalence of the planned approach. The authors solely contemplate search relevance in their work, however really diversity is additionally a very important side for search performance.

In this paper [3], author can think about information comprising of varied pictures and therefore the feature set consisting of color, texture and shape descriptors computed for an image. They need to implement a CBIR system that uses the mix of dominant color, texture and form. Color is sometimes depicted by the colour bar graph, color correlogram, color coherence vector, and color moment underneath a precise color area. Texture may be depicted by Tamura feature, rural area decomposition, SAR (Simultaneous automobile Regressive) model, physicist and moving ridge transformation.,shape may be depicted by Moment invariants, Turning angles, Fourier descriptors, disk shape, Eccentricity, and axis orientation and chemical element remodel. a picture are uniformly divided into coarse partitions. The centre of mass of every partition are elite as its dominant color. Texture of a picture are obtained by victimisation the presence of a abstraction pattern that has some properties of homogeneity. Impressions of form may be sent by color or intensity patterns, or texture, from that a geometrical illustration may be derived. the mix of the colour and texture options of a picture in conjunction with the form options can give a strong feature set for image retrieval. The similarity between question and target image are measured from 2 varieties of characteristic options which has dominant color and texture options.

In this paper[4], the author have given a completely unique approach for Content Based Image Retrieval by combining the colour and texture options known as Wavelet-Based Color bar,chart Image Retrieval (WBCHIR).Similarity between the pictures is determined by suggests that of a distance perform. The experimental result shows that the projected methodology outperforms the opposite retrieval ways in terms of Average exactitude. Moreover, the procedure steps are effectively reduced with the utilization of ripple transformation. As a result, there's a substational increase within the retrieval speed. the total compartmentalisation time for the one thousand image info takes 5-6 minutes.

In this paper [5], Contentment based Image Retrieval has overcome all the limitation of Text based Image Retrieval by considering the contents or options of image. a question image may be retrieved with efficiency from an oversized information. CBIR technology has been utilized in many applications like fingerprint identification, diversity info systems, digital libraries, crime hindrance, medicine, historical analysis. A information consists of various forms of pictures has enforced on the system completely different options like bar chart, color mean, Color structure descriptor texture is taken into thought for extracting similar pictures from the information. From the experimental result it's seen that combined options will provide higher performance than the one feature. therefore choice of feature is one in every of the necessary problems within the image retrieval. The system is claimed to be economical if linguistics gap is minimum .The result may be improved in future by introducing feedback and user's alternative within the system.

III.PROPOSED WORK

In this paper we have proposed the technique to retrieve images from the database which are similar to the query image. The proposed algorithm is as follows:

Proposed Algorithm for Retrieval by HSV and GLCM Feature:

1) Query is given from the user.

2) HSV & GLCM features are extracted calculated and these are stored in a matrix. This is called as Feature Vector. in case of extraction of HSV feature an image is partitioned into 8*8 blocks and then the HSV is extracted for the image.

3) Feature vector is also formed for the images present in the database.

4) Euclidean Distance is calculated between the feature vector of query image and database images.

5) Sorted the distance in ascending order and Top K images are displayed on the screen as output.

The proposed work is explained with the help of block diagram in fig.1,where a query image is passed by the user, then the feature extraction is applied over the query image. When HSV feature is extracted the image is partitioned into 8*8 blocks and the HSV feature is extracted. After the extraction of HSV feature, GLCM feature is extracted and then a feature vector matrix is formed for both the feature. After that both the features are combined and value is stored. The same process of feature vector extraction is done for the database images and the results are stored. After this Euclidean distance is calculated for the query image and each image into the database. The Euclidean distance is calculated and sorted in ascending order. After the sorting the top ten images or results in the sorting list are ranked as the top resultant images and then they are displayed over the output

screen as the resultant images.Whenver the Euclidean distance between the query image and the database images is calculated then the images which have zero or the minimum Euclidean distance is selected and is placed in the list of top most relevant images.The images whose Euclidean distance is maximum or those are considered as irrelevant images to the query image and they are not placed in the list.

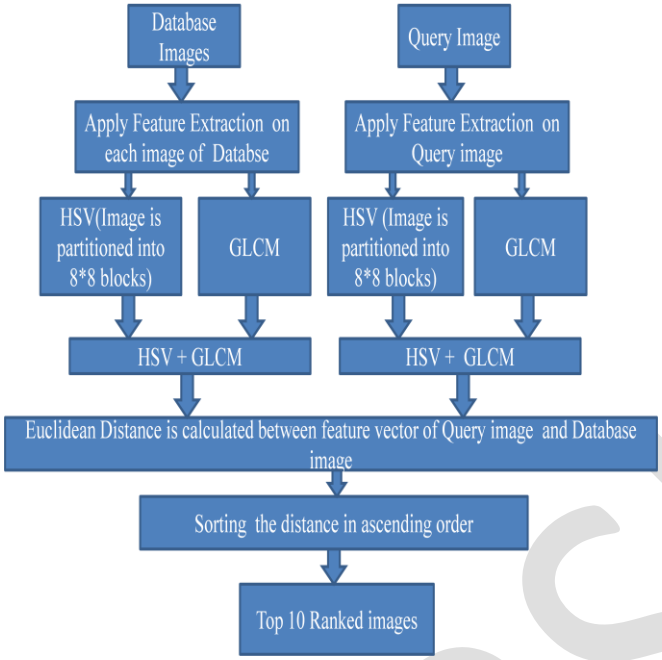

Fig.1.Block diagram of proposed work

IV. EXPERIMENT

The proposed method has been implemented using Matlab 7.2 and tested on a general-purpose database containing 150 images of different categories in JPG format of size 256x256. The search is usually based on similarity rather than the exact match. We have followed the image retrieval technique, as described in the section proposed work.

We adopt NDCG (Normalized Discounted Cumulative Gain) as the performance evaluation measure. NDCG is used to measure the usefullness on a scale of 0 to 1 of K retrieved images on the basis of their positions in the ranked list. For a higher NDCG means more similar images are ranked ahead of dissimilar images. With NDCG equal to 1 means perfect retrieval of K images.

The NDCG measure is computed as

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

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.

The experiment is done over many images from which the result is expressed with the help of taj7.jpg query image in fig.2 .When taj7.jpg query image is passed then the resul obtained are explained with the fig.3 and fig.4.

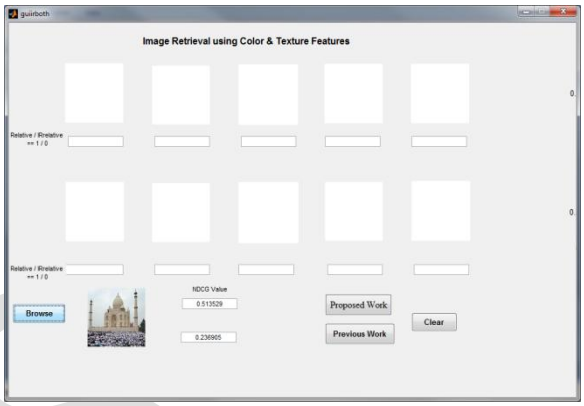

Fig.2 screenshot of input query

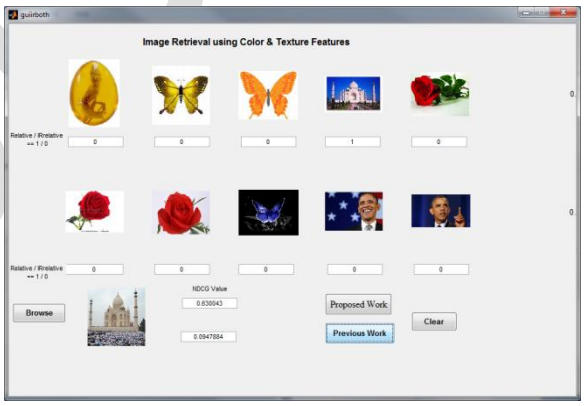

Fig.3 Images retrieved for query image taj7.jpg by previous work

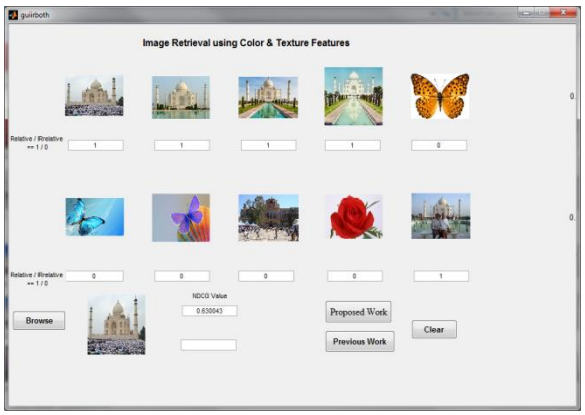

Fig.4 Images retrieved for query image taj7.jpg by proposed work

V. PERFORMANCE EVALUATION

- The performance of retrieval of the system can be measured in terms of its Recall and Precision.
- Recall measures the ability of the system to retrieve all the models that are relevant.
- Precision measures the ability of the system to retrieve only the models that are relevant.
- $\text{Precision}=\frac{no.of\ relevant\ \ images}{total\ \ no.of\ images\ \ displayed}$
- $\text{Recall}=\frac{no.of\ relevant\ \ images\ \ retrieved}{total\ \ no.of\ relevant\ \ images\ \ in\ database}$

VI. RESULT ANALYSIS

In this section the results of retrieved images which are obtained with the help of experiment over different images are expressed in the form of table and bar graphs

Table1. Precision values

Image_id	Precision(Proposed)	Precision (previous)
rose8.jpg	0.4	0.3
obama6.jpg	0.4	0.2
obama7.jpg	0.5	0.2
obama11.jpg	0.5	0.2
taj7.jpg	0.5	0.1

Table 2. NDCG Values

Image_id	NDCG (Proposed)	NDCG (previous)
rose8.jpg	0.51	0.23
obama6.jpg	0.44	0.12
obama7.jpg	0.56	0.12
obama11.jpg	0.5	0.12
taj7.jpg	0.63	0.09

Table3. Recall Values

Image_id	Recall(Proposed)	Recall(previous)
rose8.jpg	0.19	0.14
obama6.jpg	0.19	0.09
obama7.jpg	0.22	0.09
obama11.jpg	0.23	0.09
taj7.jpg	0.2	0.04

The graphs for the Precision, Recall and NDCG are given below which explains the results of the retrieved images.

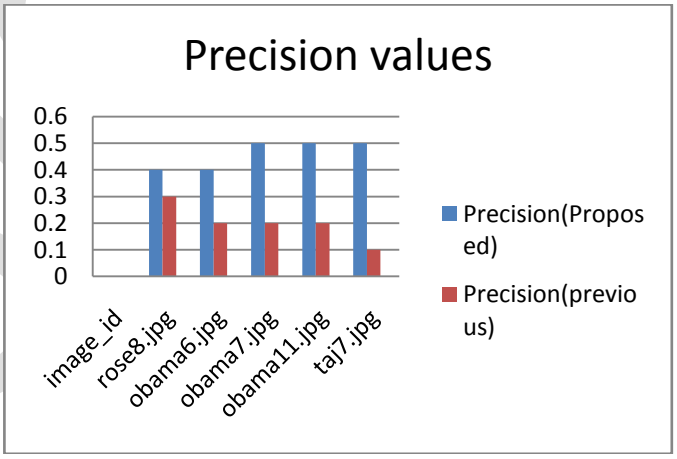

Figure 5. Precision value bar graph

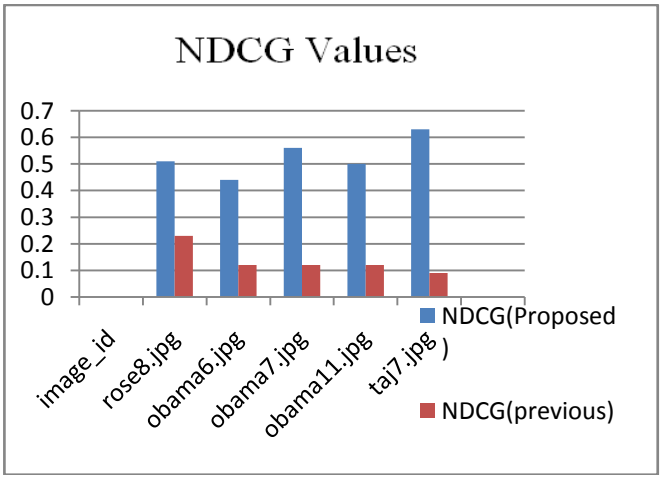

Figure 6. NDCG values graph

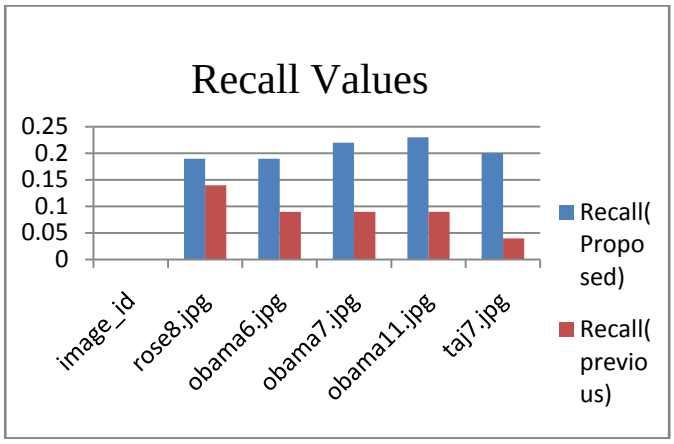

Figure 7. Recall values graph

It is clear from the above graphs that the values at different NDCG levels is better then the multimodal feature method. So the utilization of the texture features has increase the efficiency of the work then the multimodal features.
Results shows that the color and GLCM combination gives much better result in all cases as compare to the Color, edge, face, corner, etc. method.

VII. CONCLUSION

World Wide Web has necessitated the users to make use of automated tools to locate desired information resources and to follow the retrieval of desired elements. Web image re-ranking has been widely used to reduce the user searching time on the internet; its success mainly depends on the accuracy of image features similarities. The integration of image-based features has recently attracted a lot of attention. In this paper, an overview of recent works in this field, then compared them and discussed some of their limitations. The main objective of this study is to tackle this problem in an adaptable and effective way. This work presents utilizing of the visual features for ranking the image as make the re-ranking process more powerful, which is shown in results. This work demonstrated in various experiments that simple low-level visual features can enrich the semantic representation of word meaning with information that cannot be extracted from text alone. It is clear from the above result tables and bar graphs that the values at different NDCG levels is better in proposed work then the multimodal feature method.So the utilization of the texture features has increase the efficiency of the work then the multimodal features. Precision and Recall values are also improved with the use of proposed method. Results shows that the HSV and GLCM combination gives much better result in all cases as compare to the color, edge, face, corner, etc. method.

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