

# Image Retrieval System Using Three-Level Searching

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**Abstract:** To retrieve crucial pictures from a varied collection through the usage of visible queries as seek arguments are the onerous and large open problems. In this paper the writers have referred to the designs and implementations of a easy yet very effective Content-Based Image Retrieval (CBIR) device. The colorings, textures and the shapes capabilities are the essential components of this machine. With the three important consequent looking steps the looking will become multilevel. Such propounded structures are very precise as they recollect one characteristic at every step and use the consequences of the previous step as the input for the subsequent coming step in multilevel sample while in the sooner techniques all the capabilities are blended right away for the unmarried-level seek of a mean CBIR system. The propounded approach is very simple and secure to adopt. The retrieval grade of the propounded technique is valued the usage of bi-benchmark datasets for a photograph category. The above gadget of strategies suggests very good results in phrases of amelioration in retrieval characteristics, when in comparison with the literature. In proposed paintings we get accuracy like between 65.58 % to 91.25%. In used distinctive capabilities.

**Keywords:** Content-Based Image Retrieval, Image, Features, Feature Representation, Image Searching, Recall, Precision.

## I. INTRODUCTION

The collections of digital images are growing hastily inside the beyond years and led to diversity because of the revolution in era and internet and accessibility of shooting pictures in a tool. Ever since the innovation the operative and effective gear are in call for to be able to search, browse or retrieve photos. It is a difficult assignment for CBIR as for as the pix of Popular database is concerned. Various kinds of techniques had been advanced for searching and representing in popular-motive search engines.

Following are a few worries that needs to be taken care of, in the development of CBIR structures; the selection of features which might be used to take out the houses of pix, the procedure of extraction and presentation of picture capabilities and in the long run arbitrating the similarity in measures with the intention to retrieve images visually. Such styles of issues had been dealt in many methods and literature has been blessed with such a lot of techniques [1 - 6].

The colors, textures and the shapes capabilities are very vital and they're used to retrieve same visual pics from database-imaging. The majority of structures have used simply one or two features at the same time as on the opposite few systems made use of all sorts of capabilities [1]. Features which might be efficient when it comes to differentiating, the images ought to be decided on according with the sort of the dataset. Every characteristic can be applicable for the collection of widespread pix as its nature is heterogeneous (i.e. There could be herbal photographs, shade pix and object pics) and to delineate and differentiate the difference among images, one or two capabilities will no longer be enough. CBIR has especially two ways of image representation; worldwide and neighborhood representations. Local illustration is used greater than international illustration [1, 3, and 4] as the former brings out better effects. The case would not end here. To acquire robustness a wide range of CBIR structures and programs are coffered with using neighborhood illustration. Such local features extractions depend on in finding landmark factors or segmenting the photos into precise areas. No precise picture segmentation approach is discovered which can be implemented in the popular image series. The international representation takes out the features from complete image without the requirement of sub-department or search keys of hobby of the photo. Here it indicates how higher effects are accomplished inspire of worldwide representation. The size of the function database is kept sensibly small right here. A similarity degree have to be justified just after the illustration. Various similarity processes such as matching of the region and histogram are being used inside the local illustration [1, 5, and 6]. Although, for the global illustration [2] irrespective of the selected similarity degree a single-stage simple sequential search has grew to become out to be the most effective desire within the traditional CBIR.

Questioning by way of shapes textures and colorations or with the aid of one of the amalgamation of those features is propounded in lots of systems [2, 3, 5] with the use of unmarried-degree sequential searching. In this single-stage sequential seek, capabilities are combined to provide one or exclusive feature vectors. Then the capabilities are made use of the identical level without or with ready to look. It appears that the multi-stage sequential seek is not been measured yet, even though it may be very smooth and demonstrates better reclamation effects. From the zenith of our expertise there is greater to be studied in multi-stage sequential search to ameliorate the effects which might be to be retrieved.

The intention of this research is to accumulate a singular hassle-unfastened CBIR gadget to attain sufficient accuracy in image categorization and retrieval with the usage of worldwide illustration. As some distance as literature is worried the usage of the worldwide representation makes it difficult to acquire improved performances. Conversely, creators of this paper disagree with this declaration and give an explanation for that even the global illustration can be used to get better retrieval performances via the addition of recent methods. Empirical evaluation is executed on two subsets of the standard Corel dataset to authenticate the recital of this technique in opposite to other independently authenticated techniques. This propounded technique is defined in more detail later in this paper.

The relaxation of the paper is organized as follows. Section 2 describes an outline of the propounded CBIR machine. Section 3 gives details of the experiment and the effects received. Section four deals with conclusions drawn from the research findings.

## II. PROPOSED CBIR SYSTEM

The following section demonstrates the framework of a multistage CBIR device.

Image Indexing: illustrates snap shots which might be to be reserved by using the database and their low degree capabilities are shown in conjunction with their measurements.

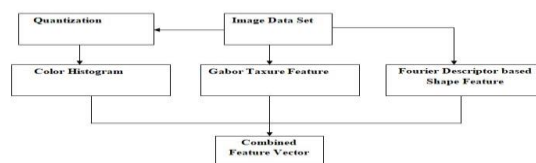


Figure 2.1: Content Based Image Indexing

For creation of a function vector, texture records is collected from several pixels in every histogram bin. Gabor texture functions are stored inside the database after calculation. According to the centroid distance, Fourier descriptor computation is used to fabricate a form feature vector. The vector that is indexed inside the database is a mixture of 3 function vectors. Primary secret is used as a sequential counter for reserving the characteristic vector in the relational database desk. (Table 2.1) the initial counter fee is thought to be one and is elevated with the aid of one whenever an image function vector receives gathered within the database.

Table 2.1: Structure of database Index Color Feature Texture Feature Shape Feature Image Path/Name

Index	Color Feature			Texture Feature			Shape Feature			Image Path/Name
	C1	C2	Cn	T <sub>n=1</sub>	T <sub>2</sub>	T <sub>m</sub>	S <sub>m=1</sub>	S <sub>2</sub>	S <sub>q</sub>	
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	gg1.jpg
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

The nomenclature of all pics in a database is exceptional; no two photographs can percentage a not unusual name. All picture capabilities particularly colour, texture and form are described the use of their very own components.

Image Retrieval: the question contempt ion and retrieval process is split into three stages. The indices of the retrieved photograph are discovered with the aid of the proposed system soon after the retrieval ends. As inside the indexing phase, coloration feature vector of described image is computed. Using the histogram intersection distance (S1), the feature vector is equated only with color function of all different photographs (M).

The output pics are ranked in augmenting order of their distance with the question photograph. Top N (<M) photos which can be towards the question photo, are now retrieved and offered as output of I stage as intermediate result RC. An array reserves the indices of these photographs. Using the index as variable within the SQL principle, the texture characteristic is retrieved the use of this array. A cellular array then reserves the retrieved set of vectors. This, in turn, receives converted into the format as lower back through the database cursor. This results in an apparent reduction of the database to N pics. This gets rid of impertinent pix and constricts the range of pics to be searched in the next level. The 2d level witnesses the Gabor texture function calculation of the chosen photograph. This is solely equated with texture function vectors of the output photographs of the first degree. This uses the Euclidean distance (S2). Top P (< N) photos which might be close to query photo in phrases of texture are provided as output (RT) of II level.

The P photograph indices are retrieved by means of formulating a question the usage of the direction of retrieved picture. An array reserves these indices and makes use of them to manufacture a database for shape feature.

In the third level, example photo's form feature vector is taken out and equated towards the shape function of images that wee the inferences of the second stage. Top K (< P) pix that are most similar to query picture are the very last output of the system. The device's accuracy can be altered on comparing images.

This propounded system of retrieval can produce better consequences

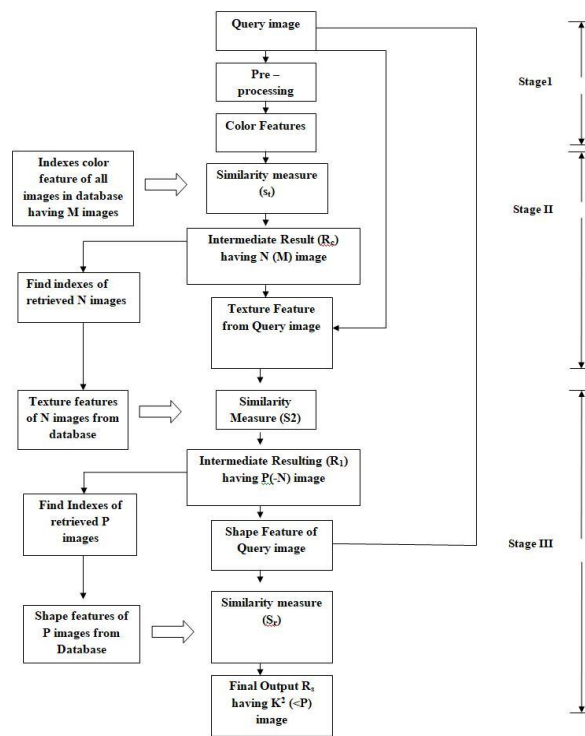


Fig. 2.2 Proposed model of image retrieval

**Feature Extraction:** The most commonly used low level features for color; texture and shape are incorporated for indexing images in the database. This shall ensure the efficacy of the proposed matching methods. This section discusses the details of feature extraction process and similarity measure used at each stage.

### Feature Extraction Stage I

In stage I, Global color histogram of query image is compared with pre calculated histogram data of all other images in the database making use of histogram intersection distance. Computation of global color histogram is done using the steps given below:

Step 1. Transform images from RGB to HSV color space.

Step 2. Apply non-uniform quantization method as given below:

$$\begin{aligned}
 H = & \left\{ \begin{array}{l} 0 \ h \in [340, 20] \\ 1 \ h \in [20, 50] \\ 2 \ h \in [50, 75] \\ 3 \ h \in [75, 140] \\ 4 \ h \in [140, 160] \\ 5 \ h \in [160, 195] \\ 6 \ h \in [195, 285] \\ 7 \ h \in [285, 305] \\ 8 \ h \in [305, 340] \end{array} \right. \quad \begin{array}{l} S \left\{ \begin{array}{l} 0 \ S \in [0, 0.2] \\ 1 \ S \in [0.2, 0.65] \\ 2 \ S \in [0.65, 1] \end{array} \right. \\ V \left\{ \begin{array}{l} 0 \ V \in [0, 0.2] \\ 1 \ V \in [0.2, 0.7] \\ 2 \ V \in [0.7, 0.1] \end{array} \right. \end{array}
 \end{aligned}$$

Step3. Plot HSV shade histogram of 81 boxes.

Step4. Save each bin cost in database to shape a colour characteristic vector.

Step5. Compute similarity using histogram intersection distance.

The output pictures of stage I are sorted as in step with their distance with the question picture and top N pics of the looked after end result known as RC are taken as input to the following degree consequently lowering the database pictures to be in comparison at each degree.

**Stage II:**

In level II, Image retrieval is accomplished the usage of Gabor texture characteristic. Gabor filter (or Gabor Wavelet) is broadly hired to draw texture functions from the pix for photograph retrieval [Manjunath et al. (2001)], and has been shown to be very efficient. Fundamentally, Gabor filters are a group of wavelets. In this, each wavelet captures strength at a selected frequency and .Course. Expanding a signal the usage of this criterion presents a localized frequency description, thereby capturing local capabilities power of the sign. Texture features can then be drawn from this organization of strength distributions. The scale and orientation feature of Gabor filter out makes it helpful particularly for texture evaluation [Sebe and Lew].

The output snap shots of this step are sorted according to their distance with the question picture .The output images of degree II are taken care of as in keeping with to their distance with the query photo and pinnacle  $P(<N)$  snap shots of the taken care of end result referred to as RT are taken as enter to the following stage.

**Stage III:**

The third level consists of drawing and comparison of the query image on the premise of Fourier descriptor. These descriptors are based totally on complicated coordinates and the centroid distance is largely used within the retrieval technique that is shape based totally. The Fourier descriptor that is centroid distance based totally has been determined out to be extra accurate. This is so because of its immunity for translation, rotation and scaling.

The Fourier descriptor is computed the usage of an object with the largest size. The Following process is followed for acquiring Fourier descriptor based totally shape characteristic:

Step 1 Image is converted from RGB to Grayscale

Step 2. Grayscale is changed to binary

Step3. Boundaries of all connected Regions are searched within the picture.

Step4. The boundary coordinates of the largest related item are segregated.

Step5. To regularize the shape boundary, polygon fitting algorithm is used.

Step6. One dimensional shape signature of the boundary coordinate is calculated based on Centroid distance.

Step7. Calculate Fourier transform of the shape signature.

Step8. Original a part of the Fourier coefficient is eliminated to make it invariant to rotation.

Step9. Magnitude values of fourteen Fourier coefficients are used and made scaling Invariant. Thus, the feature vector is obtained.

Step10. Equate this selection vector with pre-computed form characteristic vector of P photos of Stage II using distance characteristic. Images are arranged in ascending order with respect to their distances with question picture and top  $K (<N)$  pictures having near resemblance with the query picture are offered as final output of the system. We constitute this output as Rs.

**III. EVALUATION**

For assessment and assessment of the gadget the Wang dataset [15] (1st dataset) of one thousand pics is used. The Wang dataset of 10000 snap shots is a subset which selects guide pictures from the Corel picture database and it was formerly utilized in CBIR as a typical dataset for evaluation functions. Hence, such datasets are appropriate to be re-used in the course of this evaluation, since it affords a baseline to evaluate with different tested tactics which are independently developed. Each of this is composed 10 classes with a hundred pictures and they are of African human beings and villages, Beaches, Buildings, Buses, Dinosaurs, Elephants, Flowers, Horses, Mountains and glaciers, and Food. These photographs are JPEG with the resolution of 384x256 or 256x384.

Oliva and Torralba dataset [16] (second dataset) is used for further corroboration. It consists of 2688 snap shots characterized into 8 categories, categorized as Coast and seaside (360), Open country (410), Forest (328), Mountain (374), Highway (260), Street (292), City centre (308) and Tall homes (356). These pictures are JPEG with the resolution of 256x256. It was feasible to assess quantitatively and examine the overall performance, as those datasets are nicely categorised,. The measures which might be used to evaluate the propounded CBIR gadget are accuracy and recollect. And they're the most common evaluation measures in statistics retrieval. To visually summarize the overall performance in addition the confusion matrix for every dataset is computed. Recall is the fraction of significant pictures which are to be retrieved and it is defined as equation (1).

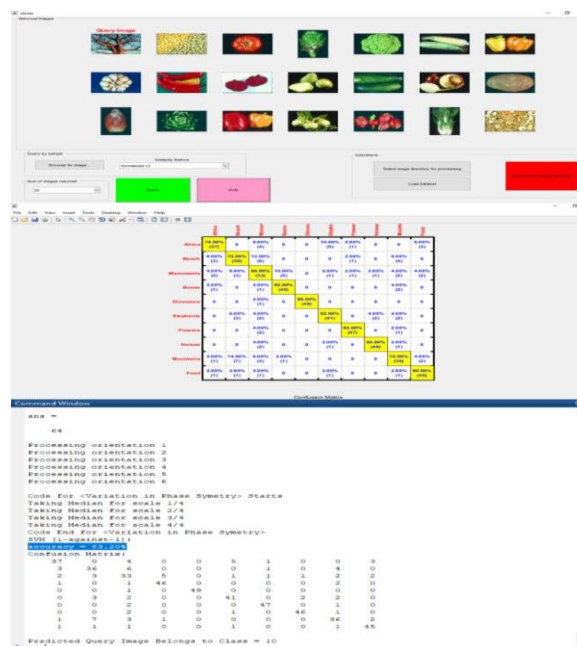
Precision is the fraction of retrieved images that are relevant to the query and it's far described as equation (2).

Precision =  $\frac{\text{Relevant snap shots} \cap \text{Retrieved pix}}{\text{Retrieved snap shot}}$  each elegance as equation (three), in which  $p(i)$  is the Average Precision of  $i$ th question picture and  $N$  is the variety of picture used for evolution.

$$P.C) = \frac{1}{N} \sum_{i=1}^N p(i) \quad (2)$$

Proposer set of rules follow we retrieve image and get Accuracy like between 68.16 percent to 91.25%





**Fig. 4.1. Example Images Covering Wang and Oliva Datasets**

Wang and Oliva datasets discover most beneficial settings to reap stepped forward retrieval performances. In accordance with the results, it's miles shown that this propounded technique outshines a few illustration techniques which are nearby on 1st dataset. This method might be used no longer simplest for the worldwide representation however also for the local representation. Performance can using international representation. The propounded device is envisioned and as compared to corroborate by means of using two general datasets. According to the tentative results it is shown that the proposed CBIR approach outperforms the other present systems in literature in phrases of development in retrieval best

#### IV. CONCLUSION

Using colour texture and shape functions for the representation this paper has supplied a easy and smooth but very powerful novel photograph retrieval approach based on multi-degree sequential looking. This feature order is elected for a well-known reason datasets and this could be altered according with the dataset. This type of technique is propounded to ameliorate the fine of retrieving for CBIR via. Be ameliorated in addition through introducing appropriate characteristic weights. Be ameliorated further by introducing appropriate feature weights.

#### REFERENCES

- (1). P.S. Hire math., Pujari, "Content Based Image Retrieval based on Colour, Texture and Shape features," Proc. 15th International Conference on Advance Computing and Communications, IEEE, Guwahati, Assam, pp. 780-784,2007.
- (2). M.H. Saad, H. I. Saleh, H. Konbor, M. Ashour, "Image retriev-al based on integration between YCbCr colour histogram and shape feature," Proc. ICENCO 7th International Computer Engineering Conference, IEEE, Giza, pp. 97-102,2011.
- (3.) N.S. Mansoori, M. Nejati, P. Razzaghi, S. Samavi, "Bag of visual words approach for image retrieval using colour information," Proc. ICEE 21 st Iranian Conference on Electrical Engineering, IEEE, Mashhad, pp. 1-6, 2013.
- (4). V. Takala, T. Ahoen, M. Pietikainen, "Block-Based Methods for Image Retrieval Using Local Binary Patterns," Proc. of the 14th Scandinavian Conference on Image Analysis, Springer Berlin Hei-delberg, Joensuu, Finland, pp. 882-891,2005.
- (5). X. Yuan, J. Yu, Z. Qin, T. Wan, "A SIFT-LBP Image Retrieval Model Based on Bag-of-Features," Proc. IEEE ICIP 18th International Conference on Image Processing, IEEE, Brussels, Belgium, pp. 1061-1064, 2011.
- (6). Li, I.Z. Wang , G. Wiederhold, "IRM: Integrated Region Matching for Image Retrieval," Proc. ACM 8th international conference on Multimedia, ACM Press, NY, USA, pp. 147-156,2000.
- (7) G. Qiu, "Indexing chromatic and achromatic patterns for content-based," Journal on pattern recognition, pp. 1675-1686, 2002.

- (8) G. Pass, R. Zabih, I. Miller, "Comparing Images Using Colour Coherence Vectors.," Proc. ACM fourth international conference on Multimedia, ACM Press, NY, USA, pp. 15-73, 1996.
- (9). M.H. Rahmana, M.R. Pickering, M.R. Frater, "Scale and Rotation Invariant Gabor Features for Texture Retrieval," Proc. DICTA International Conference on Digital Image Computing Techniques and Applications, IEEE, Noosa, QLD, pp. 602-607, 2011.
- (10). R. Manthalkar, P.K. Biswas, B.N. Chatterji, "Rotation and Scale invariant Texture Features Using Discrete Wavelet Packet Transform," Journal of Pattern Recognition, pp. 2455-2462, 2003.
- (11) S. Agarwal, AK. Verma, P. Singh, "Content Based Image Retrieval using Discrete Wavelet Transform and Edge Histogram Descriptor," Proc. ISCON International Conference on Information Systems and Computer Networks, IEEE, Mashhad, pp. 19-23, 2013.
- (12) A Y. Minaqiang K. Kidiyo, R. Joseph "A survey of shape feature extraction techniques," Journal of Pattern Recognition, pp. 43-90, 2008
- (13). Y. Chen, Wang, "A region-based fuzzy feature matching approach to content-based image retrieval," IEEE Transactions on Pattern Analysis and Machine Intelligence, IEEE, pp. 1252-1267, 2002.
- (14) P.S. Hiremath, . Pujari, "Content Based Image Retrieval Using Colour Boosted Salient Points and Shape Features of an Image," Proc. International Journal of Image Processing, pp. 10-17, 2008.
- (15) Li, W. Wang. "Automatic linguistic indexing of pictures by a statistical modeling approach". IEE"E transaction on Pattern Analysis and Machine Intelligence. 25(9), pp: 1075-1087, 2003.
- (16) A Oliva, A Torralba, "Modeling the shape of the scene: A Holistic representation of the spatial envelope", International Journal of Computer Vision, 42(3), pp. 145-175, 2001.

