

# A Novel CBIR System Based on Combination of HSI - Color moment and Gabor Filter

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## Abstract:

Content-Based Image Recovery (CBIR) is a Digital Image Processing (DIP) platform for search and recovery of query photos from various databases. CBIR process includes various steps in which highlights are extracted, as well as images, are taken from large image databases based on a visual substance like color, form and structure in line with the interest of the user. CBIR does some research to provide a reasonable answer to your client question. A new way to index colors, through the implementation of a simple SVM system is planned in this article. This paper introduces a new technique for indexing color photographs through manipulation of the elegance of the equalization process of Histogram. We also have a combination of color, texture in this algorithm. The work of the past has been strengthened in this method to achieve greater precision. We suggest histogram equalization in this paper to increase the image quality or distance matrix in order to obtain better performance than basic work.

The three channels are then autonomously encrypted. The element extraction was seen here as a paired order issue but SVM was used to organize this issue & the whole image, extracted after the feature extraction process, is grouped accordingly.

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## I. INTRODUCTION

The significance of digital image (DI) databases relies upon how cordial and precisely clients can recover pictures of intrigue. In this way, propelled inquiry and recovery apparatuses have been seen as a dire requirement for different picture recovery applications. The soonest web crawlers have embraced CBIR approaches. These arrangements have demonstrated exceptional restrictions in light of the fact that advanced pictures to be mined are either not marked or commented on utilizing off base catchphrases. At the end of the day, Content-based approaches to recovery include individual feedback

on the whole picture build-up. This boring manual errand can't be done for large image databases, however. As a promising replacement for CBIR arrangements, CBIR was designed to address the difficulty. Computerized photographs that use the CBIR system are actually taken, are spoken to utilizing an arrangement of visual highlights. As delineated in Figure 1, the regular CBIR framework comprises of a disconnected stage which goes for removing and putting away the visual element vectors from the database pictures. Then again, the online stage enables the client to begin the recovery errand by giving his inquiry picture. At last, run of the mill CBIR framework restores an arrangement of

pictures outwardly applicable to the client question. Notwithstanding, its fundamental downside comprises in the presumption that the visual similitude mirrors the semantic similarity. This suspicion does not hold on account of the semantic hole [1] between the more elevated amount meaning and the low-level visual highlights.

These problems lead to the very capable CBIR method. A CBIR system executes two main functions: first, image feature extraction where a feature set (image signatures, feature vectors) is produced.

This set carries image data and shows it within the database taking a small storage space. Second is similarity measurement. It calculates the space among the question image and whole database (DB) pictures with their feature vectors. The most like the inquiry pictures are shown because of the looking procedure. [2]

## II. USING TECHNIQUES

### 1. Feature Extraction:

Features, like, shape, texture, color, & so forth are utilized to portray the substance of the picture. Features further may be appointed low-level & unusual state features. In this progression visual data is removed after picture & spares them as highlights vectors in a highlights database. For every pixel, picture depiction is found as highlight esteem (or an arrangement of significant worth called an element vector) by utilizing feature removal. These element vectors are utilized to contrast questions and alternate pictures and recovery.

### 2. Color Correlograms (CC)

Another picture includes called CC for picture requesting proposed in. A CC imparts how the spatial relationship of sets of tones changes by division & gets both shading then spatial transport provides spatial data of pixels in a photo. Correlogram is vigorous to zooming, revolution &

scaling then considered as a nonspecific apparatus for spatial shading ordering & thus more productive than histograms. CBIR accomplished by CC by including importance criticism & 2 managed learning systems of taking in question & taking in metric in. Color Auto Correlogram (CAC) separates spatial dispersion amid precisely comparable hues, with that computational multifaceted nature gets decreased Semantic CBIR utilizing correlograms in HSV space by touchy variations to tint & less delicate to immersion & esteem depicted in [3].

### 3. Similarity Matching:

The data about every photo is secured in its component vectors for figuring procedure & these component vectors are composed by component vectors of question picture (the picture to explore in picture database whether a similar picture is available or not or what number of are comparable generous pictures exist or not) which helps in estimating comparability. This progression includes the coordinating of the above-expressed highlights to yield an outcome that is outwardly comparable with the utilization of a closeness measure technique called Distance strategy. Here is diverse distance, strategy accessible, for example, Euclidean distance, City Block Distance, Canberra Distance. [4]

### 4. Histogram Equalization (HE)

It is a methodology for modifying photo powers to finish the appraisal. It is a graphical representation of the power appropriation of a photo. It measures the number of pixels for each profundity expense mulled over. It is a manner that improves the comparison in a photograph, so one can stretch out the depth range. Evening out infers mapping one dissemination (the offered histogram) to each unique dispersion (a miles more extensive and more prominent uniform appropriation of profundity esteems) so the intensity values are speeded over the entire variety. [5].

## 5. Gabor Filter:

The Gabor filter is the most popular technologically use for extracting textural features in image recall. Due because of its similar characteristics to human perception, it is commonly used for texture analyzes. A 2D Gabor filter,  $g(x, y)$  consists of a sinusoidal fluid influx (Carrier) & 2D deciphered. Gaussian Envelope is used to monitor it.

## 6. Support Vector Machine (SVM):

The method of learning is controlled, where data are analyzed and designs used for arrangement purposes are separated. It proceeds input set, reads it, & forms performance for entirely desirable input, so that regression is achieved if output is continuous [6]. The point of the SVM arrangement strategy is to locate the best hyper-plane isolating important and unimportant vectors augmenting the span of the edge (between the two classes). The introductory technique accepts that important and superfluous vectors are directly distinguishable. The SVM isolate the entire picture database into two classes. The two classes are additionally incorporating the unlabelled pictures with two sorts they are pertinent and insignificant unlabelled pictures. The applicable unlabelled picture is identified with the important marked pictures in the picture database. In a comparative way, the unessential unlabelled picture is identified with the superfluous named pictures in the database. This SVM is also classifying the unlabelled images inaccurate manner.

## 7. HSV Color histogram

Color function is among the primary matters to enter the picture. The color of a photo is spoken to from the prominent shading spaces like RGB, XYZ, YIQ,  $L^*a^*b$ ,  $U^*V^*W$ , YUV & HSV. HSV color space gives the best CH incorporate, among the different color spaces. HSV color hole is spoken to by three embellishments relating to Hue (H), Saturation(S), & value (V).[7].

$$H = \cos^{-1} \left\{ \frac{\frac{1}{2}[(R-G) + (R-B)]}{\sqrt{(R-G)(R-B)(G-B)}} \right\}$$

$$S = 1 - \frac{3}{R+G+B} [\min(R, G, B)]$$

$$V = \frac{1}{3} [R+G+B]$$

## 8. Wavelet Transform (WT)

A multi-determination approach is given to surface examination and grouping because of Wavelet changes. The estimation of the WT incorporates recursive isolating & sub-looking at. At each level, the signal is broken down in four repeat sub-gatherings, LL, LH, HL, & HH, wherever L demonstrates low recurrence & H implies high frequency (HF). The figure shows sample wavelet transforms. In this, we use the Haar Transform.[8]



Fig.1.Sample wavelet transform

## III. LITERATURE SURVEY

Savita, et.al. [2017] This paper explores distinctive strategies for speaking to shape And in CBIR form. We have added five highlights in our research and these are organized and arranged using machine learning creativity in the SVM classification. Our photographic highlights, surface highlights (GLCM) or wavelet highlights, Gabor highlights and observable highlights have been combined. A database of 1000 images (Wang database) from 10 dissimilar classes is applied to isolate all highlights for every image and to position them in our database with the purpose of SVM to characterize the survey

magic. By using these points we can obtain a precision of grouping of up to 97.53 percent.[9]

Mohd. Aquib Ansari, et.al. [2017] In the present work, the HSV Color Histogram, quantified as not uniform 72 receptacles, was used to eliminate the bogging example of the image surface, the worldwide edge descriptors, as well as the V segment histogram (DWT) of the V portion of the HSV photo. Euclidean separation is used here to test the comparability of client picture to the image in the database. For test analysis results show that this method is excellent in terms of accuracy and versatility when comparing and other joining schemes. The results show 600 images from the Wang database are used.[10].

Muhammad Fachrurrozi, et al. [2017] Constant face acknowledgment framework process isolated into three stages, include extraction, bunching, identification, and acknowledgment. Each phase requires a different approach that is Local Binary Pattern (LBP), AHC, or Euclidean Distance. CBIR, a device that looks for pictures, is performed with the highlight of the frame. Regarding assessments including test results, reliability or accuracy values are 65.32% and 64.93% respectively.[11].

Amjad Shah1, et al. [2017] CBIR turns into an extremely difficult task because of the fast development insight and sound substance and its visual many-sided quality. From inquiry by picture to recovery of applicable pictures, CBIR has distinctive stages. Be that as it may, highlights the extraction of pictures is one of the critical stages. As of late Convolutional Neural Network (CNN) indicates great outcomes in the field of PC vision because of the capacity of extraction highlights from the pictures. This paper presents CNN for highlights extraction from pictures, in the CBIR framework. Euclidean separation is utilized for relationship among question and put away pictures utilizing the extricated highlights. Execution of the proposed work is assessed utilizing exactness. The proposed

work indicates enhanced outcomes when contrasted with the current works.[12].

Behzad Merhrbakhsh Choobar et al. [2017] Furthermore, rather than applying the calculation to the picture itself, we apply it to another picture built by getting a mean of 3<sup>TM</sup>3 sub-districts gray an incentive as every pixel's esteem. In the proposed strategy, eight unmistakable headings are characterized. Each pixel gets one of the headings as demonstrated by its relationship with its enveloping neighbors, which is figured using first-orchestrate subordinates in vertical, level and two askew bearings. We utilized the Corel 1000 database to assess our system with LBP and neighborhood tetra test (LTrP). Our proposed technique demonstrates gigantic progress in both ordinary exactness and survey. Because of applying the figuring to the mean estimation of 9 pixel-windows, the proposed method demonstrates better recuperation occurs for uproarious pictures [13].

Abdolreza Rashno, et al. [2017] In this paper, a new CBIR plot is proposed in neutrosophic (NS) space. For this reason, RGB photos in the NS region are first divided into three subsets. Shading highlights, including DCD, histogram and measurement parts, will be omitted for each portion of the image. All separate highlights of the portioned image and/or the entire image are linked to form a vector element. Function vectors are provided for selecting the most important features for ant colony optimization (ACO). Functionality. Functionality. Experimental results have shown that the approach being proposed exceeds our preceding method by 2 percent and 1 percent, with respect to the precision and recall, with the same characteristic vector and feature-gathering technique. In addition, the proposed approach makes a 13% and 2% improvement in accuracy and tests it separately using prior techniques [14].

#### IV. PROPOSED WORK

Propose Methodology



This work introduces a new tool for the indexing of coloration photographs by using the simplicity of the Histogram edge direction system. We also have a combination of light, form or texture features proposed in this algorithm. Previous work is strengthened in this method to improve the accuracy. This thesis suggests an equalization of histogram to enhance image quality or distance matrix to achieve a better outcome than basic work.

Then we autonomously encrypt three channels. Component extraction was considered as 2-fold order problem but SVM was used to organize this question, and the characterization technique for the whole image was provided after the extraction process.

### Propose Algorithm

- Step. 1. First, browse the query picture.
- Step. 2. Apply edge direct histogram for edge-preserving based feature extraction.
- Step. 3. Apply HSV Histogram on the query picture.
- Step. 4. Apply color Auto correlogram.
- Step. 5. Apply Gabor wavelet transform on query image.
- Step. 6. Apply wavelet transform on query image.
- Step. 7. Create a feature template using SVM.
- Step. 8. Retrieval image using distance matrix and SVM.
- Step. 9. Calculate precision, execution time and recall of retrieved images.

$$\text{Precision} = \frac{\text{No. of relevant image retrieved}}{\text{Total number of image retrieved}}$$

$$\text{Recall} = \frac{\text{No. of relevant image retrieved}}{\text{number of image in the database}}$$

- Step. 10 Stop

### Flowchart

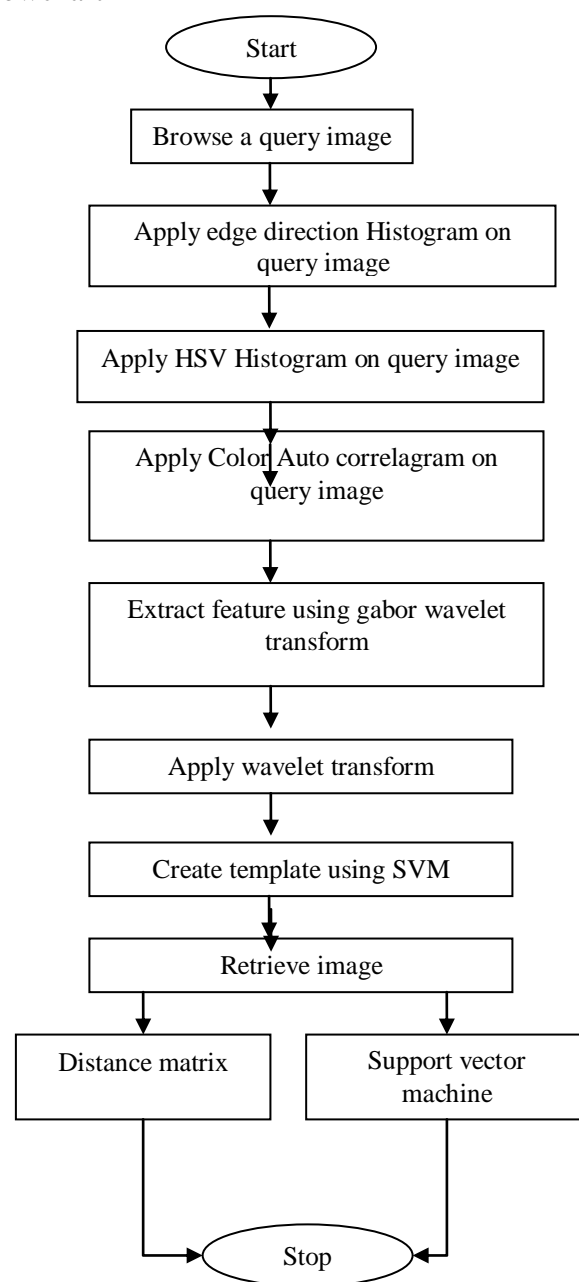


Fig. 1. Flow chart of proposed work

### V. RESULT ANALYSIS

For output assessment, this segment is used in Matlab2013b. In these works, leading analyses of the Corel-1000 database execute a proposed strategy. This collection contains African photographs of plants, elephants, beaches, horses, dinosaurs, structures and food. Each category includes 100 pictures of 384\* 256 scale. The experimental is guided by various images that are returned from 10 to 50.

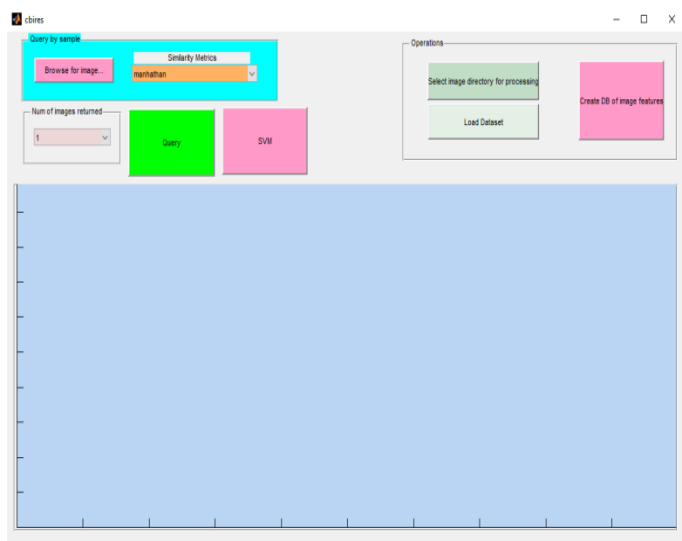


Fig.2. First, run the code and get GUI.

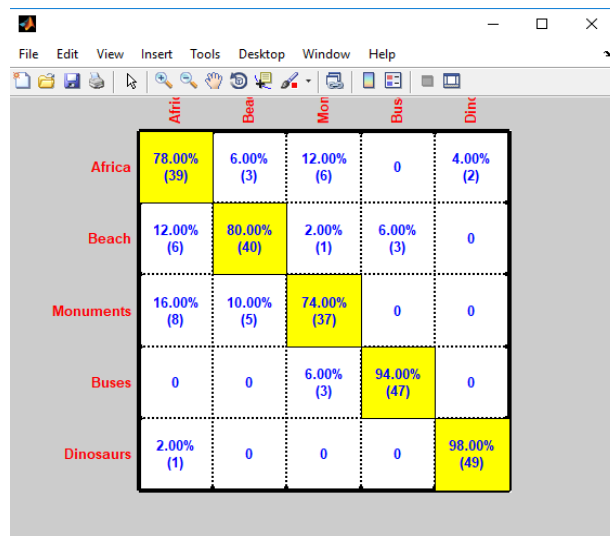


Fig. 5. Plot distance matrix using SVM.

Precision and recall using manhattan.

Table. 1 Comparison on Base Metrix and Propose Metrix.

Image name	Similar matrix	Base Accuracy	Propose Accuracy
0.jpg	Manhattan	86.80%	94.39%
1.jpg	L1	81.60%	91.66%
2.jpg	L2	84.00%	94.62%
3.jpg	Standardized l2	82.80%	93.48%
4.jpg	Mahalanobis	86.00%	91.88%
5.jpg	Cityblock	82.40%	93.48%
6.jpg	Chebyshev	87.60%	90.74%

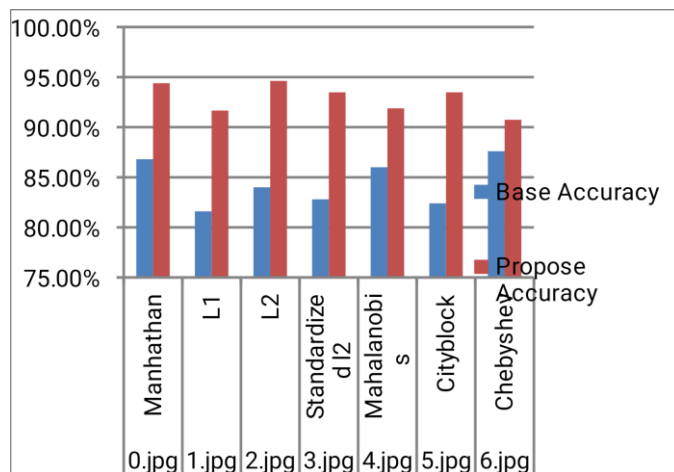


Fig.6: Graph.1 Comparison on Base Metrix and Propose Metrix.

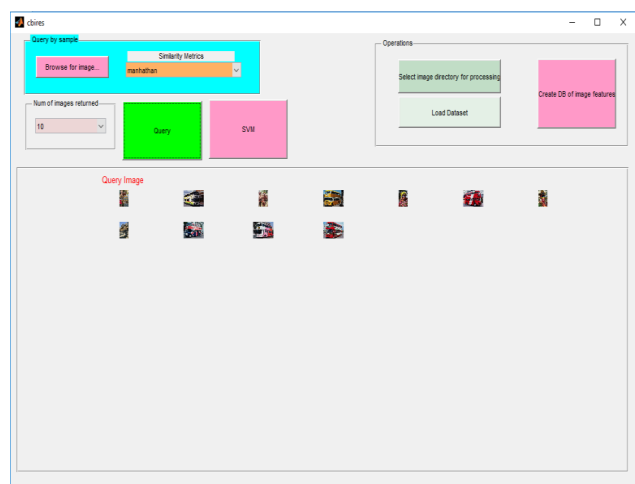


Fig. 3. Similarity matching using a distance matrix.

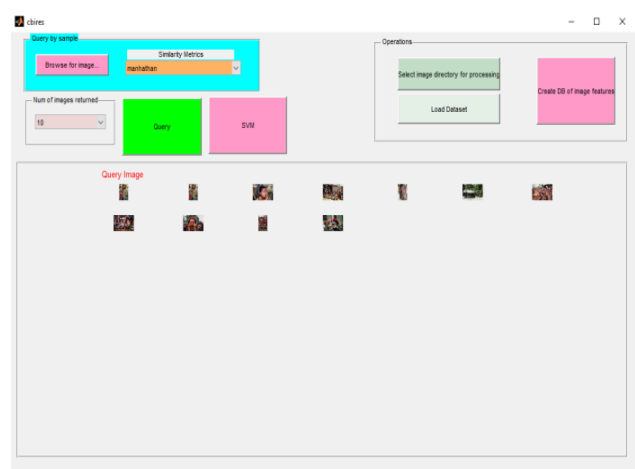


Fig. 4. Similarity matching using a support vector machine.

Table. 2. Comparison on Base Metrix and Propose Metrix

Image name	Similar matrix	Base Precision	Propose Precision
0.jpg	Manhathan	0.7800	0.8828
1.jpg	L1	0.7000	0.8840
2.jpg	L2	0.7400	0.8630
3.jpg	Standardized l2	0.8400	0.8817
4.jpg	Mahalanobis	0.8000	0.8750
5.jpg	Cityblock	0.7600	0.8742
6.jpg	Chebyshev	0.7600	0.8759

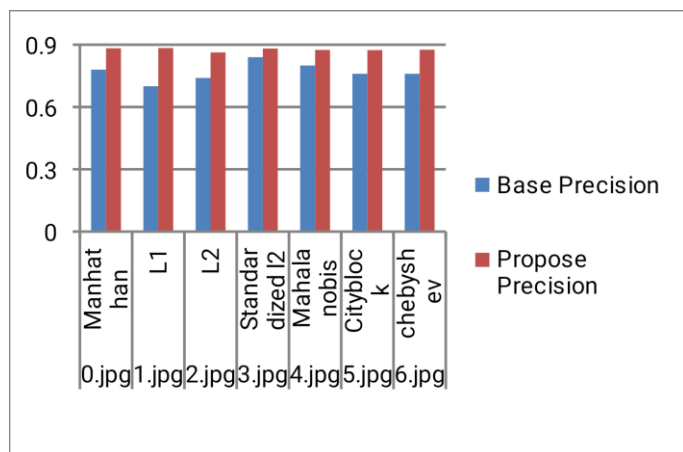


Fig. 7: Graph.2. Comparison of Based Metrix and Propose Metrix

## VI. CONCLUSION

The essential point of this paper is to speak to the hugeness of SVM in the proficient recovery of picture in this SVM is utilized as the classifier which is playing out the assignment of grouping of the picture and this procedure of order is given to the whole image which is extracted after the FE using Gabor filter. Finally, Ultimately, the previous work is improved in this approach to achieve better accuracy. We give histogram equalization in this paper to enhance the image quality or distance matrix in order to obtain better results than basic work. This strategy gives much preferable execution over the conventional technique for picture retrieval.

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