

An Improve Method of Content Based Image Retireval by Using Different Distance Metric on Color image

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Abstract— Content Based Image Retrieval (CBIR) is the method which uses visual statistics to find the pictures from a big database on the foundation of user's enter in conditions of query image and usually some effective features for color string, HSV histogram, edge detector and intensity map are extracted. And the experimental results based on precision, accuracy and feature extraction (FE) time. This trained database is used for classification of the query image. According to retrieved picture classify. In this set of rules, now we have proposed a mixture of color, form and texture features. In this approach, the previous work is enhanced to achieve better precision and reduce feature extraction time. Calculate precision, execution time and recall of retrieved images.

Keywords—CBIR;RGB,HSI;YCBCr;EgdeDetection;Distance metrics.

I. INTRODUCTION

The importance of digital image databases depends on how friendly and accurately users can retrieve images of interest. Therefore, advanced search and retrieval tools have been perceived as an urgent need for various image retrieval applications. The earliest search engines like google have followed text based picture retrieval strategies. These solutions have shown drastic barriers because digital snap shots to be mined are either not labelled or annotated the use of faulty keywords. In other phrases, text-based totally retrieval tactics necessitate manual annotation of the complete photograph collections. However, this tedious manual task is not feasible for large image databases.

CBIR emerged as a promising substitute to surpass the challenges met with the aid of text based picture retrieval answers. In fact, digital pictures, which might be mined using CBIR device, are represented using a fixed of visual features. As illustrated in Figure 1, ordinary CBIR system consists of an offline section which targets at extracting and storing the visual characteristic vectors from the database pictures. On the other hand, the online phase allows the user to start the retrieval task by providing his query image. Finally, normal CBIR gadget returns a hard and fast of pictures visually applicable to the person query. However, its most important drawback is composed within the assumption that the visual similarity reflects the semantic resemblance. This assumption does no longer maintain because of the semantic hole [1] among the better level that means and the low-level visible functions.

II. USING TECHNIQUES

2.1 Color Spaces (CS)

A coloration space is described as a version for representing shade in terms of depth values. Typically, a CS defines a one- to 4-D location. A shade factor, or a color channel, is one of the dimensions. A colour dimensional area (i.e. one dimension per pixel) represents the gray-scale space. Thease models (RGB Color Space, HSV Color Space, YIQ Color Space and YCbCr Color Space) are commonly used in color image retrieval systems [2].

A color area is defined as a model for representing color in terms of depth values. A shade space is a technique by means of which we are able to specify, create and visualize the shade. Three critical coloration space RGB, YCbCr fashions are in short elaborated as follows.

A. RGB COLOR SPACE

The RGB color version is composed of the number one colorations Red, Green, and Blue. They are taken into consideration because the 'additive primaries' due to the fact the colors are introduced collectively to supply the preferred shade. The diagonal from foundation (zero, 0, zero) black to factor (1, 1, 1) white which represents the grey-scale. Zero intensity for each component gives the darkest shade and complete intensity of every gives a white. When the intensities for all of the components are the same, the result is a color of grey, darker or lighter relying at the intensity.

B. YCbCr COLOR SPACE

YCbCr is a scaled and offset model of the YUV shade area wherein Y represents luminance (or brightness), U represents coloration, and V represents the saturation value [3]. Here the RGB colour space is separated right into a

luminance component (Y) and two chrominance components (Cb and Cr). After conversion from RGB to YCbCr colour space, it's going to separate RGB additives into luminance and chrominance information.[4].

III. LITERATURE SURVEY

Behzad Merhrbakhsh Choobar et al. [2017] In this paper; we suggest new method named local full-directional pattern for CBIR. In addition, instead of applying the algorithm to the image itself, we apply it to a new image constructed by getting mean of 3×3 sub-regions gray value as each pixel's value. In the proposed method, eight distinct directions are defined. Each pixel gets one of the directions in keeping with its dating with its surrounding acquaintances, which is calculated the usage of first-order derivatives in vertical, horizontal and two diagonal directions. We used Corel 1000 database to evaluate our technique with LBP and neighborhood tetra sample (LTrP). Our proposed approach shows giant development in each common precision and recollect. Due to making use of the algorithm to the imply fee of nine pixel-windows, the proposed method shows higher retrieval results for noisy pictures [5].

Abdolreza Rashno et al. [2017] In this paper, new CBIR scheme is proposed in neutrosophic (NS) domain. For this undertaking, RGB pix are first converted to three subsets in NS domain and then segmented. For each section of a photo, shade capabilities together with dominant color descriptor (DCD), histogram and statistic components are extracted. All extracted functions from either segmented picture or the whole photo are blended to create a function vector. Feature vectors are furnished for ant colony optimization (ACO) feature choice which selects the most applicable features. Selected features are used for final retrieval process. Proposed CBIR scheme is evaluated on Corel picture dataset. Experimental consequences show that the proposed approach outperforms our previous method (with the same characteristic vector and feature collection technique) by 2% and 1% with deference to precision and recall, in that order. Also, the proposed method achieves the improvement of 13% and 2% in precision and recall, respectively, in comparison with prior methods [6].

Devi S, et al. [2016] In this paper color pictures are the features extracted the usage of listed from EDBTC. A new framework of CBIR with unsupervised clustering is used right here in which the quantity of time required for comparing the target and question photograph is drastically decreased. Experimental result indicates that the proposed method not only achieves a great of picture compression but achieves a giant discount in the quantity of time required for photograph retrieval. The proposed approach became able to attain a median of four to five sec distinction in overall performance time in comparison to the antique retrieval approach without clustering. The velocity of retrieval varies parallel with the wide variety of pictures in the database i.e. An increase in database images confirmed good sized increase in the machine overall performance [7].

Navneet Kaur et al. [2016] In this paper, importance Feedback is used to transaction with this trouble which based on SVM gadget they expansively used inside the CBIR system to bridge the semantic gap linking low stage facial appearance and immoderate level human interest capabilities. The learning techniques are predominantly applied for the classification of pix in labelled and unlabelled datasets. In our planned paintings we need to artwork on KNN, SVM and Bayes Classifier to classify the pictures. The of entirety of our projected paintings is carried out in Open Cv and experiments behavior at the Corel Dataset having 10,000 photographs. After attempting the experiments on numerous images we must calculate the Precision and Recall which constitute in the form of graphs. After reading the results we have concluded that our technique is powerful to reduce the semantic gap [8].

Jing-Ming Guo et al. [2014] This paper gives a singular come near to index color picture utilizing the functions extracted from the EDBTC. The EDBTC produces coloration quantizes and a chunk map picture that is further method makes use of Vector Quantization for producing a picture feature descriptor. Herein, functions are introduce, mainly Color Histogram Feature and Bit Pattern Histogram characteristics, to compute the assessment between a query in photograph and the aim image in database. The CHF and BHF are exercise consultation from the VQ-listed color quantizer and VQ-listed bitmap image, respectively. The distance computed from CHF and BHF can be implemented to degree the similarity between snap shots. As documented in experimental stop result, the proposed indexing approach outperforms the former BTC-based totally picture indexing and the opposite contemporary photograph retrieval plans with herbal and textural datasets. Thus, the proposed EDBTC isn't most effective examined with good capability for image compression, but it additionally gives an powerful manner to index snap shots for the CBIR machine [9].

IV. PROPOSE WORK

Propose Methodology

In this algorithm, now we have proposed a mixture of color, shape and texture features. In this approach, the previous work is enhanced to achieve better precision and reduce feature extraction time.

Propose Algorithm

1. Consider each image in the large image database. Resize the images into a standard order like 256X256.
2. Convert the RGB image into YCbCr image.
3. Consider the Y matrix and apply canny edge detector to it and store the resulting matrix as Y1.
4. Now apply Prewitt edge detection on the Y matrix and store the resulting matrix as Y2.

5. Now combine the edges obtained in Step 3 and Step 4 to obtain the matrix Y. Then combine this with the unmodified Cb and Cr to obtain Y'CbCr image.
6. Now convert this Y'CbCr image back to RGB image. Then find the R, G, B matrices of this image and find the histogram of each of these separately. These histograms i.e. Hr, Hg, Hb will contain 256 bins.
7. Perform the discrete wavelet transform of Hr, Hg, Hb and take the approximation coefficients to obtain the feature vector corresponding to the chosen image. The size of the vector will be 1X128.
8. Now find the feature vector corresponding to every image in the large database. Using this shape the function vector database that's every row could be fashioned by means of every of the feature vector.
9. Determine the similarity matrix of query image and image database using ED, MD, Canberra, Minkowski, Chebychev, cosine and spearman. We have used COSINE DISTANCE which incorporates the dot product scaled through the fabricated from Euclidean distances from the origin. It represents the angular distance of two vectors while ignoring.

$$dcos(x, y) \rightarrow 1 - \frac{\langle x, y \rangle}{\|x\|_2 \|y\|_2} = 1 - \frac{\sum_{i=1}^n x_i y_i}{\sqrt{\sum_{i=1}^n x_i^2} \sqrt{\sum_{i=1}^n y_i^2}}$$

10. Calculate precision, execution time and recall of retrieved images.

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

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

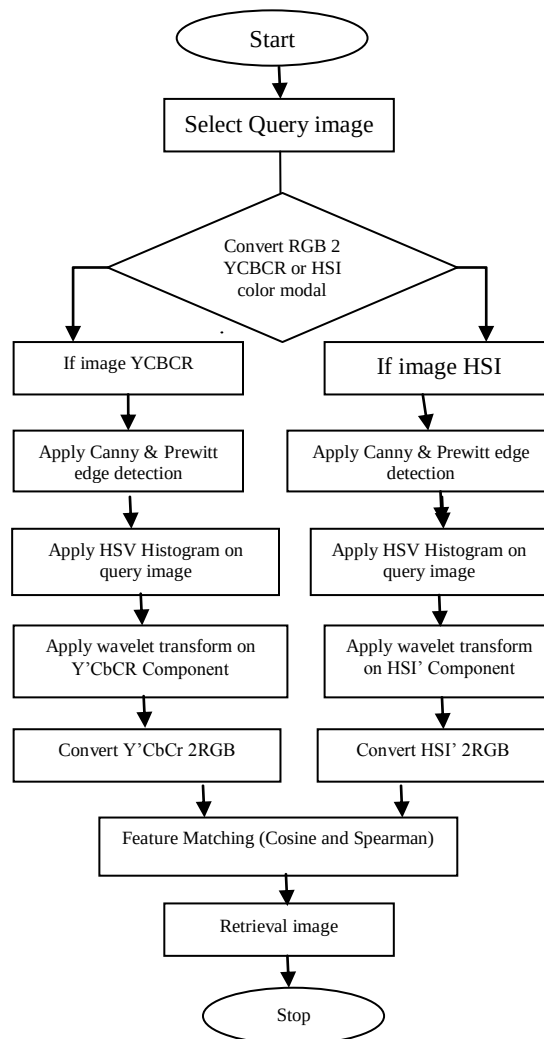


Fig . 1 Flow chart on Propose work

V. RESULT ANALYSIS



Fig. 2 image dataset



Fig. 3 query image

A. IN YCBCR COLOR MODEL:-

B. EDGE DETECTION TECHNIQUES:-

1. **CANNY EDGE DETECTOR:-** The canny edge detector is an optimal edge detector. It provides low error rate as it has a response to edges and non response to non edges.
2. **PREWITT EDGE DETECTOR:-** . The Prewitt edge filter is used to detect edges by applying horizontal and vertical filters in sequences.
 Here we combine both these filters to obtain better results.

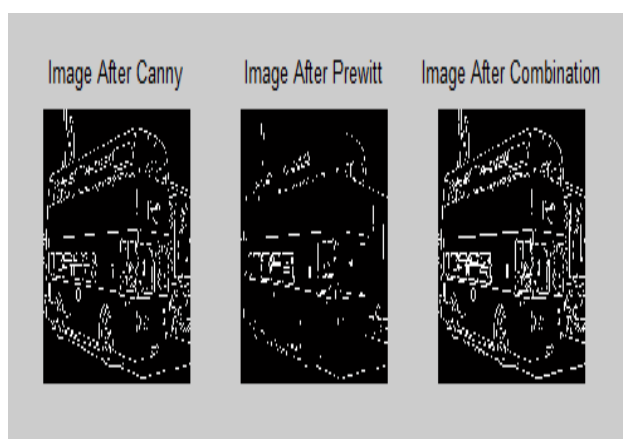


fig.4 (a) Image after Canny edge detection,(b)Image after Prewitt edge detection,(c) Image after combining Canny and Prewitt edges

1. In first case I have used cosine as our Similarity metrics, following results are shown:-

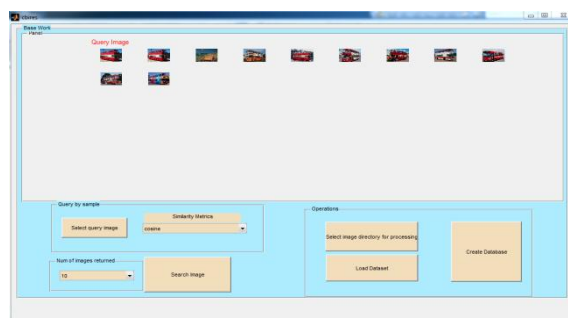


Fig. 5 cosines as our Similarity metrics

2. In second case I have used spearman as our Similarity metrics, following results are shown:-

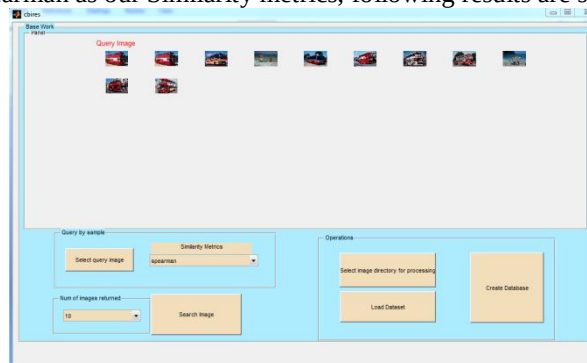


Fig. 6 Spearman as Our Similarity Metrics

C. IN HSI COLOR MODEL:-

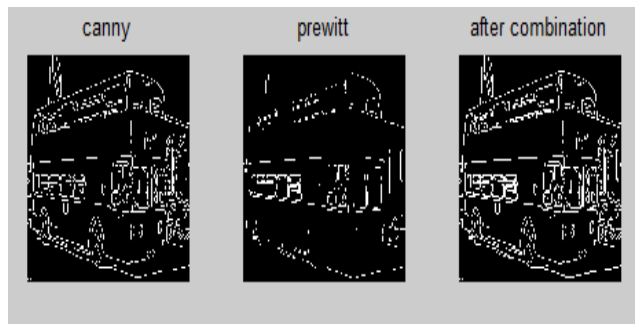


Fig..7 Apply canny and Prewitt and after combination both techniques

1 .In First case I have used cosine as our Similarity metrics, following results are shown:-

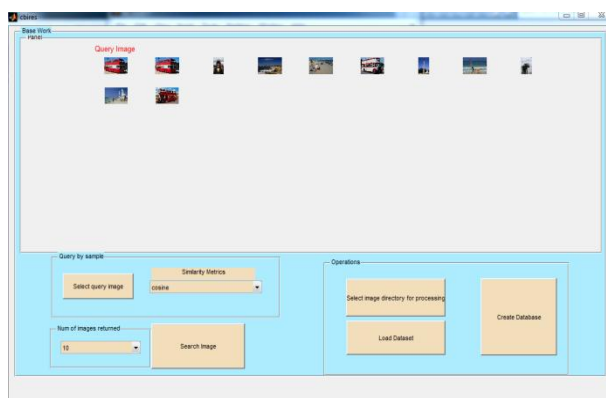


Fig. 8 cosine as our Similarity metrics

1 .In second case I have used spearman as our Similarity metrics, following results are shown:-

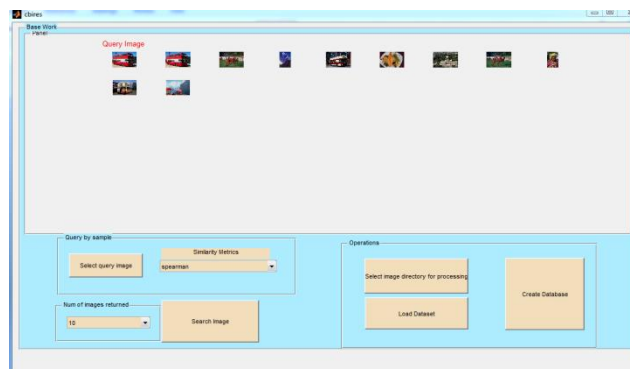
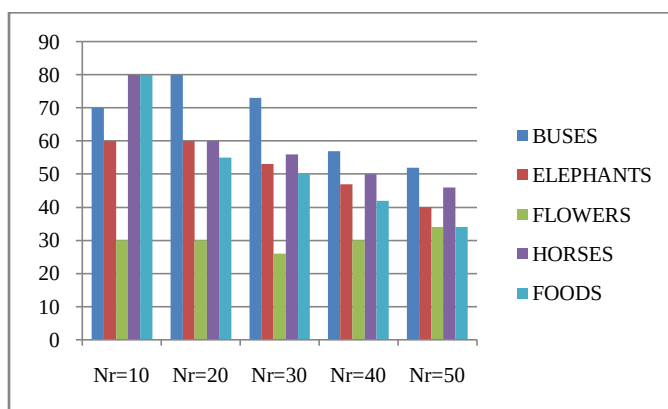


Fig.9 Spearman as our Similarity metrics

D. YCBCR COLOR SPACE

Table .1 Base Precision on YCBCR color Space

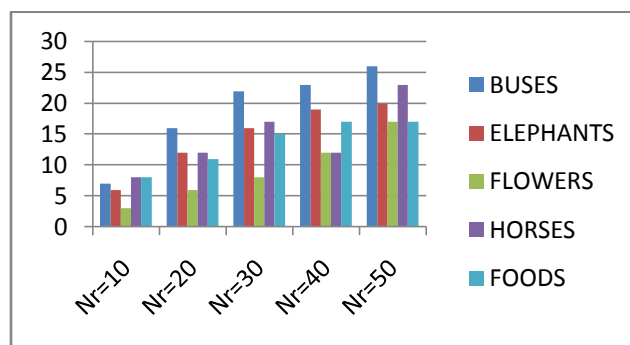
PRECISION (%)					
IMAGE	Nr=10	Nr=20	Nr=30	Nr=40	Nr=50
BUSES	70	80	73	57	52
ELEPHANTS	60	60	53	47	40
FLOWERS	30	30	26	30	34
HORSES	80	60	56	50	46
FOODS	80	55	50	42	34



Graph .1 Base Precision on YCBCR color Space

Table .2 Base Recalls on YCBCR color Space

RECALL (%)					
IMAGE	Nr=10	Nr=20	Nr=30	Nr=40	Nr=50
BUSES	7	16	22	23	26
ELEPHANTS	6	12	16	19	20
FLOWERS	3	6	8	12	17
HORSES	8	12	17	12	23
FOODS	8	11	15	17	17

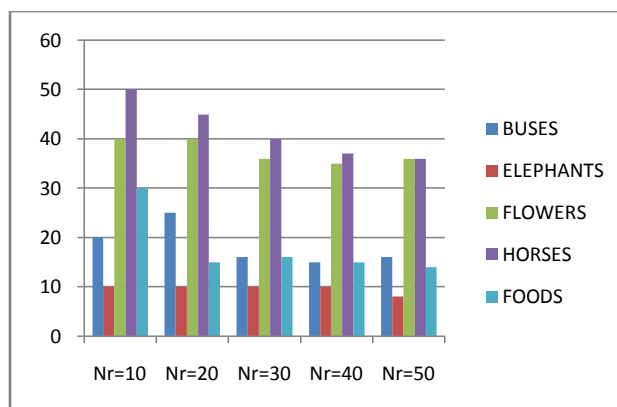


Graph .2 Base Recalls on YCBCR color Space

E. HSI COLOR SPACE

Table .3 Base Precision on HSI color Space

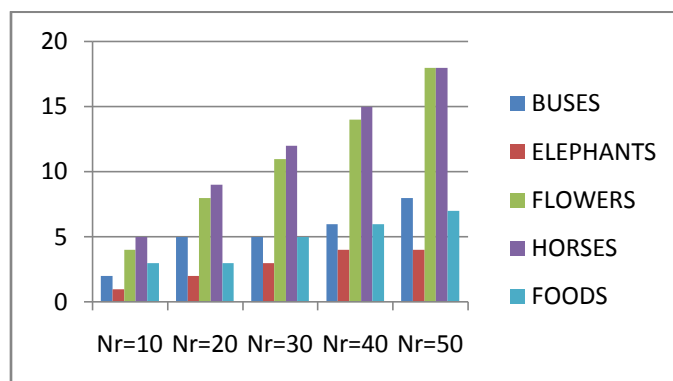
PRECISION(%)					
IMAGE	Nr=10	Nr=20	Nr=30	Nr=40	Nr=50
BUSES	20	25	16	15	16
ELEPHANTS	10	10	10	10	8
FLOWERS	40	40	36	35	36
HORSES	50	45	40	37	36
FOODS	30	15	16	15	14



Graph 3 Base Precision on HSI color Space

Table .4 Base Recalls on HSI color Space

RECALL(%)					
IMAGE	Nr=10	Nr=20	Nr=30	Nr=40	Nr=50
BUSES	2	5	5	6	8
ELEPHANTS	1	2	3	4	4
FLOWERS	4	8	11	14	18
HORSES	5	9	12	15	18
FOODS	3	3	5	6	7

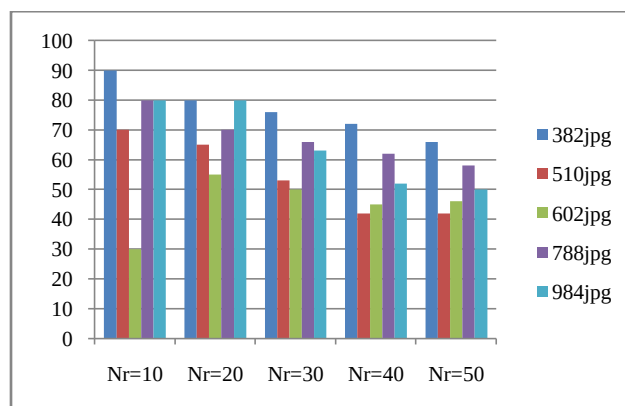


Graph.4. Base Recalls on HSI color Space

F. PROPOSE YCBCR COLOR SPACE

Table 5 Propose Precision On Cosine Distance Metric Ycbr Color Space

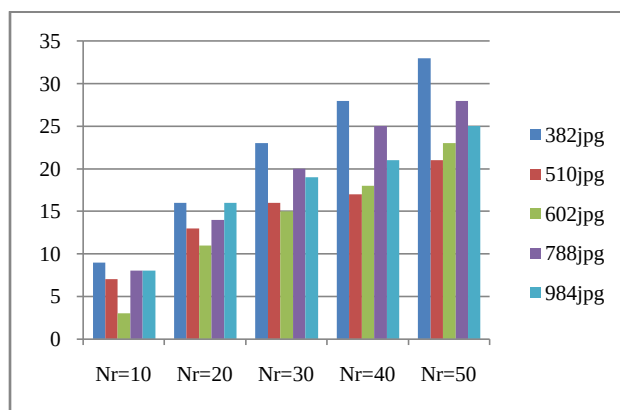
COSINE DISTANCE METRIC					
Precision (%)					
Image	Nr=10	Nr=20	Nr=30	Nr=40	Nr=50
382jpg	90	80	76	72	66
510jpg	70	65	53	42	42
602jpg	30	55	50	45	46
788jpg	80	70	66	62	58
984jpg	80	80	63	52	50



Graph..5 Propose Precision On Cosine Distance Metric YCbCr Color Space

Table 6. Propose Recall On Cosine Distance Metric Ycbr Color Space

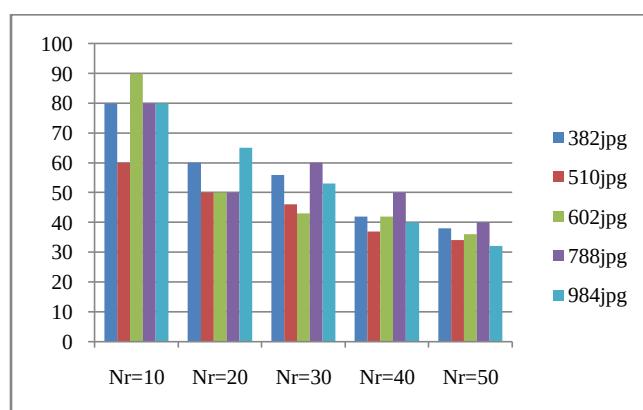
COSINE DISTANCE METRIC					
Recalls (%)					
Image	Nr=10	Nr=20	Nr=30	Nr=40	Nr=50
382jpg	9	16	23	28	33
510jpg	7	13	16	17	21
602jpg	3	11	15	18	23
788jpg	8	14	20	25	28
984jpg	8	16	19	21	25



Graph.. 6 Propose Recall On Cosine Distance Metric Ycbcr Color Space

Table 7. Propose Precision On Spearman Distance Metric YCBCR Color Space

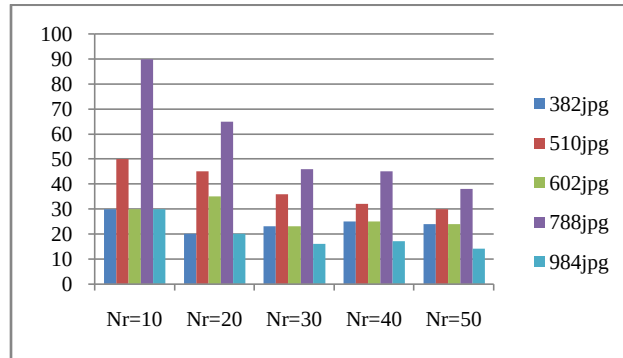
SPEARMAN DISTANCE METRIC					
Precision (%)					
Image	Nr=10	Nr=20	Nr=30	Nr=40	Nr=50
382jpg	80	60	56	42	38
510jpg	60	50	46	37	34
602jpg	90	50	43	42	36
788jpg	80	50	60	50	40
984jpg	80	65	53	40	32



Graph .7 Propose Precision On Spearman Distance Metric YCBCR Color Space

Table 8 Propose Recall on Spearman Distance Metric YCBCR Color Space

SPEARMAN DISTANCE METRIC					
Recall (%)					
Image	Nr=10	Nr=20	Nr=30	Nr=40	Nr=50
382jpg	8	12	17	17	19
510jpg	6	10	14	15	17
602jpg	9	10	13	17	18
788jpg	8	10	18	20	20
984jpg	8	13	16	16	16

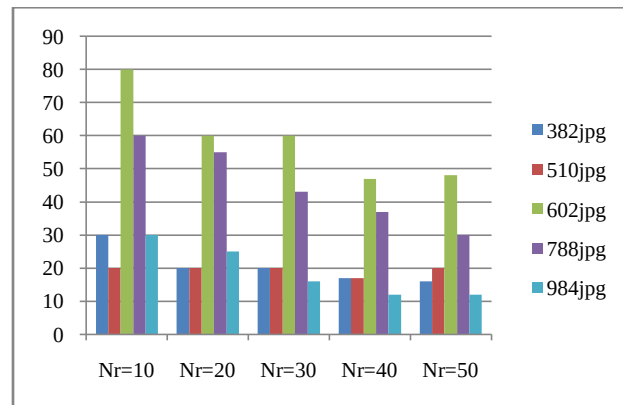


Graph 8 Propose Recall on Spearman Distance Metric YCBCR Color Space

G. PROPOSE HSI COLOR SPACE

Table 9. Propose Precision on Cosine Distance Metric HSI Color Space

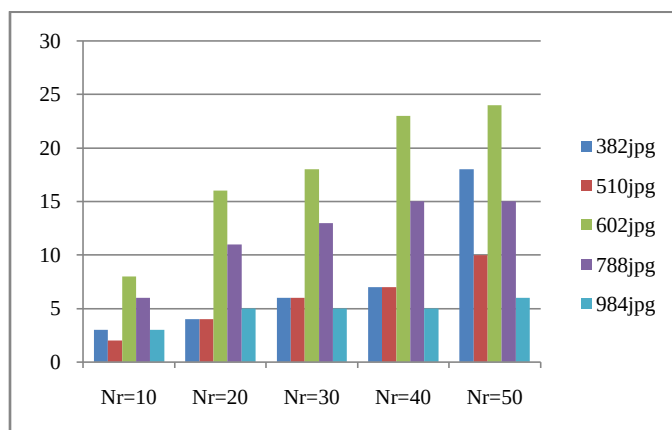
COSINE DISTANCE METRIC					
Precision (%)					
Image	Nr=10	Nr=20	Nr=30	Nr=40	Nr=50
382jpg	30	20	20	17	16
510jpg	20	20	20	17	20
602jpg	80	60	60	47	48
788jpg	60	55	43	37	30
984jpg	30	25	16	12	12



Graph 9 Propose Precision on Cosine Distance Metric HIS Color Space

Table 10. Propose Recall on Cosine Distance Metric HSI Color Space

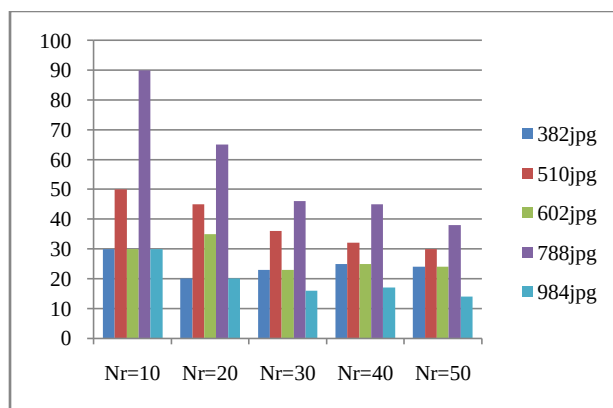
COSINE DISTANCE METRIC					
Recall (%)					
Image	Nr=10	Nr=20	Nr=30	Nr=40	Nr=50
382jpg	3	4	6	7	18
510jpg	2	4	6	7	10
602jpg	8	16	18	23	24
788jpg	6	11	13	15	15
984jpg	3	5	5	5	6



Graph 10 Propose Recall on Cosine Distance Metric HSI Color Space

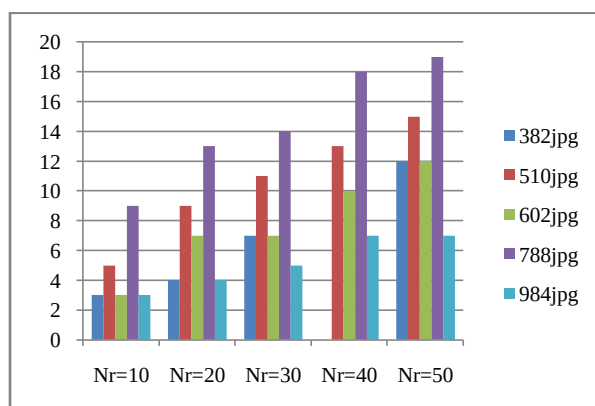
Table 11. Propose Precision on Spearman Distance Metric HSI Color Space

SPEARMAN DISTANCE METRIC					
Precision (%)					
Image	Nr=10	Nr=20	Nr=30	Nr=40	Nr=50
382jpg	30	20	23	25	24
510jpg	50	45	36	32	30
602jpg	30	35	23	25	24
788jpg	90	65	46	45	38
984jpg	30	20	16	17	14



Graph 11 Propose Precision on Spearman Distance Metric HSI Color Space

Table 12. Propose Recall on Spearman Distance Metric HSI color space



Graph. 12 Propose Recall on Spearman Distance Metric HSI color space

Conclusion

CBIR is defined as a procedure that retrieves and searches images from a huge database amount on automatically-derived features basis like color, texture and shape. It is a field of research that is attracting professionals from different industries like crime prevention, medicine, architecture, fashion and publishing. In this thesis we study about CBIR and some previous thesis. In this research, implement a new method for CBIR by The canny edge detector is an optimal edge detector. It provides low error rate as it has a response to edges and non response to non edges. The Prewitt edge filter is used to detect edges by applying horizontal and vertical filters in sequences. Here we combine both these filters to obtain better results. It is observed results of shape, color and texture fused categories are more robust than the texture and color features based image retrieval. Results show that our proposed CBIR schema has higher precision and F-measure in comparison with base system for different image categories. For future works, other optimization algorithm uses for best path and reduce time execution. In the future, try to improve results on texture images.

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