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Content Based Image Retrieval Through Color, Shape and Texture Features Using Edbtc.

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Abstract— Content Based Image Retrieval is an important technique which uses visual contents to retrieve images from large database. a content based image retrieval technique is based on the concept of region-based image retrieval has been described. This technique integrates color, texture and shape features using local binary patterns (LBPs). In this technique ,the image is divided into a fixed number of blocks and from each block LBP-based color ,texture and shape features are computed. All three features are combined to make a single completed binary region descriptor(CBRD) represented in the LBP way. Here the size of an output picture is reduced to (64*64) from the input size (256*256) through minimum and maximum quantifier. CCF is used to extract the color factors. EDBTC and BPF are used to extract the shape of the picture. Gabor wavelet is used to extract the texture of the picture .Pictures are retrieved using similarity measures through Euclidean distances. The main purpose is to extract the picture factors using EDBTC to reduce the size of data stream without altering the picture quality and offers indexing of images.

Index Terms— BPF-Bit Pattern Feature, BTC-Block Truncation Coding, CBRD-Completed Binary Region Descriptor, CCF-Color Co-Occurrence Feature, CHF-Color Histogram Feature, EDBTC-Error Diffusion Block Truncation Coding, LBP-Local Binary Patterns.

1 INTRODUCTION

The main aim of the project is to acquire the attributes of the image by using EDBTC to reduce the size of data stream without altering the quality of the picture. We use color quantizers and bitmap picture to build picture attribute descriptor. The CHF is acquired from two color quantizers indicate the color distribution and picture contrast. The edges and textural data of the picture are described from bitmap picture by designing the bit design histogram attribute. The comparability between two pictures can be effortlessly measured from the CHF and BHF esteems utilizing a particular distance metric computation. Exploratory outcomes exhibit the prevalence of the proposed attribute descriptor contrasted with the previous existing systems in picture retrieval errand under common and textural pictures. The EDBTC strategy compress the picture productively, and in the meantime, its comparing compacted data stream can gives a viable element descriptor to performing picture retrieval and characterization. The proposed design can be considered as a successful possibility for real time picture retrieval applications

1.1 CBIR

Content based image retrieval(CBIR), also known as query by image content(QBIC).This paper presents a new approach to derive the image feature descriptor from the Error-diffusion based block truncation coding (EDBTC) compressed data stream.

Numerous previous ideas had been designed to increase the restoration precision within the content based picture retrieval (CBIR) framework. One among them is to utilize image attributes to obtain from the compacted expertise stream. As inverse to the based procedure that concentrates a picture descriptor from the primary picture, this retrieval plot straightforwardly produces image attributes from the packed stream without first executing the translating system. This variety of restoration manner to reduce the time calculation for picture attribute extraction for lots of the multimedia knowledge that are converted over to compacted record early before they are been recorded.

1.2 EDBTC

The EDBTC design performs well in those zones with promising outcomes; since it gives preferred recreated picture quality over that of the BTC conspire. In this project, the idea of the EDBTC is taken into account the CBIR space, in which the picture attribute descriptor is built from the EDBTC packed stream data. In this design, the packed data stream that saved in database is a bit much decoded to get the picture attribute descriptor. The descriptor is straightforwardly acquired from EDBTC color quantizers and bitmap picture in packed space The EDBTC scheme performs well in those areas with promising results, since it provides better reconstructed image quality than that of the BTC scheme. In this paper, the concept of the EDBTC compression is catered to the CBIR domain, in which the image feature descriptor is constructed from the EDBTC compressed data stream. In this scheme, the compressed data stream that is already stored in database is not necessary decoded to obtain the image feature descriptor. The descriptor is directly derived from EDBTC color quantizers and bitmap image in compressed domain by involving the vector quantization (VQ) for indexing by including the vector quantization (VQ).

1.3 IMAGE RETRIEVAL

An image recovery framework restores an arrangement of images from a gathering of pictures in the database to take care of clients' demand with comparability assessments, for example, picture content likeness, edge design closeness, shading similitude, and so forth. An image recovery framework offers a proficient approach to get to, peruse, and recover an arrangement of comparable images in the constant applications. A few methodologies have been created to catch the data of image contents by straightforwardly processing the image highlights from an image.

2 LITERATURE SURVEY

Many former [8] schemes have been developed to improve the retrieval accuracy in the content-based image retrieval (CBIR) system. One type of them is to employ image features derived from the compressed data stream. As opposite to the classical approach that extracts an image descriptor from the original image, this retrieval scheme directly generates image features from the compressed stream without first performing the decoding process. This type of retrieval aims to reduce the time computation for feature extraction/generation since most of the multimedia images are already converted to compressed domain before they are recorded in any storage devices

[5] G. Qiu [20], In previous work, two picture attributes have been used to index a set of images in database, they are block color co-occurrence matrix and block pattern histogram. The first CBIR system designed using the BTC can be found here. The two quantized values and the corresponding bitmap image is used to generate the picture attribute from BTC in which a picture block is merely represented.

M. R. Gahroudi and M. R. Sarshar [9], earlier plans have been proposed to update the recuperation precision in the content based picture recuperation (CBIR) structure. One sort of them is to use picture attributes gained from the compacted data stream. Invert to the built up approach that without first executing the deciphering method, expels a photo descriptor from the main picture this recuperation plot clearly make picture qualities from the decreased data stream.

[4] J.-M. Guo, H. Prasetyo, and H.-S. Su, Here, without doing the decoding procedures, the metadata of the image are built from the typical square truncation coding (BTC) or halftoning-based BTC compact data stream. To access the relative images from the database these images are accessed through two phases, indexing and searching.

To produce the characteristics of the image [7], the YCbCr coloration is used in indexing of the image strategy is employed. At first stage, a image with RGB coloration area is converted to the YCbCr color space; finally, for Y color area, the encoding using BTC is achieved. Using VQ, images functions are produced through a YCbCr image. The approach produces a superior outcome as far as the retrieval precision.

The idea behind the BTC [10] is searching for a sample vectors to restore the first images. In particular, the BTC packs a image into another domain by partitioning the user image into different non-overlay image elements; this will be then calculated using two extreme quantifiers & bitmap image. Two sub images built by the two quantifiers & the relating bitmap image will be delivered toward the completion of encoding step, which are later sent to the decoder module

2.1 SYSTEM DESIGN

The proposed strategy packs a images productively, & in the meantime, its comparing compacted information stream can give a viable element descriptor to performing retrieving of images & indexing. Thus, the purposed plan can be considered as a viable contender for constant images recovery applications. The images attribute descriptor is built from three methods of techniques, for example, color or shading quantifiers, bitmap images & texture or surface descriptor of Gabor wavelet transform. The shading cooccurrence include (CCF) taken from two shading quantifiers that represents the shading appropriation & the contrasts in images, while the BPF built from a bitmap images describes the images edges & textural data. The closeness amongst trained & testing images can be measured from their CCF & BPF, Mean Amplitude & Mean Square Energy esteems utilizing a particular distance metric calculation. Exploratory outcomes show the prevalence of the proposed attribute descriptor contrasted with the previous existing plans in images retrieving undertaking under original & textural images. Subsequently, the proposed plan can be considered as a powerful contender for retrieving applications of real-time images.

The image feature descriptor is simply constructed from two EDBTC representative color quantizers , its corresponding bitmap image and Gabor wavelet for texture.

2.2 Figures

Proposed system block diagram

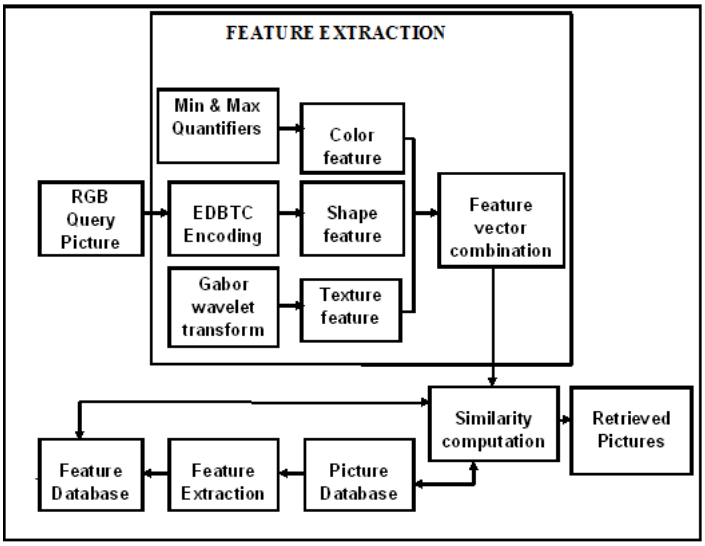

Fig.2: Proposed System Block Diagram

The minimum quantizer is formed by combining the minimum pixel values obtained from the Red band, Green band and Blue band respectively. The maximum quantizer is formed by combining the maximum pixel values obtained from the Red band, Green band and Blue band respectively. The size was reduced to 64 x64 if the input we are giving as 256 x 256. Thus downsampling is done. Eventhough the size of the image was redcuced, the clarity of the image remains the same.

EDBTC also transmits the two extreme color qua ntizers (minimum and maximum quantizers) to the decoder. The RGB color space is employed, thus the minimum and maximum quantizers are also in the RGB color representation.

A. Proposed Methodology

i. Minimum and Maximum Quantizer Extraction (Color):

EDBTC rely on the two extraordinary color quantifiers to the decoder that concentrate the least & most noteworthy pixels into two images.

Minimum quantizer is stated as:

$$X_{Min} = \{x_{Min}(i,j);\ i = 1,2,\ldots,\frac{M}{m}\ ;\ j = 1,2,\ldots,\frac{N}{n},\}.. (1)$$

Maximum quantizer is stated as

$$X_{Max} = \left\{ x_{Max}(i,j);\ i = 1,2,\ldots,\frac{M}{m};\ j = 1,2,\ldots;\frac{N}{n}\ ,\right\}..... (2)$$

this is applied on all three channels of the images:

$$x_{Min}(i,j) = \left[\min_{\forall k,l} b_{k,l}^{red}(i,j), \min_{\forall k,l} b_{k,l}^{green}(i,j), \min_{\forall k,l} b_{k,l}^{blue}(i,j)\right] ..... (3)$$

$$x_{Max}(i,j) = \left[\max_{\forall k,l} b_{k,l}^{red}(i,j), \max_{\forall k,l} b_{k,l}^{green}(i,j), \max_{\forall k,l} b_{k,l}^{blue}(i,j)\right] ..... (4)$$

ii. Bitmap Image (Shape):

Given an aboriginal RGB colored of M × N size images. This images is split to many non-overlay images m × n sized blocks, & every block can be processed solitarily.

$$B = \left\{ b\ (i,\ j);\ i\ = 1,\ 2,\ldots,\frac{M}{m};\ j = 1,\ 2,\ldots,\frac{N}{n}\right\}... (5)$$

The user images chunk b (i, j) is first translated into the interband median images by

$$\overline{b}_{(k,l)}(i,\ j) = \frac{1}{3}\left[b_{k,l}^{red}(i,j) + b_{k,l}^{green}(i,j) + b_{k,l}^{blue}(i,\ j)\right];$$

k = 1, 2, . . . , m; l = 1, 2, . . . , n. ..... (6)

iii. Inter-band Average Image:

The interband median calculation is applied to all blocks of the images.

An element of images of a smaller esteem contrasted with the limit is swung to 0 (dark pixel); else it will be 1 (white pel) to develop the bitmap images portrayal. To find mean esteems of the interband average images element:

$$x_{Min} = \min_{\forall\, x,y} \overline{f}\,(x,y)..... (7)$$

$$x_{Max} = \min_{\forall\, x,y} \overline{f}\,(x,y)..... (8)$$

$$\overline{x} = \sum_{x=1}^{m}\sum_{y=1}^{n} \overline{f}\,(x,y)..... (9)$$

Bitmap images h(x,y) is produced using below method:

$$h(x,y) = \begin{cases} 1\ , if\ \overline{f}\,(x,y) \geq \overline{x} \\ 0,\ if\ \overline{f}\,(x,y) < \overline{x} \end{cases} ..... (10)$$

The esteem f(x, y) of not processed pixels are rejuvenated using the below method.

$$\overline{f}\,(x,y) = \overline{f}\,(x,y) + e\,(x,y) * \epsilon ..... (11)$$

Where 'e' is the error core to disseminate the quantization continued to its nearby elements that aren't been

processed through EDBTC thresholding.

$$\left(\frac{1}{16}\right)\begin{bmatrix} & * & 7 \\ 3 & 5 & 7 \end{bmatrix} \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (12)$$

This * in above matrix indicates convolution progression.

iv. Gabor Wavelet Transform (Texture):

We can also calculate texture factors such as Mean-squared energy & Mean Amplitude from Gabor wavelet transform for every scale & orientation is returned.

v. Color-Co-Occurrence Factor Extrication:

The Color Cooccurrence factor (CCF) & Bit Pattern Factor (BPF) are used to extract attributes of the images. The C.C.F is acquired through the two color quantifiers, & the BPF through bitmap images.

vi. Bit Pattern Factor Extrication:

The surface, shape & other characteristics of the images are extricated utilizing Bit Pattern Factor.

Let Q = {Q1, Q2, . . . , QNb } be bit design code word that includes Nb the binary code words. From training images, the bit design codebook is produced utilizing binary vector quantization with soft centroids.

Toward the finish training stage, the binarization of all code vectors to yield the last outcome by performing the hard thresholding. Accordingly BPF is characterized through

$$BPF\ (t) = Pr\left\{\begin{matrix} \widetilde{b}\,(i,j) = t \mid i = 1,2,\ldots,\frac{M}{m}; \\ j = 1,2,\ldots,\frac{N}{n} \end{matrix}\right\} \ldots (13)$$

For all t = 1, 2, . . . N_b.

vii. Texture factor Extrication:

We can also calculate texture characteristics such as Mean-squared energy & Mean Amplitude from Gabor wavelet transform for every scale & orientation is returned.

viii. Database Factor Extrication:

Similar to Query attribute extrication, the CCF, BPF & the texture factors are extricated for every images present in the storage

ix. Similarity Computation:

The resemblance among the images is computed utilizing:$\delta\ (query, target)$

$$= \alpha_1 \sum_{t=1}^{N_c} \frac{|CCF^{query}\,(t) - CCF^{target}\,(t)|}{CCF^{query}(t) + CCF^{target}\,(t) + \varepsilon} + \alpha_2 \sum_{t=1}^{N_b} \frac{|BPF^{query}\,(t) - BPF^{target}\,(t)|}{BPF^{query}\,(t) + BPF^{target}(t) + \varepsilon} \ldots\ldots\ldots \quad (14)$$

x. Performance Analysis

In the image classification task, the proposed method performance is measured with the proportion correct classification (accuracy) from the nearest neighbor classifier. The classifier assigns a class label of testing set using the similarity distance computation as used in the image retrieval task. The similarity distance is computed and sorted in the ascending order between the query image q and target images in the database, and then the first L images are returned as a set of retrieved images.

The average exactness P(q) & the mean review R(q) estimations for portraying the images retrieval execution is characterized as underneath:

$$P\ (q) = \frac{1}{N_t L}\sum_{q=1}^{N_t} n_q(L) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (15)$$

$$R\ (q) = \frac{1}{N_t N_R}\sum_{q=1}^{N_t} n_q(L) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (16)$$

Where L, Nt, & NR indicate the quantity of recovered images, the quantity of images in storage database, quantity of important images on every

class, solitary. The q & nq (L) signify the user given images & quantity of effectively recovered images amid L recovered images set, solitary.

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3 EXPERIMENTAL RESULTS

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Table 1: Comparison between existing and designed system

S.NO	Existing System [2]	Designed System
1	profound learning factors for images grouping and acknowledgment is utilized which is very intricate	Bolster vector machine calculation is utilized for grouping which is not all that complex
2	Veracity is 80%	Veracity is 89%
3	GLCM feature is applied; energy and standard deviations are calculated for images retrieval.	Factor values such as CCF, BPF, mean & standard deviation values of all three color channels are examined
4	Time consumption is high	Time taken is high only, not low, but contrasted to the previous work, computational time is better

Table 2: Comparison between existing and designed system

S.NO	Existing System [2]	Designed System
1	Veracity is 80%	Veracity is high (above 90%)
2	Precision total positive rate) value is below 0.8	Precision value is 0.9

4 GRAPHS

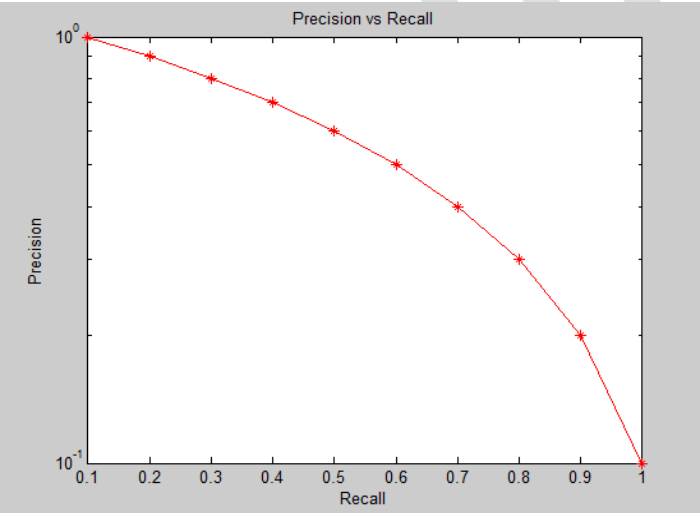

Fig.3. Precision Vs. Recall

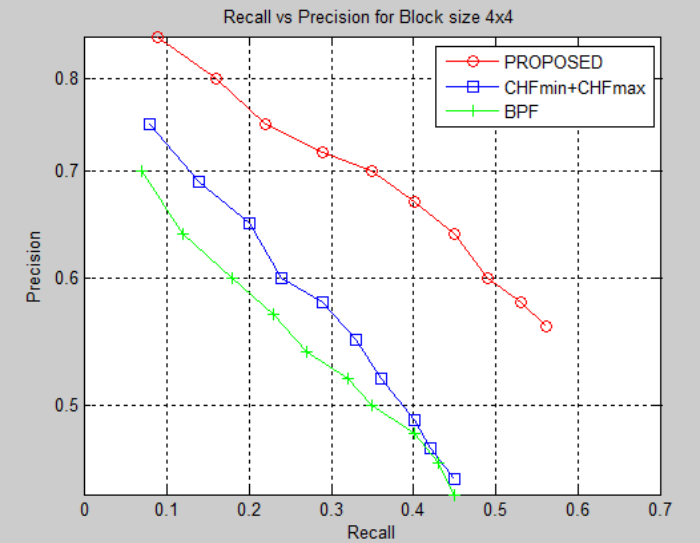

Fig.4. Recall Vs. Precision for Block size 4X4

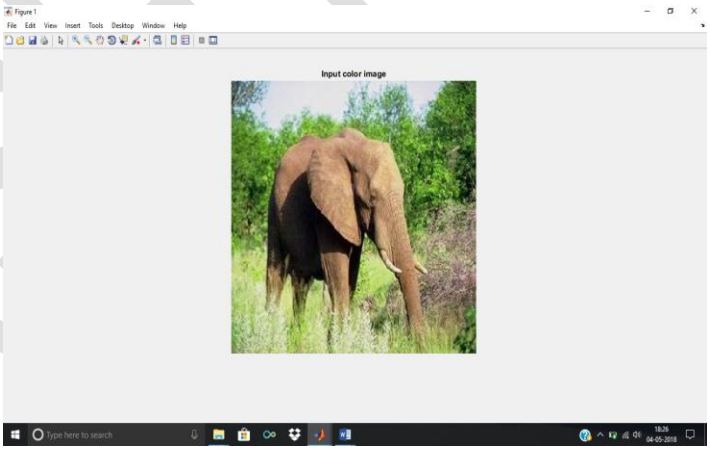

Fig.5. Input Query image

Input Image is divided into 4X4 blocks. 256X256 image is converted into 64X64 image.

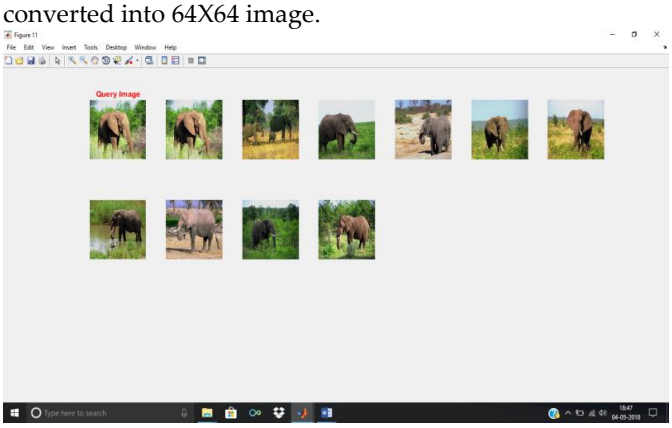

Fig.6. Retrieved images.

5 CONCLUSIONS

Advances in data storage and image acquisition technologies have enabled the creation of large image collections. Thus, we need appropriate information systems able to efficiently manage such collections. Systems that address this task are commonly known as Content-Based Image Retrieval Systems whose operation is basically trying to retrieve images similar to an image sample. For this purpose, parameters such as shape,
color, texture, etc. are used, usually encoded in a feature vector.

A new strategy is proposed in this project for color picture indexing through the EDBTC technique. An element descriptor acquired from a color picture is developed from the EDBTC encoded information (two delegate quantizers and its bitmap picture) by consolidating the VQ. The CCF viably speaks to the color dissemination in the picture, while the BPF describes the picture edge and surface. From the experimental analysis we can say that the proposed method is more superior to the previous BTC-based picture indexing systems but also to the prior existing methods in the literary works based on the CBIR. To accomplish a higher retrieval precision, color based element acquired from the color spaces, for example, YCbCr, hue–saturation–intensity, and lab and surface indexing plan.

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