

Retrieval of Images Using Color, Shape and Texture Features Based on Content

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Abstract—The current study deals with deriving of image feature descriptor by error diffusion based block truncation coding (EDBTC). The image feature descriptor is basically comprised by the two error diffusion block truncation coding, color quantizers and its equivalent bitmap image. The bitmap image distinguish the image edges and textural information of two color quantizers to signify the color allocation and image contrast derived by the Bit Pattern Feature and Color Co-occurrence Feature. Tentative outcome reveal the benefit of proposed feature descriptor as contrast to existing schemes in image retrieval assignment under normal and textural images. The Error-Diffusion Block Truncation Coding method compresses an image efficiently, and at the same time, its consequent compacted information flow can provides an efficient feature descriptor intended for operating image recovery and categorization. As a result, the proposed design preserves an effective candidate for real-time image retrieval applications.

Keywords—Bit pattern feature, Content-based image retrieval (CBIR), Color, color co-occurrence feature, Error diffusion block truncation coding (EDBTC), Feature vector, Image Retrieval, Local binary pattern (LBP), Texture.

I. INTRODUCTION

The Content Based Image Retrieval (CBIR) also known as a forceful tool, the impression has been one of the most vital explore part from the time since 1970. The database for storing millions of images at this time is very time to use to form and keep up. As, it has one of the considerable employ's in loads of setting together with medicines, biometric security and satellite image privilege. The appliances of Content Based Image Retrieval have greater than before countless collapse with presence of little price disk storage and soaring speed processors and for these state the key constraint is to retrieve exact images. Many expertises have been built up by the researchers in support of processing such image databases like sorting, searching, browsing and retrieval. It uses the chart sign to seek images databases and regain the necessary images which includes color, texture; shape and region are widely made survey for indexing and representation purpose. By incorporating with content based retrieval systems many kinds of elements of an image doubts can make the most of to search for related images quality in the database.

In the expected system, the CBIR performs to start through image segmentation by isolating image interested in a range of regions along with that these regions are applied to take back the image. Searching up of the images is done on the source of image regions which encompass interconnected association with regions that are present in image insecurity and these images are retrieved according to the nature of the color, shape or else the location and also their grouping format. From the obtained conclusion it is specified that the CBIR be able to end up with valuable retrieval of the images by means of the

segmentation criterion. It is repeatedly bring into being so as to point out there is any manner of semantic gap involving the visual value plus semantic content of the image. Whereas by taking out the useful features this gap can be dropped off and this trouble maintained to be work out by adding two individual features which need to be broken to remove the contents of images such as first one is indexing the image for color of the image another one is retrieving image in favor of texture as of the indexed database and the useless images that are totally irrelevant to the ask for image are to be cleaned by using color feature.

II. RELATED WORK

A good number of the previous plots were prepared to recover the accurateness of the attaining of images in the CBIR System. One amongst such structure takes up the elements of the images so as to gain it from the compressed tabular structure. But this means, causes straightforwardly the quality of the images as of the flow that is compacted not including the practice of interpretation at first. So such kind of taking out plan minimizes the working out time used to take out the qualities [1].

Erection of characteristics of images was done on DCT Domain; the part of firmness was dreadfully unfortunate. The intended form that has a planning which is thorny, gives acquiescence to balance the extents of the reasonable image even as by a compressed considerations [2].

Taking out of image attributes are build up straight from the usual BTC that is, Block Truncation Coding which worked on indexing and probing in favor of getting the related gathering

of images as of the list. This also makes use of the thing versioning plus function support variance ruling in a style expansively, which offers the innovative boundary in support of creators towards using it [3].

Headed for creating the traits of image were the chunk of image is signified just using the two quantized ideals along with the consequent bitmap image this manner is made use of that utilize the temperament of BTC. Having any other user confined essentials in the societal sites may possibly direct an unsympathetic upshot on the confidentiality of a few sufferers without doubt [4].

For the generation of the color space an image indexing scheme employs the YCBBR method were the image with RGB color liberty be initially transformed hooked on the YCBBR color gap. A precision of the gaining the images through employing this plan give in enhanced upshots. A solution to the troubles which utilize these facts supplies is acknowledged here that can be brought into play [5].

As there was a difficulty in the long-established approach which were completely dependent as the complexity of dimensionality that in turn cause the terrible conditions in performances and made the work out time unbearable. The main problem was, it used to produce the low quality output which would make the retrieval process complex. By looking at the above work we found some of the limitations and they are as follows:

- It used to give low worth conclusion in retrieving the images for example the output would be completely a mismatch to the image that was inquired for retrieving.
- For retrieving the image the extraction of features were done directly.

III. SYSTEM DESIGN

A. Proposed System

The intended model consists of the three basically formed type of course that is, color quantizer's, bitmap image the texture descriptor of LBP. For color image retrieval the type of feature used is Color Histogram (CHF) which generates the two color quantizer that stand for the supply of the color as well as the gap among the image that is to be gathered, but the Bit Pattern Histogram (BHF) depicts the information about the image texture as well as the ends of the image, and it can be said that a projected preparation is a well thought-out as one of the applicable image retrieval application. The major Advantages of proposed System are,

- Compared to the earlier form this plan put forward a potential productivity and also it beat the problem from the older structure in terms of the classification of natural scene.

- The precision of the retrieval of the images give away the superior outcome as match up to prior structure.

B. Objective

Getting the images right in the arrangement it is insisted; by means of fine significance along with speedy effects is the imperative intent of the foreseen form.

C. Methodology

As at hand are three aspects upon which this mock-up is formed and they are Color, Shape and the Texture. So, the algorithm used in support of color is the HSI color form, were every part of the pixels present in the image are assembled with the algorithm.

D. System Architecture

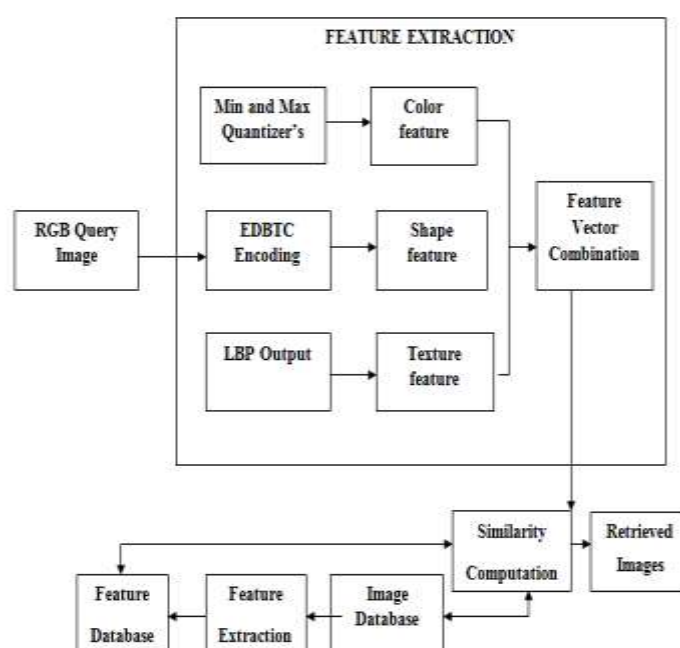


Figure 1. Block diagram

System approach states about extreme stage condition pattern of the software machine. The RGB query image is dig out into color, shape and texture feaures by means of unique set of procedure into function vector arrangement, and subsequently a technique to search for for set of similar images from the database and the concluding result is retrieved.

IV. IMPLEMENTATION

A. Modules

- Minimum and Maximum Quantizer Extraction:

The minimum quantizer is shaped by joining the minimum pixel principles that are acquired through the Red Band, Green Band and Blue Band respectively. Equally the maximum quantizer is premeditated by unification of the maximum pixel morals with Red, Green and Blue band respectively from which

it was stumbled upon that there was a decrease in size to 64 x64 from 256 x256 nevertheless the clarity leftovers the unchanged.

To embody the set of minimum and maximum quantizer's as of all mass of images is recised as

$$\begin{aligned} X_{min} &= \{x_{min}(i, j); i = 1, 2, \dots, \frac{M}{m}; j = 1, 2, \dots, \frac{N}{n}\} \\ X_{max} &= \{x_{max}(i, j); i = 1, 2, \dots, \frac{M}{m}; j = 1, 2, \dots, \frac{N}{n}\} \end{aligned} \quad (1)$$

Wherever $X_{min}(I, j)$ and $X_{max}(I, j)$ stand for the minimum and maximum standards, in that order, in excess of red, green, and blue conduit on the parallel image block (I, j) .

The two ideals can be properly devised like

$$\begin{aligned} x_{min}(i, j) &= \left[\min_{\forall k, l} b_{k, l}^{red}(i, j), \min_{\forall k, l} b_{k, l}^{green}(i, j), \min_{\forall k, l} b_{k, l}^{blue}(i, j) \right], \\ x_{max}(i, j) &= \left[\max_{\forall k, l} b_{k, l}^{red}(i, j), \max_{\forall k, l} b_{k, l}^{green}(i, j), \max_{\forall k, l} b_{k, l}^{blue}(i, j) \right] \end{aligned} \quad (2)$$

We have an inventive RGB color image size i.e $M \times N$, which is then at the first alienated into compound non overlying of image lumps of size $m \times n$, so that each block can be practiced in parallel.

$$B = \{b((i, j)); i = 1, 2, \dots, \frac{M}{m}; j = 1, 2, \dots, \frac{N}{n}\} \quad (3)$$

- Color Co-occurrence Feature (CCF) Extraction:

An image is molded into a bitmap image by providing work for EDBTC algorithm. To describe the stuffing of image two image features are commenced they are CCF one more is BPF.

By the aspects of the color co-occurrence matrix, the image element can be get hold of on or after the color circulation of image.

$$\begin{aligned} CCF(t1, t2) &= \\ \Pr \{ \tilde{i}_{min}(i, j) = t1, \tilde{i}_{max}(i, j) = t2 | i = 1, 2, \dots, \frac{M}{m}; j = 1, 2, \dots, \frac{N}{n} \} \end{aligned} \quad (4)$$

- Bit Pattern Feature (BPF) Extraction:

The BPF is an added style of drawing out pattern that is helpful in exemplifying the edges, shape moreover the filling of images. A representative bit pattern codebook as of a set of training bitmap image set is produced by using the binary vector quantization from the EDBTC encoding process.

As a consequence BPF is labeled as

$$BPF(t) = \Pr \{ \tilde{b}(i, j) = t | i = 1, 2, \dots, \frac{M}{m}; j = 1, 2, \dots, \frac{N}{n} \} \quad (5)$$

For all $t = 1, 2, \dots, Nb$.

- Texture Feature Extraction:

LBP, Local Binary Pattern is a manner of prototype with the intention to extract the quality features of an image.

- Database Feature Extractions:

The images with the aim of are at hand in the database having to be taken out, so for that intention this variety of attribute mining is used.

- Similarity Computation:

The Query image and the images set that are available in the log have a resemblance quotient which is referred as a target image can be précedised using the qualified distance measure. At the first an inquiry image is prearranged with EDBTC, fabricated as the consequent CCF and BPF.

On the record, the similarity capacity between two images is classified as

$$\begin{aligned} \delta(query, target) &= \alpha_1 \sum_{t=1}^{N_c} \frac{|CCF^{query}(t) - CCF^{target}(t)|}{CCF^{query}(t) + CCF^{target}(t) + \varepsilon} \\ &+ \alpha_2 \sum_{t=1}^{N_b} \frac{|BPF^{query}(t) - BPF^{target}(t)|}{BPF^{query}(t) + BPF^{target}(t) + \varepsilon} \end{aligned} \quad (6)$$

- Performance study:

To measure the performance of the extraction and retrieval of an image the probable copy utilizes classification mission which seize the extent redress arrangement starting the closest neighbor classifier. The assessment lay down of class label is consigned by the classifier by means of the similarity distance computation the same as draw on the image recovery undertaking.

Authoritatively, the classic precision $P(q)$ and typical recall $R(q)$ dimensions for recitation of the routine of repossession of a portrait can be understandable as

$$\begin{aligned} p(q) &= \frac{1}{NtL} \sum_{q=1}^{Nt} nq(L), \\ R(q) &= \frac{1}{NtNR} \sum_{q=1}^{Nt} nq(L), \end{aligned} \quad (7)$$

Where L , Nt and NR stand for the quantity of retrieved images, amount of images in attendance to database and image relevance on each class correspondingly. The images that are in the approved manner retrieved are designated by the signs q

and nq , whereas the query depiction is indicated by (L) surrounded by L retrieved portrayal set respectively.

V. PERFORMANCE ANALYSIS

Tools: The tool used for our work is as follows:

Image Processing Tool Box:

It provides the consent for the advancement of the image, credentials of the class of the image, smear free images, noise free image retrievals, slicing of the image parts, variation in the arithmetical operation at the same time listing of the image.

Below are the two execution modes given by the Image processing device

- Fundamental import as well as export
- Display
- Fundamental import as well as export

It performs the task that sanctions type of images acquired via the success of image strategies for a case of point, digital cameras, imaging devices for a medical area resembling CT and MRI, microscopes, airborne sensors and satellite, telescopes etc, that's why such image be able to experiential, investigate and also the progress of these images interested in plentiful data types collectively among the single accuracy plus a double accuracy floating point accumulation on to signed along with unsigned 8 bit, 16 bit as well as 32 bit integers. The read and write procedures for an image have been adapted to bring out these tasks effortlessly.

- Display Function

The display utility is been more used to, which can be demonstrated for the images so as to read it as a result of import intention. This concept accumulates to consent for making the displays of an image in terms of graphics in addition to wording, images contained by a proper window along with detailed displays such as outline plot and the histogram and furthermore.

- Results and Discussion



Figure 2. Original image

The original image is given as the input query image from the set of images from the database.



Figure 3. Red channel image

The input query image is converted into Red Channel Image.



Figure 4. Green channel image

The input query image is converted into Green Channel



Figure 5. Blue channel image

The input query image is converted into Blue Channel Image.



Figure 6. Minimum quantized image
Conversion of Query Image into Miniimum Quantized Image



Figure 7. Maximum quantized image
Conversion of Query Image into Maximum Quantized Image.



Figure 8. Grayscale image
Conversion of Query Image into Gray Scale Image.



Figure 9. Bitmap image

Conversion of Query Image into Bitmap Image



Figure 10. Output image

Retrieval of all the set of interrelated images that are in the database together with the Query Image.

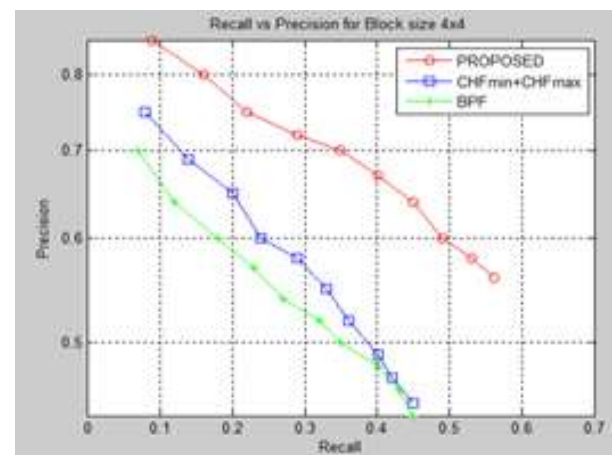


Fig 11. The comparison on features combination with various block sizes of RGB color for proposed, minimum Color Histogram Feature (CHF) and maximum Color Histogram Feature, Bit-Pattern Feature (BPF).

VI. CONCLUSION

This composed application encourages the user to extract the images relying on the feature vector description. This application helps the user to recover the suitable arrangement of comparable image from the database, in view of the color, shape and texture elements alongside the query image. By Minimum and Maximum Quantizer's where it make an interpretation of the inquiry image into red, green and blue channel, Shape by Error-Diffusion Truncation Coding where it changes over the color image to gray scale and gray scale to binary, and texture elements by utilizing Local-Binary Pattern for outside appearance of the image. This application can be effortlessly utilized by the user to uncover the specific image. Relying over the shape and color their features can be taken back as well as merged through the anticipated facet which is measured towards progressing the usefulness of the planned approach that is considered on behalf of the enrichment of the exhibition of the excerption.

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