FEATURES EXTRACTED FROM ORDERED-DITHER USING CONTENT-BASED IMAGE RETRIEVAL

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Abstract:- This report gives a thorough review of the specialized accomplishments in the exploration region of picture recovery, particularly content-based picture recovery, a range that has been so dynamic and prosperous in the previous few years.Content Based Image Retrieval (CBIR) is a proficient recovery of pertinent pictures from expansive databases in light of components removed from the picture. This report proposes a framework that can be utilized for recovering pictures identified with an inquiry picture from an extensive arrangement of particular images.Also presents a strategy for substance based picture recovery (CBIR) by misusing the upside of low many-sided quality requested dither square truncation coding (ODBTC) for the era of picture substance descriptor. In the encoding step, ODBTC packs a picture obstruct into relating quantizers and bitmap picture. Two picture elements are proposed to record a picture, specifically, shading co-event include (CCF) and bit design highlights (BPF), which are created straightforwardly from the ODBTC encoded information streams without playing out the deciphering procedure. The CCF and BPF of a picture are essentially gotten from the two ODBTC quantizers and bitmap, individually, by including the visual codebook. Trial comes about demonstrate that the proposed strategy is better than the square truncation coding picture recovery frameworks and the other prior techniques, and in this way the ODBTC plan is not just suited for picture pressure, due to its straightforwardness, additionally offers a basic and compelling descriptor to list pictures in CBIR framework.

I. INTRODUCTION

Content-based image retrieval (**CBIR**), also known as query by image content (QBIC) and content-based visual information retrieval (CBVIR) is the application of computer vision to the image retrieval problem, that is, the problem of searching for digital images in large databases.

"Content-based" means that the search will analyze the actual contents of the image. The term 'content' in this context might refer colors, shapes, textures, or any other information that can be derived from the image itself. Without the ability to examine image content, searches must rely on metadata such as captions or keywords. Such metadata must be generated by a human and stored alongside each image in the database.

An image retrieval system returns a set of images from a collection of images in the database to meet users' demand with similarity evaluations such as image content similarity, edge pattern similarity, color similarity, etc. An image retrieval system offers an efficient way to access, browse, and retrieve a set of similar images in the real-time applications. Several approaches have been developed to capture the information of image contents by directly computing the image features from an image [1].

The image features are directly constructed from the typical Block Truncation Coding (BTC) or halftoning-based BTC compressed data stream without performing the decoding procedure. These image retrieval schemes involve two phases, indexing and searching, to retrieve a set of similar images from the database. The indexing phase extracts the image features from all of the images in the database which is later stored in database as feature vector. In the searching phase, the retrieval system derives the image features from an image submitted by a user (as query image) [2].

II. REVIEW OF LITERATURE

Content-Based Image Retrieval Using Features Extraction:

The use of images in human communication is hardly new. Content-based image retrieval (CBIR), a technique for retrieving images on the basis of automatically-derived features such as color, texture and shape. Feature (content) extraction is the basis of content-based image retrieval. In a broad sense, features may include both text-based features (key words, annotations) and visual features (color, texture, shape, faces) [3].

The history of the content-based image retrieval can be divided into three phases:

· The retrieval based on artificial notes.

· The retrieval based on vision character of image contents.

· The retrieval based on image semantic features.

All current CBIR systems, allows users to formulate queries by submitting an example of the type of image being sought, though some offer alternatives such as selection from a palette or sketch input. The system then identifies those stored images whose feature values match those of the query most closely, and displays thumbnails of these images on the screen Error! Reference source not found. Some of the more commonly used types of feature used for image retrieval are described below.

III. COLOR RETRIEVAL

The color feature is one of the most widely used visual features in image retrieval. It is relatively robust to background complication and independent of image size and orientation. In image retrieval, the color histogram is the most commonly used color feature representation. Statistically, it denotes the joint probability of the intensities of the three color channels. Several methods for retrieving images on the basis of color similarity have been described in the literature, but most are variations on the same basic idea. Each image added to the collection is analyzed to compute a color histogram which shows the proportion of pixels of each color within the image. The color histogram for each image is then stored in the database. The matching process then retrieves those images whose color histograms match those of the query most closely. The matching technique most commonly used, histogram intersection, was first developed by Swain and Ballard [1991]. Variants of this technique are now used in a high proportion of current CBIR systems [4].

IV. TEXTURE RETRIEVAL

Texture refers to the visual patterns that have properties of homogeneity that do not result from the presence of only a single color or intensity [5]. The ability to retrieve images on the basis of texture similarity may not seem very useful. But the ability to match on texture similarity can often be useful in distinguishing between areas of images with similar color (such as sky and sea, or leaves and grass). A variety of techniques has been used for measuring texture similarity. Alternative methods of texture analysis for retrieval include the use of Gabor filters and fractals. Texture queries can be formulated in a similar manner to color queries, by selecting examples of desired textures from a palette, or by supplying an example query image. The system then retrieves images with texture measures most similar in value to the query. A recent extension of the technique is the texture thesaurus, which retrieves textured regions in images on the basis of similarity to automatically-derived code words representing important classes of texture within the collection [4].

4.1 Shape retrieval

The ability to retrieve by shape is perhaps the most obvious requirement at the primitive level. Unlike texture, shape is a fairly well-defined concept. Shape matching of three-dimensional objects is a more challenging task – particularly where only a single 2-D view of the object in question is available [4]. In general, the shape representations can be divided into two categories, boundary-based and region-based. The former uses only the outer boundary of the shape while the latter uses the entire shape region.The most successful representatives for these two categories are Fourier descriptor and moment invariants [5].

V. REPORT ON PRESENT INVESTIGATION

5.1 Problem Definition

Issues with customary strategies for picture ordering [Enser,1995] have prompted to the ascent of enthusiasm for procedures for recovering pictures on the premise of naturally determined elements, for example, shading, surface and shape.

A procedure for substance based picture recovery (CBIR) for the era of picture substance descriptor. In the encoding step, packs a picture hinder into relating quantizers and bitmap picture. Two picture elements are proposed to list a picture, in particular, shading co-event highlight (CCF) and bit design highlights (BPF).The CCF and BPF of a picture are basically gotten from the two quantizers and bitmap, individually. The ODBTC plan is not just suited for picture pressure, in light of its effortlessness, additionally offers a basic and compelling descriptor to list pictures in CBIR framework.

1. Shading Co-Occurrence Feature (CCF):

The shading circulation of the pixels in a picture contains gigantic measure of data about the picture substance. The trait of a picture can be gained from the picture shading appropriation by method for shading co-event network. This framework likewise speaks to the spatial data of a picture. Shading Co-event Feature (CCF) can be gotten from the shading co-event framework.

2. Bit Pattern Feature (BPF):

BPF portrays the edges, shape, and picture substance. The double vector quantization creates an agent bit design codebook from an arrangement of preparing bitmap pictures.

5.2 Methodology

Two image features are proposed to index an image:

1. color co-occurrence feature (CCF)
2. bit pattern features (BPF)

Which are generated directly from the ODBTC encoded data streams without performing the decoding process. The CCF and BPF of an image are simply derived from the two ODBTC quantizers and bitmap. Figure 3.1 shows the Block diagram of the proposed image retrieval method.

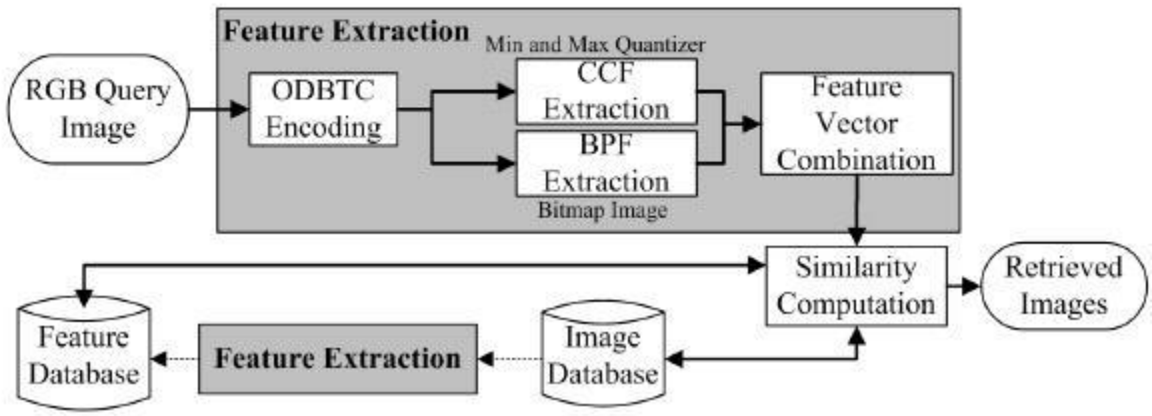

Figure 3.1 Block diagram of the proposed image retrieval method.

5.3 Ordered- Dither Block Truncation Coding:

The main advantage of the ODBTC image compression is on its low complexity in generating bitmap image by incorporating the Look-Up Table (LUT), and free of mathematical multiplication and division operations on the determination of the two extreme quantizers. The traditional BTC derives the low and high mean values by preserving the first-order moment and second-order moment over each image block, which requires additional computational time. Conversely, ODBTC identifies the minimum and maximum values each image block as opposed to the former low and high mean values calculation, which can further reduce the processing time in the encoding stage. In addition, the ODBTC yields better reconstructed image quality by enjoying the extreme-value dithering effect. At the end of the ODBTC encoding, the bitmap image, bm, the minimum quantizer, Xmin, and maximum quantizer, Xmax ,are obtained and considered as encoded data stream.

5.4 Color Co-occurrence Feature (CCF)

Color Co-occurrence Feature (CCF) can be derived from the color co-occurrence matrix. Figure 3.2 shows the schematic diagram for deriving the CCF. In the proposed scheme, CCF is computed from the two ODBTC color quantizers. The minimum and maximum color quantizers are firstly indexed using a specific color codebook. The color co-occurrence matrix is subsequently constructed from these indexed values. Subsequently, the CCF is derived from the color co-occurrence matrix at the end of computation. In general, the color indexing process on RGB space can be defined as mapping a RGB pixel of three tuples into a finite subset of codebook index. The CCF calculation is simple, making it more preferable for CBIR task.

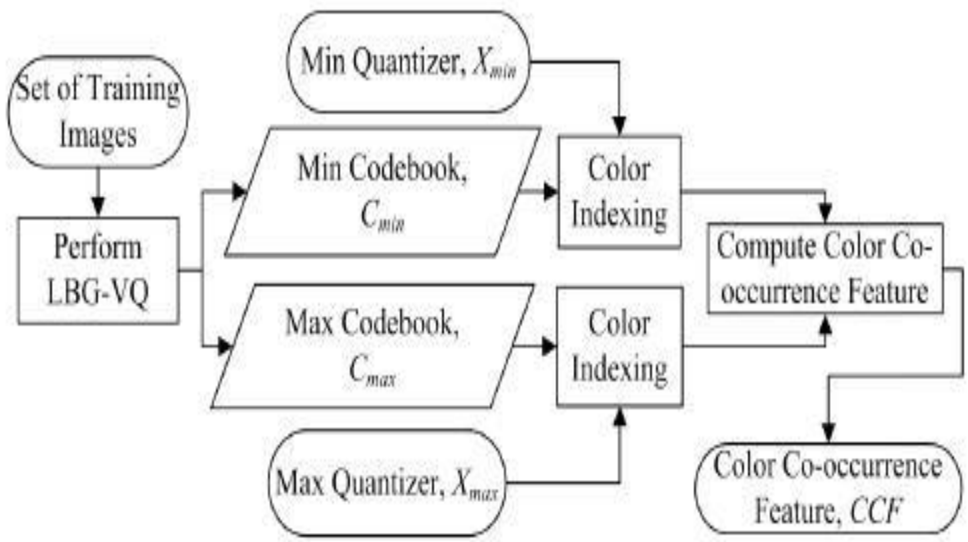

Figure 3.2 Block diagram for computing the color co-occurrence feature.

5.5 Bit Pattern Feature (BPF)

Another feature, namely Bit Pattern Feature (BPF), characterizes the edges, shape, and image contents. Figure 3.3 shows the schematic diagram for deriving the BPF. The binary vector quantization produces a representative bit pattern codebook from a set of training bitmap images obtained from the ODBTC encoding process. Let Q = {Q1, Q2. . .QNb } be the bit pattern codebook consisting Nb binary code word. These bit pattern codebooks are generated using binary vector quantization with soft centroids, and many bitmap images are involved in the training stage.

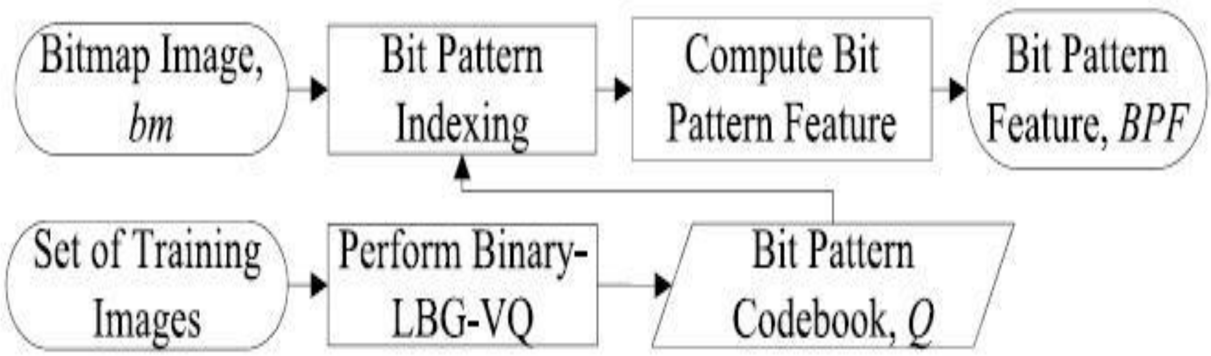

Figure 3.3 Block diagram for computing the bit pattern feature.

The bitmap of each block bm (i, j) is simply indexed based on the similarity measurement between this bitmap and the code word Qq. Subsequently, the BPF is simply derived as the occurrence probability of the bitmap image mapped into the a specific bit pattern codeword Qq.

Similar to that of the CCF, the BPF only needs a simple computation, making it suitable for real applications where fast response is required.

5.6 Implementation Plan

The proposed image retrieval methods introduce two image features to index an image:

1. color co-occurrence feature (CCF)
2. bit pattern features (BPF)

The similarity between two images (i.e., a query image and the set of images in the database as target image) can be measured using the relative distance measure [6]. The similarity distance plays an important role for retrieving a set of similar images. The query image is firstly encoded with the ODBTC, yielding the corresponding CCF and BPF. The two features are later compared with the features of target images in the database. A set of similar images to the query image is returned and ordered based on their similarity distance score, i.e. the lowest score indicates the most similar image to the query image. The average precision P(q) and average recall R(q)measurements for describing the image retrieval performance are defined in [7] as below:

$$P(q) = 1/NtL \sum_{q=1}^{Nt} n_q(L)$$

$$R(q) = 1/NtNR \sum_{q=1}^{Nt} n_q(L)$$

Conclusion

The extent to which CBIR technology is currently in routine use is clearly still very limited. In particular, CBIR technology has so far had little impact on the more general applications of image searching, such as journalism or home entertainment. Only in very specialist areas such as crime prevention has CBIR technology been adopted to any significant extent. The process of designing of CBIR system has been successfully carried out and the expected outcome is achieved. The main functions that a CBIR should perform are:

Constructing feature vectors from the image based on its content and storing it in the database. Similarity comparison and segmentation. Retrieving the images based on the feature vectors.

In this study, an image retrieval system is presented by exploiting the ODBTC encoded data stream to construct the image features, namely CCF and BPF. The proposed scheme can provide the best average precision rate compared to various former schemes in the literature. The proposed scheme can be considered as a very competitive candidate in the color image retrieval application. Another feature can be added by extracting the ODBTC data stream, to enhance the retrieval performance.

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- Similarity comparison and segmentation.
- Retrieving the images based on the feature vectors.

In this study, an image retrieval system is presented by exploiting the ODBTC encoded data stream to construct the image features, namely Color Co-occurrence and Bit Pattern features. The proposed scheme can provide the best average precision rate compared to various former schemes in the literature. As a result, the proposed scheme can be considered as a very competitive candidate in color image retrieval application.

The experimental results demonstrate that the proposed method is not only superior to the former BTC-based image indexing schemes, but also the former existing methods in the literature related to the content based image retrieval. To achieve higher retrieval accuracy, another feature can also be added.

This technique is devoted to improving existing techniques involved in feature extraction, similarity matching and reducing the overall computation time of image retrieval system while increasing the accuracy.

The main contributions of the technique are listed below:

1. Design and development of a multistage model for image retrieval to improve the retrieval accuracy by filtering down irrelevant images at each stage.

2. The accuracy of region based image retrieval system is improved by introducing novel region codes based matching scheme.

For the further studies, the proposed image retrieval scheme can be applied to video retrieval. The video can be treated as sequence of image in which the proposed ODBTC indexing can be applied directly in this image sequence. The ODBTC indexing scheme can also be extended to another color space as opposed to the RGB triple space. Another feature can be added by extracting the ODBTC data stream, not only CCF and BPF, to enhance the retrieval performance. In the future possibilities, the system shall be able to bridge the gap between explicit knowledge semantic, image content, and also the subjective criteria in a framework for human-oriented testing and assessment.

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