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CONTENT BASED IMAGE RETRIEVAL USING ORDERED DITHERED BLOCK TRUNCATION CODING

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Abstract—**This paper presents a technique for Content-Based Image Retrieval (CBIR) by exploiting the advantage of low complexity Ordered-Dither Block Truncation Coding (ODBTC) for the generation of image content descriptor. In encoding step, ODBTC compresses an image block into corresponding quantizers and bitmap image. Two image features are proposed to index an image, namely Color Co-occurrence Feature (CCF) and Bit Pattern Features (BPF), which are generated directly from 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, respectively, by involving the visual codebook. Experimental results show that the proposed method is superior to the Block Truncation Coding (BTC) image retrieval systems and the other former methods, and thus prove that the ODBTC scheme is not only suited for image compression since of its simplicity, but also offers a simple and effective descriptor to index images in CBIR system**

General Terms: **Bit Pattern Feature, Color Co-occurrence Feature, Content-Based Image Retrieval, Ordered Dither Block Truncation Coding.**

1. Introduction

The content based is defined as to analyze the actual contents of the image. The term content in this context might refer colors, shapes, texture, or any other information that can be derived from the image itself. The feature extractor simply generates an image feature for the CBIR task from compressed data stream without performing the decoding (decompression) process. The Block Truncation Coding (BTC) is an image compression method which requires simple process on both encoding and decoding stages. The BTC compresses an image in a simple and efficient way. BTC firstly divides an input image into several image blocks, and each image block is subsequently represented with two specific quantizers to maintain its mean value and standard deviation identical to the original image block. The BTC produces two quantizers, namely high and low quantizers, and a bitmap image at the end of the decoding process. The BTC decoding performs the reverse procedure by simply replacing the bitmap information with the high or low quantized. Further reduce the computational complexity, improve image
quality, and achieve a higher compression ratio. The dithering-based BTC, namely Ordered Dither Block. Ordered Dithered Block Truncation Coding (ODBTC) and its effectiveness in generating representative image feature. The array of an ODBTC method substitutes the fixed average value as the threshold value for the generation of bitmap image. The extreme values in ODBTC are simply obtained from the minimum and maximum value found in the image blocks. Thus the image contains high efficiency and low computational complexity. Most of the applications have been developed based on to index images in database using features generated from the ODBTC compressed data stream. This indexing technique can be extended for CBIR. ODBTC compresses an image into a set of color quantizers and a bitmap image. The Digital image retrieval system generates two image features, namely Color Co-occurrence Feature (CCF) and Bit Pattern Feature (BPF), from the above color quantizers and bitmap image. As the results, the CBIR can provide there trivial accuracy.

2. Image retrieval

The Ultimate aim in Large number of Image Processing application is to extract important features from image data, from which a description, interpretation, or understanding of the scene can be provided by the machine. Image processing can be defined as, the processing or altering an existing image

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in a desired manner. This system allows the user to take hard copy of the image using printer routines and allows the user to store screen image into the disk file using file format (bmp, jpg, gif).Image processing in its general form pertains to the alteration and analysis of pictorial information. We find instances of image processing system is the human brain together with the eye. The system receives, enhances and stores image at enormous rates of speed. The objective of image processing is to visually enchance or statistically evaluate some aspect of an image not readily apparent in its original form. The basic principal of image processing operations carried out will assist us in greater perception and vision but does not add any information content. This objective is carried out through development and implementation of processing means necessary to operate upon images.The recent availability of sophisticated semiconductor digital devices and compact powerful computers, coupled with advances in image processing algorithms, has brought digital image processing to the fore front. Digital image processing has a broad spectrum and applications, such as remote sensing via satellites and other spacecraft image transmission and storage for business applications, medical processing, radar sonar and acoustic image processing, robotics and automated inspection of industrial parts

3.Existing System

The new type of CBIR approaches is presented in which the spatial pyramid and order less state-of- the bag features image representation were employed for recognizing the scene categories of images from a huge database. Two image features have been proposed, namely block contrast color co-occurrence matrix and block pattern co-occurrence matrix, to index a set of images in database. An image with RGB color space is firstly converted into the YCbCr color space, it employs the YCbCr color space for the generation of image feature subsequently, the BTC encoding is performed only for Y color space. By employing VQ, two images features (contrast and block pattern co-occurrence matrix and color pattern co-occurrence matrix) are generated from a YCbCr image. This method in yields a better result in terms of the retrieval accuracy This method offers a promising result and outperforms the former existing methods in terms of the natural scene classification. a performance evaluation is introduced to measure the effectiveness.

4. Proposed System

The Proposed techniques ODBTC algorithm is used for an image compression is on its low complexity in generating bitmap image. Two image features are introduced in this method characterize the image contents, such as namely Color Co-occurrence Feature (CCF) and Bit Pattern Feature (BPF). The CCF is derived from the two colors Quantizes, and the BPF is from the bitmap image The ODBTC is used to compress the data stream such as the bitmap image and two extreme colors quantizes. The ODBTC employed in this method decomposes an image into a bitmap image and two colors quantize which are subsequently exploited for deriving the image feature descriptor. In which an image block is merely represented using two quantized values and the corresponding bitmap image. As the results to provide the best average precision rate and very complicated as a color image retrieval applications. Thus the image features is derived from the ODBTC encoded data stream.

5. Experimental Architecture and Implementation

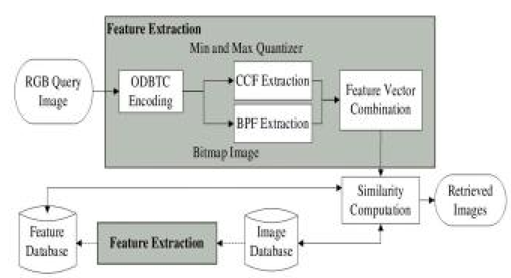

Figure 5.1. Experimental architecture

5.1 ODBTC Encoding

Given an original RGB color image of size $M \times N$. This image is firstly divided into multiple on overlapping Image blocks of size $m \times n$, and each image block can be processed independently. The original image block is firstly converted into the inter-band average image. As opposed the single threshold utilized in classical BTC, the ODBTC employs the void-and-cluster dither array of the same size as an image block to generate the bitmap image. The set can be off-line pre-calculated and stored as a Look-Up-Table (LUT) for later usage. The ODBTC performs the thresholding on the inter-band average image with the scaled version of dither array for each image block to obtain the representative bitmap image. ODBTC also

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transmits the two extreme color quantizes (minimum and maximum quantizers) to the decoder. The RGB color space is employed in this project, thus the minimum and maximum quantizers are also in the RGB color representation. In except for the image compression, ODBTC compressed data stream, i.e., the bitmap image and two extreme color quantizers, can be further utilized as an image descriptor. A simple method for CBIR task is developed in this project using the image feature derived from the ODBTC encoded data stream. ODBTC algorithm is generalized for color images in coping with the CBIR application. 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 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.

5.2 Color Co-Occurrence Feature

. The color distribution of the pixels in an image contains huge amount of information about the image contents. The attribute of an image can be acquired from the image color distribution by means of color co-occurrence matrix. This matrix calculates the occurrence probability of a pixel along with its adjacent neighbors to construct the specific color information. This matrix also represents the spatial information of an image. In the proposed scheme, CCF is computed from the two ODBTC color quantizers.

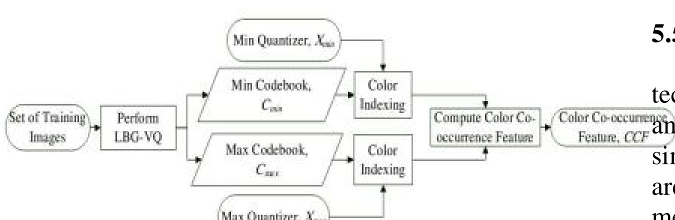

Figure5.2. Block diagram for color co-occurrence Features

The minimum and maximum color quantizes are firstly indexed using a specific color codebook. The color co-occurrence matrix is subsequently constructed from these indexed values. After performing the color indexing for minimum and maximum quantizes, the color co-occurrence matrix (i.e., Color Co-occurrence Features (CCF)) for a given image can be directly computed. The color co-occurrence matrix is a sparse matrix, in which the zeros dominate its entries. To further reduce the feature dimensionality of the CCF and to speed up the image retrieval process, the color co-occurrence matrix can be binned along its columns or rows to form a 1D image feature descriptor

5.3. Bit Pattern Feature

Another feature, namely Bit Pattern Feature (BPF), characterizes the edges, shape, and image contents. The binary vector quantization produces a representative bit pattern codebook from a set of training bitmap images obtained from the ODBTC encoding process. At the end of training stage, the hard thresholding performs the binarization of all code vectors to yield the final result.

5.4. Similarity Measure

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. 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. The lowest score indicates the most similar image to the query image. The target image #1 has the lowest similarity score, indicating it has the most similar appearance to the query image. In addition, the target image #1 is a scaled version of the query image.

5.5. Performance Analysis

We evaluate the performance of proposed techniques, is introduced to measure the effectiveness and also retrieve a set of similar images based on the similarity distance score. Four quantitative evaluations are used to examine the performance of proposed method, i.e., precision, recall, Average Retrieval Rate (ARR), and Average Normalized Modified Retrieval Rank (ANMRR).The feature descriptor is tested for CBIR system using Corel, Brodatz-1856, Vistex-640, ALOT, Holidays, UKBench, Corel-DB, and Vistex-

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DB image databases.The performance of CorelDB and Vistex DB are investigated in terms of ANMRR. The other image databases employs the classification accuracy to assess the classification performance of the proposed Feature Descriptor.

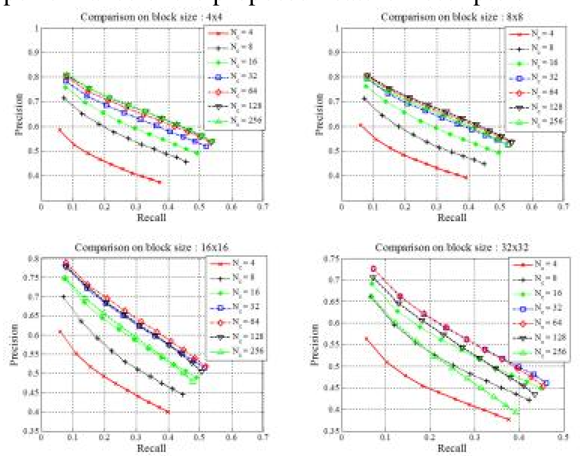

Figure 5.3 Comparison on features combination with various block sizes

For the Corel image database, five images are randomly selected from each class to form a training set for generating the color and bit pattern codebook. The color and bit pattern codebook are derived using the well-known LBG-VQ algorithm and the binary VQ with soft centroids, respectively and also the several code book size is separated into bit pattern code and training codebook size. We employ the same training procedure for the other colorimage databases.For VQ is employed the case of gray scale image database scalar to generate the color codebook and also effectiveness of feature descriptor in CBIR system.In this subsection, the effect of different codebook sizes on the image retrieval performance is investigated. The ODBTC encodes all images in database over various image block sizes, to obtain the image feature descriptor. Then, the color indexing is performed by incorporating the trained color codebook to produce the CCF. Meanwhile, the bit pattern indexing is also performed by means of the trained bit pattern codebook to obtain the BPF.

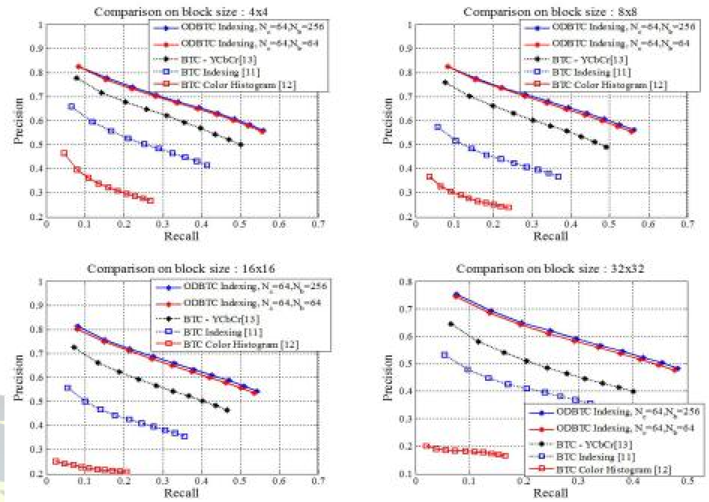

Figure 5.4 Comparison between the BTC-based and ODBTC-based image indexing

6.CONCLUSION

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. As documented in the experimental results, 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

Future Enhancement- An image retrieval scheme can be replaced to video retrieval. The video can be extracting the 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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