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A Review on User Oriented Image Retrieval System Using Halftoning BBTC.

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Abstract - *The Image Retrieval system is implementing previously on various parameters likewise an image retrieval system returns a set of images from a collection of images in the database to meet user's demand with image content similarity, edge pattern similarity, color similarity, etc. In the existing system various algorithm is use such as Image Compression Algorithm, Image Hiding Algorithm for Watermaking, Block Truncation Coding, Clifford algebra which is used to define color alteration , Block truncation Algorithm , Digital Image Processing , Block Optimization and Arithmetic coding based on Histogram , BTC with Assorted color space, Data-Driven parallel Implementation with BTC , VQ codeword search Technique. An image retrieval system offers an efficient way to access or retrieve a set of similar images by directly computing the image features from an image as reported by using different kinds of techniques as well as algorithms. In case of proposed system, image retrieval 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.*

Key Words: *Digital Halftoning, Image Compression Algorithm, EBTC, Adaptive Block truncation Algorithm, Image Hiding Algorithm for Watermaking.*

1. INTRODUCTION

An image revival system returns a set of images from a collection of images in the database to fulfil the user's requirements which evaluates the features such as image content, edge pattern correspondence, colour similarity, etc. An image retrieval system gives an efficient way to access, browse, and recovers 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 characteristics from an image as reported in database. In this survey, the proposed system is compared with previous existing system in which contains numerous existing techniques. In system titled as 'Color Image Clustering using Block Truncation Algorithm' [11], the strategy for earlier image retrieval system focused on "search-by-query" approach. The user provides an example image for the query, for which the database is searched exhaustively for images that are most similar. Clustering is a method of grouping data objects into different groups, such that similar data objects belong to the same group and dissimilar data objects to different clusters.

The next existing system is 'Enhancement of Colored Images in Digital Image Processing' [14] in which the generic raw data was pre-processed, normalized and then data points are clustered using Fuzzy C means technique.

Feature vectors for all the classes are generated by extracting the most relevant features from the corresponding clusters and used for further classification. An important observation was that the classification accuracy obtained using Fuzzy C-Means clustering for generic feature extraction was very close to the accuracy of classification obtained by using problem-specific feature extraction. The system titled as An 'Efficient Image Compression Algorithm Based on Histogram Based Block Optimization and Arithmetic Coding'[5] is proposed to provide an efficient algorithm for lossy image compression/decompression scheme using histogram based on block optimization and arithmetic coding.

In Content-Based Image Retrieval (CBIR), visual characteristics such as shape, color and texture are the descriptors to characterize images. During the retrieval, features and descriptors of the query were compared to those of the images in the database in order to rank each indexed image according to its distance to the query. The candidate's patterns were then retrieved from database by comparing the distance of their feature vectors.

Proposed novel approach for generalized image retrieval based on semantic concepts like color, texture and edge histogram descriptor and Block Truncation Coding (BTC) are used to extract features from image dataset.

2. LITERATURE SURVEY

2.1 Existing System

Dr.Sanjay Silakari, Dr.Mahesh Motwani, Proposed the System Color Image Clustering using Block Truncation Algorithm [11]

Method:

The image database containing raw image data cannot be directly used for retrieval. Raw image data need to be processed and descriptions based on the properties. The strategy for earlier image retrieval system focused on "search-by-query". The user provides an example image for the query, for which the database is searched exhaustively for images that are most similar. Clustering is a method of grouping data objects into different groups, such that similar data objects belong to the same group and dissimilar data objects to different clusters. Image clustering consists of two steps:

1. The former is feature extraction
2. Grouping.

For each image in a database, a feature vector capturing certain essential properties of the image is computed and stored in a feature base. Clustering algorithm is applied over this extracted feature to form the group. In this paper we use a data mining approach to cluster the images based on color feature. Concept of color moment is extended to obtain the features and k-means algorithm is applied to cluster the images.

Advantages:

Low-level features are extracted directly from digital representations of the image and do not necessarily match the human perception of visual semantics.

System 2:

Ramanpreet Kaur, Sukhpreet Kaur, proposed the system Enhancement of Colored Images in Digital Image Processing. [14]

Method:

Image mining is the process of searching and discovering the data from database. Enhancement of colored images is based on the visual content of the Image. Desirable features can be extracted based on the visual content of the Image. Color, texture, pattern, image topology, shape of objects and their layouts and locations within the image, etc are the basis of the Visual Content of the Image and they indexed.

Generic Feature Extraction for Classification Using Fuzzy C Means Clustering. The raw data was pre-processed, normalized and then data points are clustered using Fuzzy C means technique. Feature vectors for all the classes are generated by extracting the most relevant features from the corresponding clusters and used for further classification. An important observation was that the classification accuracy is obtained using Fuzzy C-Means clustering for generic feature extraction was very close to the accuracy of classification obtained by using problem-specific feature extraction

Proposed Image Feature Extraction Techniques, Each of the features was represented using one or more feature descriptors. During the retrieval of image the, features and descriptors of the query were compared to those of the images in the database in order to rank each indexed image according to its distance to the query.

The candidate's patterns were then retrieved from database by comparing the distance of their feature vectors. Content based image retrieval is a technology which helps to organize digital pictures archives by their visual content, by this definition anything ranging from image similarity function to a robust image annotation engine falls under the purview of Content based image retrieval.

System 3:

The Authors Subarna Dutta, Aditya Abhinav, Partha Dutta, Purushottam Kumar, Amiya Halder proposed the system An Efficient Image Compression Algorithm Based on Histogram Based Block Optimization and Arithmetic Coding. [5]

Method:

In this system, an efficient algorithm has been proposed for lossy image compression/decompression scheme using histogram based block optimization and arithmetic coding.

In an image there is usually a likelihood of high correlation between pixels. Such correlations between pixels or a block of pixels are exploited to achieve image compression. In this paper, M×N image is considered- that is, there are M number of rows each containing N pixel values. The basic approach in block optimization is for each block in the image one modified pixel value is generated and is stored in compressed file leading to compression. But the drawback of this method is some amount of data loss in the decompressed file.

The proposed algorithm mitigated this loss to some extent by taking histogram based block optimization. This methodology takes a block under consideration and draws a histogram of the block. Histogram gives the total no. of pixels assigned to each gray level. Then the peak of the histogram is found out. This peak represents the pixel value that is repeated maximum number of times in the block. This pixel value is then stored for the block in compressed file leading to compression as well as reduced loss while decompression as compared to averaging based block optimization.

Advantage:

The main advantage of histogram based block optimization is that it leads to less data loss while decompression is achieved.

System 4:

Author H .B Kekre Implements the system as Image Classification using Block Truncation Coding with Assorted Color Spaces. [9]

Method:

The paper portrays comprehensive performance comparison of image classification techniques using block truncation coding (BTC) with assorted color spaces. Overall six color spaces have been explored which includes RGB color space for applying BTC to figure out the feature vector in Content Based Image Classification (CBIC) techniques

The results explicitly reveal performance improvement (higher average success rate values) with proposed color-BTC methods with luminance chromaticity

color spaces compared to RGB color space. Best result is shown by YUV color space based BTC in content based image classification.

Image classification techniques can be used to classify the total number of image content in a database into limited number of major classes. Image classification and categorization is essential to speed up the image retrieval process.

Advantages:

1. Image classification demands increasing importance in fields like pattern recognition, content based image retrieval, security, media and journalism.

2. It has been conferred from the results that the luminance chromaticity color spaces perform better in terms of classification.

3. The YUV color space gives the best performance followed by YCbCr color space among all the other color spaces used in the approach.

Disadvantages:

Excessive amount of irrelevant record in a database leads to complicated and time consuming search of image data in it.

System 5:

An Adaptive Block Truncation Coding Scheme and Its Data-Driven Parallel Implementation. [12]

Method:

The proposed coding algorithm is based upon the absolute moment block truncation coding (AMBTC). AMBTC calculates the mean of each block and then performs a Two level quantization .In order to improve the image quality, a AMBTC-based coding scheme has been described . First of all, in order to derive a better trade off between reconstructed quality and computational complexity, the proposed scheme introduces a three level classification technique. Compared to the previous two-level classification technique the proposed three level classification technique enables more adaptability in encoding/decoding an image. Moreover, to further improve the compression efficiency, differential pulse coding modulation (DPCM) is employed in the current scheme.

In this system, the image quality is evaluated in terms of the mean squared error (MSE) between the reconstructed luminance values and its original ones by virtue of the existing peak-signal-to-noise (PSNR) metric. Good reconstructed images typically have PSNR values of more than 30 dB.

DPCM is utilized to remove the redundant information existing in neighboring block images within an identical image.

System 6:

The Authors Riyaz Ahmad Dar, M. Mese Proposed the system as A Review of Block Truncation Coding Using Digital Halftoning [7]

Method:

In this method we are use halftoning algorithm to improve the computational complexity, compression ratio and image quality of BTC. It use the error deffusion technique. It can diffuse the error between near pixel. Error deffusion used to convert a multi level image into binary image. In this method we used void and cluster dithering approch using this image quality is improved. Dot deffusion algorithm is similar to tradition BTC algorithm. It has two differences:

1) High mean and low mean are replaced by X_{max} and X_{min} in a block.

2) The bitmap generation is done using dot deffusion halftoning

Block Truncation Coding (BTC) is a lossy image compression technique which uses moment preserving quantization method for compressing digital gray scale images. Block truncation coding is a lossy type of image compression. In block truncation coding (BTC), the original image is divided into fixed-size non overlapping blocks of size M×N. The block size chosen is usually small to avoid the edge blurring and blocking effect. Each block is independently coded using a two level (1-bit) quantizer. The two values preserve the first and the second moment characteristic of the original block. BTC does not provide a higher gain than any of the modern image compressing

algorithms like JPEG or JPEG-2000, but it is much lesser complex.

Block Truncation Coding Using Halftoning :

This system used the error diffusion techniques. Error diffusion enjoys the benefit of diffusing the quantised error into the neighbouring pixels. The error diffusion can effectively diffuse the error between the neighboring pixels and then maintains the average grayscale in a local region. This system used the void and cluster dithering approach. Using the void-and-cluster halftoning, the image quality is improved when operated in high coding gain applications. The dither array in order dithering is employed to substitute the fixed average threshold in BTC, and the extreme pixel values in a block are adopted to substitute the high mean and low mean.

System 7:

Kartik Sau, Ratan Kumar Basak Presents the Image Compression based on Block Truncation Coding using Clifford Algebra. [4]

Method:

The present work investigates image compression based on Absolute Moment Block Truncation Coding (AMBTC) and Clifford Algebra here. In this method we give a positive integer values as the sum of large perfect square of positive integer.

The largest square is computed from the given integer, and then the same process is repeated from the residual part of the integer successively. The proposed method gives very good performance in terms of PSNR values when compared to the conventional BTC and AMBTC. To assess image quality some parametric measures bring into service such as: Peak Signal to Noise Ratio (PSNR), Weighted Peak Signal to Noise Ratio (WPSNR), Bit Rate (BR) etc Clifford algebra contains some steps as follows:

Step 1) Size of image in pixels is divided into sub images.

Step 2) Calculate average gray level. It having real numbers, complex numbers, quaternion number & other.

Step 3) Then it classified into two ranges of values.

Step 4) Pixel values are quantized to 0 otherwise 1.

Step 5) blocks matrix (B) send to each block.

Step 6) each image block is deduced by coping 1.

Advantages:

- Advantages of this method are algebraically separating colors which are handled from geometric operation done to them.
- It used to define color alteration with algebric opration.
- Its advantages are simplicity, Fault tolerance, High compression efficiency and good image quality of decoded image.

Disadvantages:

- Clifford algebra achieves its simple structure by presenting subspaces.
- It gets simple operation but more involved object.
- Clifford algebra needs 2^n number to be specified.

System 8:

The Auther D.Harihara Santosh Proposed Absolute Moment Block Truncation Coding For Color Image Compression.[6]

Method:

In this paper color image data compression using AMBTC is developed. This technique decreases the computational complexity and achieves the minimum mean square error and PSNR. Image data compression is the minimization of the number of information carrying units used to represent an image. It is classifying into two types that is:

1) Lossy compression technique

2) Lossless compression technique

In lossy compression technique message can never be recoverd. In lossless compression technique original message can be exactly decoded.

Block Truncation Coding :

It Achieves constant bit rate of 2.0 bits per pixel.It divides the original images into small sub-images and then using a quantizer, which adapts itself according to the image statistics, to reduce the number of gray. In block

truncation coding an image is firstly segmented into n x n blocks of pixels.

Quad Free Segmentation:

The quad tree segmentation technique divides the given image in to set of variable sized blocks using a threshold value.

Advantages:

It has the advantages of preserving single pixel and edges having low computational complexity.

Disadvantages:

The need for an efficient technique for compression of images ever increasing because the raw images need large amount of disk space seems to be a big disadvantage during transmission and storage.

System 9:

Zhi-Wei Zhang, Ming-Hui Wang Proposed Color image retrieval using extended fast VQ codeword search technique and vector composition based feedback .[3]

Method:

The paper present a novel fast image retrieval algorithm based on extended fast VQ codeword search technique to improve the efficiency of the content based image retrieval system. It reduces the retrieval time without decreasing accuracy of retrieving the first K most similar images. In this method Gaussian normalization technique is used.

The main idea of VQ is to divide an image into blocks and then encode those vector by vector using indices of their nearest codewords in predesigned codebooks; vector quantization is the origin of fast codeword search algorithm.

Vector Quantization:

It is block based image encoding technique.VQ generate a representative codebook from a training set consisting a number of training vectors.The encoded image first divided into non-overlapping n-dimentional vector.

Guassian sNormalization:

This is used to normalize each component into same range (-1, 1).

Advantages:

This scheme can be directly used to many websites for image search to speedup the search speed.

Disadvantages:

It needs color conversion matrix.

System 10

The Author K.Y. Min, J.W. Chong Proposed the system Cost effective block truncation coding for color image compression .[15]

Method:

To reduce the bit rate of the basic BTC, selected single bit-map is employed to represent the edge information of the coding block in the proposed CE-BTC. The AQC algorithm divides the input image into non-overlapping blocks of size $m \times n$ pixels. The quantization steps to the difference of the block, and quantizes these data, which have been subtracted by the minimum of the block, with three-bit-codes.

A cost effective BTC (CE-BTC), which can improve not only bit rate but also the performance of BTC while maintains a low hardware implementation.

Advantages:

- Usage of line buffer memory in low cost approach CE-BTC is only a half of that in the optimal approach in CE-BTC.
- Quantizer adapts local properties of image.
- This quantizer produces good quality images that appear to be enhanced at data rate 1.5 bits/picture element.

Table -1: Existing Techniques and using Techniques

Systems	Technique/Algorithm
Color Image Clustering using Block Truncation Algorithm	BTC Algorithm
Enhancement of Colored Images in Digital Image Processing	Fuzzy C Means Clustering
An Efficient Image Compression Algorithm Based on Histogram Based Block Optimization and Arithmetic Coding.	Block Optimization and Arithmetic Coding Histogram
Image Classification using BTC with Assorted color images	Content Based Image Classification (CBIC) technique
An Adaptive Block Truncation Coding Scheme and Its Data-Driven Parallel Implementation	Absolute moment block truncation coding (AMBTC)
the Image Compression based on Block Truncation Coding using Clifford Algebra	BTC using Clifford Algebra
A review of block truncation coding using digital halftoning	Halftoning algorithm

2.2 Proposed System

Block truncation coding is a lossy type of image compression. In block truncation coding (BTC), the original image is divided into fixed-size non overlapping blocks of size M×N. The block size chosen is usually small to avoid the edge blurring and blocking effect. Each block is independently coded using a two level (1-bit) quantizer. The two values preserve the first and the second moment characteristic of the original block. BTC does not provide a higher gain than any of the modern image compressing algorithms like JPEG or JPEG-2000, but it is much lesser complex. Digital Halftoning is a technology of converting a continuous tone image to a two tone image.

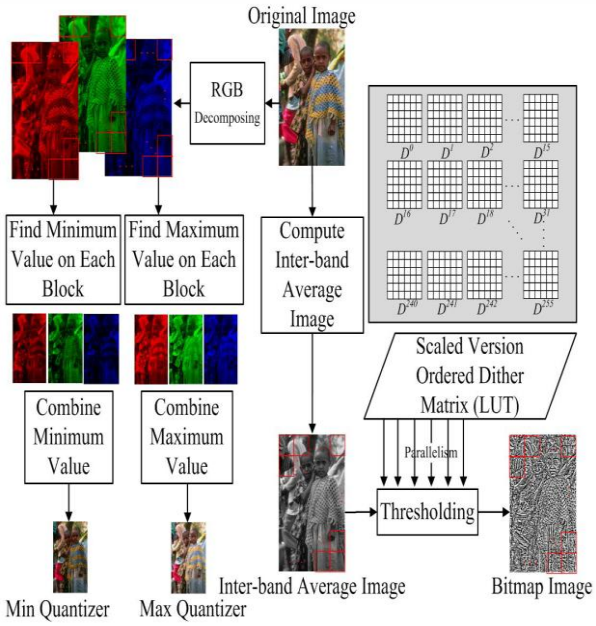

Fig.1 Block diagram of the proposed ODBTC encoding for a color image. [1]

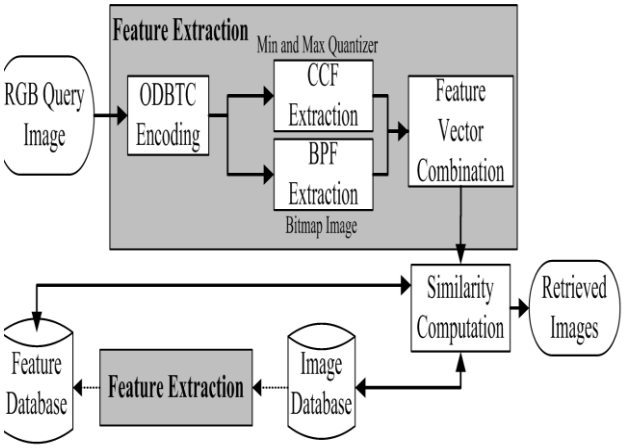

Fig2: Block diagram of the proposed image retrieval method.[1]

Block Truncation Coding Using Digital Halftoning:

This system used the error diffusion technique. Error diffusion enjoys the benefit of diffusing the quantised error into the neighbouring pixels. The error diffusion can effectively diffuse the error between the neighboring pixels and then maintains the average grayscale in a local region.

This system used the void and cluster dithering approach. Using the void-and-cluster halftoning, the image quality is improved when operated in high coding gain applications. The dither array in order dithering is employed to substitute the fixed average threshold in BTC, and the extreme pixel values in a block are adopted to substitute the high mean and low mean.

Proposed Image Feature Extraction Techniques and Their Applications for CBIR and Biometrics Systems. In Content-Based Image Retrieval (CBIR), visual features such as shape, color and texture are extracted to characterize images. Each of the features was represented using one or more feature descriptors. During the retrieval, features and descriptors of the query were compared to those of the images in the database in order to rank each indexed image according to its distance to the query. The candidate's patterns were then retrieved from database by comparing the distance of their feature vectors.

Proposed a novel approach for generalized image retrieval based on semantic concepts like color, texture and edge histogram descriptor and Block Truncation Coding (BTC) are used to extract features for image dataset.

Advantages:

- Digital halftoning based BTC image compression technique provide an excellent image quality and artifact free result.
- The method is extremely fast and the image quality achieved is comperable to the best method.
- It has the advantages of preserving single pixel and edges having low computational complexity.
- In general, BTC has the advantage of achieving high image quality while consuming little computational time. In addition, it can be applied to color imagery, moving imagery, and graphics.
- One advantage is that the quantizer is used to transmit an image from transmitter to a receiver.

3. CONCLUSIONS

In the existing system different algorithm is used such as Image Compression Algorithm, Image Hiding Algorithm for Watermaking, Block Truncation Coding, Clifford algebra which is used to define color alteration , Block truncation Algorithm , Digital Image Processing , Block Optimization and Arithmetic coding based on Histogram , BTC with Assorted color space, Data-Driven parallel Implementation with BTC, VQ codeword search Technique.

In proposed system, 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. Halftoning algorithm is easy and improves the performance of images as compared to other algorithms.

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