

A Review on Improved Ordered Dither Block Truncation Coding Technique by using K-Nearest Neighbor (Knn) and Neural Networks for Content-Based Image Retrieval

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ABSTRACT

This paper represents a technique used Content-Based Image Retrieval by exploiting the advantage of low complexity Ordered-Dither Block Truncation Coding for the generation of image content descriptor. Advantage : 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. It will reduce computation time and yield better image quality. 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. ODBTC Encoding Steps: ODBTC encoding is divided into two parts one is a generation of the bitmap image and second is a calculation of minimum quantizer and maximum quantizer. Neural networks can be very useful for image processing applications. In Neural networks re-emerged only after some important theoretical results were attained in the early eighties most notably the discovery of error backpropagation and new hardware developments increased the processing capacities.

Keywords : Content-Based Image Retrieval, Ordered Dither Block Truncation Coding, Knn, Neural Networks.

I. INTRODUCTION

1.1 Image processing

Image processing is a method to transfer an image into digital form. There are various operations can be applied on picture to get an improved image or to take out some important information from it. A method has been developed to extracts and recognizes those texts accurately in real time, therefore it can be practical to many important applications like document analysis, text based image indexing and vehicle license plate extraction etc and many applications have become realities in recent years [1]. Image processing technique provides better results than the original image. An image may be consist of sub-images sometimes referred to as

regions-of-interest, ROIs, or simply regions. The accuracy of the entire recognition algorithm highly depends on the accuracy of the segmentation algorithm to break the image to text into individual characters [2]. Image processing basically includes the following three steps.

1. Importing the image with the optical scanner or by digital photography.
2. An Output is the last stage in which result can be altered image or report that is based on image analysis.

Organization purpose: Firstly, it begins about the concepts of image retrieval. Secondly about the related work.

1.2 Image Retrieval

Image retrieval tasks many thousands, or millions of images from the database are searched by the user. The main objective of the user is to find out a particular image but in some other cases any image from a class can be find out. A very flexible query mechanism is provided by the optimal interface that is possible through a natural language interface [3]. There is difference between the common task of classification and Image retrieval as in case of common classification it includes face detection and character recognition. The potential of number of images in retrieval is very large and example images number is very small. [4].

1.3 Text Based Image Retrieval

Text based image retrieval system is also known as the concept based image retrieval is the most commonly retrieval system. It is the method in which search is based on annotation of images. All the data is selected from the databases which has the similar text, keywords, tags, labels surrounding the image as it is provided in the query string after which similar images are return by the system. Google Images are the commonly used TBIR system. The whole visual content of images is difficult to express in words and irrelevant results are produced by the TBIR system.

1.4 Content Based Image Retrieval

CBIR is the application of computer vision to retrieve images. CBIR aims at avoiding the textual descriptions but it also retrieve images on the basis of their similar properties. The creations of CBIR involve research of databases and image processing and handling problems related to storage issues with friendly interface. Images are particularly complex to manage volume of image they occupied, retrieve in application and context dependent task. It requires transferring of high level user perception to low level image features. The content used term define the set of features such as colors, shapes, textures, or any

other information that can be extracted from an image. When this technique was not available to examine the content of image, searchers was dependent on metadata such as captions or keywords [5].

1.5 Feature extraction algorithms:

- **Color Feature:**

The color feature of an image plays a significant role in the human visual perception mechanism. CBIR can be partticiply in many ways like Histogram, Color moments, Color etc[6,7].The color histograms and the statistical methods of color representation have been utilized in order to represent the color of an image. The color histogram of the query image and all database of image are provided by these methods. On the basis of user, the proportion of color can be specified such as its type what kind of result is required. In the process those images will be retrieved whose histogram matches with that of the query image [8].

- **Texture Feature:**

Texture is another property of image which is used in pattern recognition and computer vision.Texture [9] is defined as structure of surfaces formed by repeating a particular element or several elements in different relative spatial positions .Another essential property of images is texture. In the pattern recognition and computer vision various texture are represented and investigated. This Texture representation method is divided into three parts such as structural and statistical.

- **Shape-based retrieval:**

For the query image and all database images various number of characteristic features of object's shape are calculated. After obtaining all shape features, they are matched with databases for the retrieval. The commonly used method for the extraction of shape feature use the global features like aspect ratio, circularly and moment invariants.

1.6 Content Based Image Retrieval: Image retrieval is a computer system for searching, browsing and retrieving utilize some methods of adding metadata like captioning, keywords and descriptions to retrieve the image and can be performed over words. Manual image annotation is time consuming and expensive [10]. Image search is a specialized data search to find images. To search an image user can provide query terms such as image link, keywords and click some images. As a result it will return similar query result.

1.7 Ordered Dither Block Truncation coding in CBIR

ODBTC compresses an image block into corresponding quantizers and bitmap image. Advantage: 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. It will reduce computation time and yield better image quality. 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 [11]. In addition, the ODBTC yields better reconstructed image quality by enjoying the extreme-value dithering effect. ODBTC Encoding Steps: ODBTC encoding is divided into two parts one is generation of bitmap image and second is calculation of minimum quantizer and maximum quantizer.

1.8 Neural Networks The nearest images obtained using feature extraction techniques are routed to Neural Network classification [12]. Neural Networks are very effective in case of classification problems where detection and recognition of target is required. It is preferred over other techniques due to its dynamic nature of adjusting the weights according to final output and applied input data. This adjustment of weights takes place iteratively until desired output is obtained. And this weight adjustment of network is

known as learning of neural network.[13] The architecture of neural network consists of a large number of nodes and interconnection of nodes.

1.9 k-nearest neighbors

In pattern recognition the **k-nearest neighbors algorithm (k-NN)** is a non-parametric method used for classification and regression. KNearest Neighbors is one of the most basic yet essential classification algorithms in Machine Learning and content-based image retrieval. It belongs to the supervised learning domain and finds intense application in pattern recognition, and intrusion detection.

- Knn-number of neighbor:
- If $K=1$, choose the nearest neighbor
 - If $K>1$, – For classification choose the most frequent neighbor. – For regression calculate the average of K neighbors.

II. RELATED WORK

Muhammad Fachrurrozi, Saparudin, Erwin, Clara Fin Badillah, Junia Erlina, Mardiana, Auzan Lazuardi, 2017. Presented the use of Agglomerative Hierarchical Clustering (AHC) algorithm by which automatically the grouping of face images can be possible. In order to obtain the vector feature from the face image, the pre-processing is utilized for feature extraction [16]. Chaitanya Vijaykumar Mahamuni, Jan. 05 – 07, 2017 Neha Balasaheb Wagh, “Study of CBIR Methods for Retrieval of Digital Images based on Colour and Texture Extraction”, 2017 International Conference on Computer Communication and Informatics. To find the digital images this is a specialized search. The images are extracted out by using text, keywords and other features in most applications of image processing. In the traditional methods of image retrieval, metadata was included such as captions, important keywords that describe the features of image [17]. Jing-Ming Guo and Heri Prasetyo, “Content-Based Image Retrieval Using Features Extracted From Halftoning-

Based Block Truncation Coding”, IEEE Proposed a CBIR technique by exploring the pros and cons of ODBTC for the generation of image descriptor. In encoding, ODBTC compress an image into corresponding image and bitmap image [21]. Heri Prasetyo, Dwi Riyono, “Fast Vector Quantization for ODBTC Image Reconstruction”, 2017 International Conference on Computer, Control, Informatics and its Applications. A simple approach on improving the quality of Ordered Dither Block Truncation Coding (ODBTC) decoded image is proposed in this paper. In this approach, the ODBTC decoded image is regarded as noisy-image in which the occurrence of impulsive noise needs to be suppressed. For the impulsive noise reduction, the proposed method exploits the Vector Quantization (VQ) for substituting the ODBTC decoded image with the image patch of clean image codebooks. Herein, the fast VQ is employed to further reduce the computational time compared to that of the classical VQ approach. The experimental results exhibit the image quality improvement of the ODBTC decoded image with the proposed post processing image reconstruction.

III. PROBLEM FORMULATION

The content based image retrieval is technique which can extract the useful information from the large amount of data. The Data which is extracted from the large amount of data is the image data which is similar to query data. The ODBTC is the technique which can extract the color features of the input image. The images which are in the dataset have also the color features from which training dataset is created. The technique of classification is applied which can classify the most relevant images which have the similar type of features. To improve the accuracy of classification the more number of features need to extract for the classification.

IV. RESEARCH GAP

Following are the various research gaps of this work:-

1. The technique of ODBTC for the content based image retrieval do not extract the content effectively which reduce its accuracy
2. In the ODBTC technique, the SVM classifier is used to classify data which has very high execution time.

V. PROPOSED WORK

1. To study and analyze various content-based image retrieval methods (like block truncation coding, Ordered Dither Block Truncation coding with Knn) for image processing.
2. To design and implement proposed technique for improve ODBTC for content-based image retrieval by using KNN and Neural Network.
3. To compare the Improved ODBTC technique with existing ODBTC techniques in terms of accuracy, error rate and response time .

VI. CONCLUSION

The content based image retrieval is the technique which is applied to extract relevant information from the rough data. To extract relevant information the features are analyzed and technique of classifications is applied for the content based image retrieval. In this work, it is concluded that various techniques of classifications are applied for the information retrieval, In future techniques of ODBTC will be improved for the information retrieval.

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