International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 03 Issue: 01 | Jan-2016 www.irjet.net p-ISSN: 2395-0072

Image Retrieval Based on its Contents Using Features Extraction

Priyanka Shinde [1], Anushka Sinkar [2], Mugdha Toro [3], Prof.Shrinivas Halhalli [4]

[123]*Student, Computer Science, GSMCOE,Maharashtra, Pune, India*

[4]*Professor, Computer Science, GSMCOE, Maharashtra, Pune, India*

Abstract - With the increase in popularity of the network and development of multimedia technologies, users are not satisfied with the traditional information retrieval techniques so there should be an appropriate system to efficiently manage these collections**.** Due to the enormous increase in image database sizes, as well as its vast deployment in various applications, the need for Content-Based Image Retrieval(*CBIR)* development arose. Goal of CBIR system is to support image retrieval based on visual content of image**.** Searching of relevant images from a large database has been a serious problem in the field of data management. CBIR involves searching of relevant images based on the features extracted from a query image. The process involves extraction of image features such as color, texture, shape. Therefore, images are represented as a vector of extracted visual features instead of just pure textual annotations. This paper presents a technique for CBIR by exploiting the advantage of low complexity ordered-dither block truncation coding (ODBTC) for the generation of image content descriptor. 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 the ODBTC encoded data streams. The ODBTC scheme is not only suited for image compression, because of its simplicity, but also offers a simple and effective descriptor to index images in CBIR system. In this survey paper the techniques used for content based image retrieval are discussed. It also introduced the combination of features like color, texture for accurate and effective CBIR.

Key Words: *CBIR, ODBTC, CCF, BPF, Color, Texture.*

1. Introduction

A significant amount of research efforts have been devoted in addressing the Content Based Image Retrieval (CBIR) problem. 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. Some attempts have been addressed to describe the visual image content, several approaches have been developed to capture the information of image contents by directly computing the image features earlier. In [1], the image feature is simply constructed in DCT domain. An improvement of image retrieval in DCT domain is presented in, in which the JPEG standard compression is involved to generate the image feature. Some attempts have been addressed to describe the visual image content [3], [5]–[6]. Most of them are dealing with the MPEG-7 Visual Content Descriptor, including the color Descriptors (CD), Texture Descriptor (TD), and Shape Descriptor (SD) to establish the international standard for the CBIR task. This standard provides a great advantage in the CBIR research field, in which some important aspects such as sharing the image feature for benchmark database,

comparative study between several CBIR tasks, etc., become relatively easy to be conducted using these standard features. The standard also offers a great benefit in the distributed system, in which the image content descriptor can be remotely modified by the user. In this scenario, the original image is not necessary transferred over different locations, but only the image descriptor is required for modification and recalculation. A new type of CBIR approach is presented in [7], in which the spatial pyramid and order-less bag-offeatures image representation were employed for recognizing the scene categories of images from a huge database. The method in [8] presented the holistic representation of spatial envelop with a very low dimensionality for representing the scene image. As reported in [1], this method achieved the best classification performance with much lower feature dimensionality compared to that of the former schemes in image classification task. The CBIR system which extracts an image feature descriptor from the compressed data stream has become an important issue. Since most of the images are recorded in the storage device in compressed format for reducing the storage space requirement. The Block Truncation Coding (BTC) is an image compression method which requires simple process on both encoding and decoding stages. The BTC produces high and low quantizers, and a bitmap image at the end of the decoding process. The first CBIR system developed using the BTC can be found in [11]. The method exploits the nature of BTC to generate the image feature in which an image block is merely represented using two quantized values and the corresponding bitmap image. The dithering-based BTC, namely Ordered Dither Block Truncation Coding (ODBTC) [7], [8], involves the low-pass nature of the Human Visual System (HVS) for achieving an acceptable perceptual image quality. ODBTC are simply obtained from the minimum and maximum value found in the image blocks. This indexing technique can be extended for CBIR. ODBTC compresses an image into a set of color quantizers and a bitmap image. As documented in the experimental results, the proposed CBIR can provide promising results in terms of the retrieval accuracy compared to the state-of-the-arts.

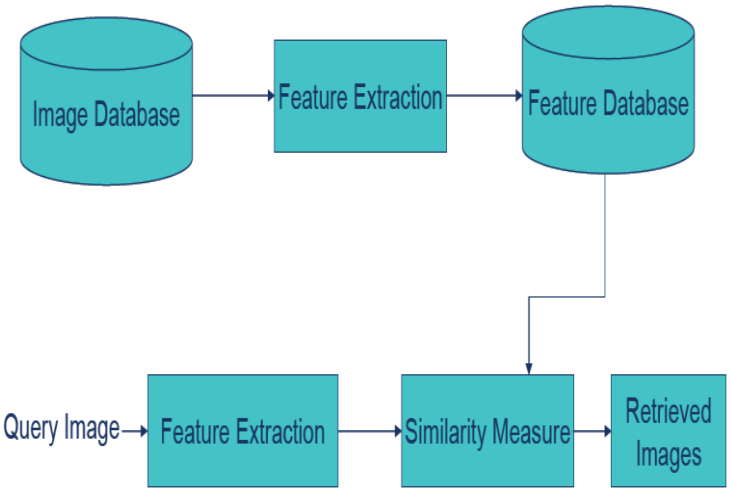

Fig -1: CBIR SYSTEM ARCHITECTURE

2. Materials and Methods

The CBIR divided into following modules for design and development.

Module 1: Add new module

Module 2: Color Histogram module

2.1 Add New Module

In this module Administrator add the images to the database. The images to database are added individually or the folder of images can be added simultaneously. The dialog box of image insertion successful will be displayed. Later the user can select the query image from any of the folder which is a real world entity. If administrator go ahead with future process before adding the query image a dialog box indicating that query image is to be inserted.

2.2. Color Histogram Module

Here in this module features are extracted based on

- Average RGB

- Local Color Histogram
- Global Color Histogram

2.2.1 Average RGB

The red, green and blue color intensity of query image is calculated and compared with the RGB values of database images and related images are displayed as output.

2.2.2 Local Color Histogram

The image will segmented into and color histogram of each blockwill be obtained. We calculate the distance, using their histograms, between a region in one image and a region at same location in the other image in database.

2.2.3 Global Color Histogram

Global color histogram of each block will be obtained. We calculate the distance, using their histograms, between a region in one image and a region at same location in the other image in database. Same as the local color histogram but considers all the regions of the image.

3. Results

Extensive experiments were conducted to examine the performance of the proposed method. The image descriptors are obtained from the ODBTC encoded data stream which is already stored in the database. First, CCF and BPF are computed over all images in the database. Subsequently, thesystem returns a set of similar images from the databasebased on their similarity distance. Finally, the image retrieval performance is tested when several images are turned asqueries. Many databases are involved in the experiments.Four quantitative evaluations are used to examine the performance of proposedmethod, i.e., precision, recall, Average Retrieval Rate (ARR),and Average Normalized Modified Retrieval Rank (ANMRR).In the image classification task, the proposed method performanceis measured with the proportion correct classification(accuracy) from the nearest neighbor classifier. The classifierassigns a class label of testing set using the similarity distancecomputation as used in the image retrieval task. Formally, the average precision *P(q)* and average recall *R(q)* measurements for describing the image retrieval performanceare defined.

4. Discussion

4.1 Ordered-Dither Block Truncation Coding

The motivation of adopting the Ordered Dithered Block Truncation Coding (ODBTC) and its effectiveness in generating representative image features.In this paper, the 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.The traditional BTC derives the low andhigh 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.

4.2 ODBTC Indexing

In this section, the proposed method is elaborated by introducing how to derive an image feature descriptor from the ODBTC data stream. Figure no. 1 illustrates the schematic diagram of the proposed CBIR method. The ODBTC employed in the proposed method decomposes an image into a bitmap image and two color quantizers which are subsequently exploited for deriving the image feature descriptor. Two image features are introduced in the proposed method to characterize the image contents, i.e.,

Color Co-occurrence Feature (CCF) and Bit Pattern Feature (BPF). The CCF is derived from the two color quantizers, and the BPF is from the bitmap image.

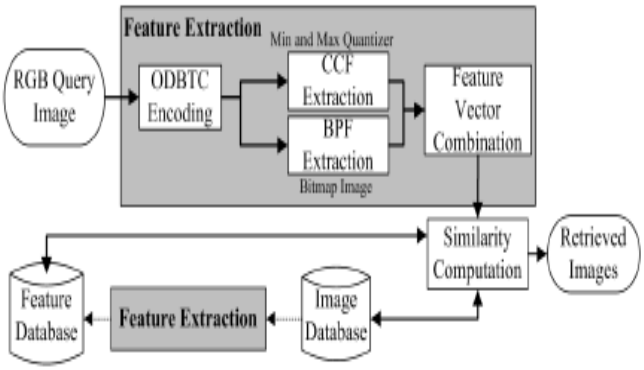

Fig.-2: BLOCK DIAGRAMOF IMAGE RETRIEVAL METHOD

5. CONCLUSIONS

The need for Content- Based image retrieval is to retrieve images that are more appropriate, along with multiple features for better retrieval accuracy.“Content-based” means that the search makes use of the contents of image themselves, rather than relying on human-inputted metadata such as captions or keywords. The similarity measurements and the representation of the visual features are two important tasks in CBIR.Given a query image, with single object present in it; mission of this work is to retrieve similar kind of images from the database based on the features extracted from the query image. We use content- based search, for high accuracy multiple features like color, texture and shape is incorporated. In this project, we implemented a CBIR system based on multiple features representations. For the further studies, 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.

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BIOGRAPHIES

	Prof. Shrinivas Halhalli working as Assistant professor in Dept. of Computer Engineer , GSMCOE , Balewadi , Pune , India
	**Priyanka Sunil Shinde** studying B.E. Computer from GSMCOE , Balewadi in Pune University , Pune , India
	**Anushka Vijay Sinkar** studying B.E. Computer from GSMCOE Balewadi in Pune University. Pune , India
	**Mugdha Vinayak Toro** studying B.E. Computer from GSMCOE , Balewadi in Pune University , Pune , India