

A study and survey on content-based image retrieval using low level features for mobile devices

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Journal Samvakti Journal of Research in Information Technology
<https://www.sjrit.samvaktijournals.com/>
Volume 1 Issue 1 (2020); Page No : 41 - 49

Discipline Information Technology

Date Received : July 1, 2020

Publication Date : October 28, 2020

Paper Type : Article

Journal ID : 202007.343.48.255

doi : 10.46402/202007.343.48.255

doi URL : <https://dx.doi.org/10.46402/202007.343.48.255>

Access Type : Open Access ([Attribution-NonCommercial-NoDerivatives 4.0 International](#))

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ABSTRACT

In the arena of Image Processing, Image Retrieval has developed one of the greatest dynamic research parts in the previous few years. The image retrieval is interesting and fastest developing methodology in all the fields. It is effective and well-organized approach for retrieving the image from large image scale database. Content based Image retrieval (CBIR) means search the contents of the image rather than the information and capture images from database as per the user's requirement. In Content based Image Retrieval (CBIR), images are retrieved by their visual content such as color, texture and shapes. It is a technique to take input as query object and gives output from an image database. Mobile image retrieval is one of the most exciting and fastest growing research fields in the area of multimedia technology. Modern multimedia mobile devices are prepared with camera and higher storage abilities; this desires the need of effective multimedia content management concluded in several networks. In this paper surveys have been conducted on some CBIR features such as color, texture and shape retrieval of images from the large-scale image database and also study to compare content-based image retrieval features like color, texture and shape for efficient and accurate image retrieval on mobile devices. After going through comprehensive analysis of CBIR techniques so this paper gives summarization of the different features like color, texture and shape of images with their functionality for content-based image retrieval systems (CBIR).

Keywords : Content Based Image Retrieval (CBIR), Color, Image Processing, Image Retrieval, Mobile, Mobile Image Retrieval, Shape, Texture

INTRODUCTION

Content Based Image Retrieval (CBIR) is invented in 1992 used by T. Kato based on color and shapes^[2]. The approach of content-based image retrieval (CBIR) system is to search image and retrieve relevant images from image database using visual content of an image. CBIR is a technique which uses visual contents called as features. To search images from large scale image database according to user's request in the form of a query image. In today's era, CBIR receives input as a query object and as an output it receives similar objects from an image database^[2]. Generally, for image retrieval CBIR used as visual features like color, texture, shapes or any combination of them. Image can be analysed and retrieval automatically by automatic description which depends on their objective features. In large databases content-based image retrieval (CBIR) is searching the problem of digital images. Early 1990 CBIR was become a very active research area. Most image retrieval system have been used like Random browsing, Search by example, search by sketch, search by text and navigation with customized image categories^[2]. Today, CBIR features such as Color, Shape and textures using these fillings we retrieve images from large image scale database. Content-based image retrieval area possesses an incredible potential for exploration and utilization correspondingly for researchers and people in industry due to its promising results. The main area of CBIR system is to improve the efficiency through image indexing and retrieval, so reducing the necessity for human interference in the indexing process^[1]. Figure 1^[24] shows CBIR program on mobile devices.

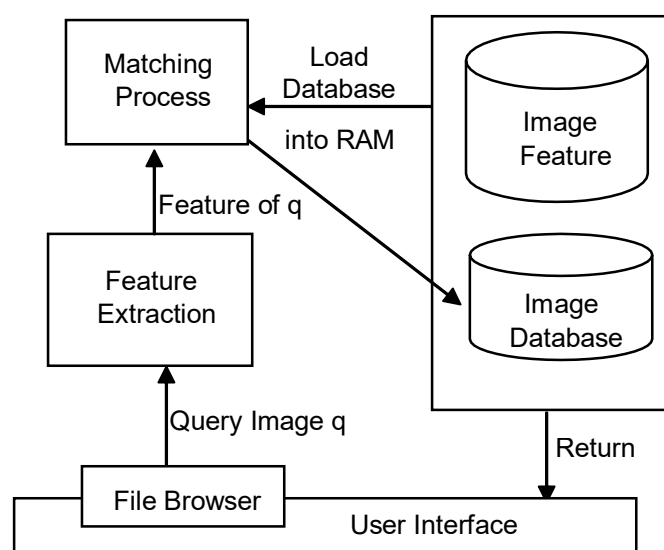


Figure 1 : CBIR program on mobile devices^[24]

Now-a-days progressively more users use mobile devices as their personal gadget for surfing on the Internet. With this tendency searching is becoming more universal and

one of the most popular application on mobile devices. It is finding that search interest on mobile devices is more than that on desktop. Search started by mobile devices is always have strong purpose, which are mostly related to local information such as local spots and local business-like cinemas, restaurants, hospitals etc. Existing search technique is based on text-based search and local map search. The user can type object name or search on online local map to find the target. Though, Image search is becoming universal as the development of content based and image retrieval. This allows user to capture photo using integral camera and then started search queries about objects to the user. The content-based image search, famous products, including Google Image^[25], TinEye^[26] on PC and Google Goggles^[27] on mobile phone can take single images as search queries and return to the user similar images or even with information extracted from their databases.

Feature Extraction Techniques

Content Based Image Retrieval (CBIR) uses Feature Extraction is a technique to extracts image from large scale image database including optical features can be classified as low-level features. Multiple methods have been introduced for each of these optical features and each of them characterizes the feature from a different perception^[4]. Main three low level features are the Color, Texture and Shape.

A. Color Feature

The color feature is one of the most widely used visual features in image retrieval. It is basic features for the content of images. With the color feature human can categorizes and distinguish amongst object and images. Colors are used in image retrieval because they are providing powerful information about images. The color feature is one of the most widely used visual features in image retrieval. Images characterized by color features have many advantages like robustness, efficiency, execution easiness, computational easiness, low storing necessity^[5]. To extract the color features from the content of an image, we need to select a color space and use its properties in the extraction. In common, colors are defined in three dimensional color spaces. In digital image purposes, RGB color space is the most prevalent choice^[3]. The main drawback of the RGB color space is that it is device dependent system^[3]. For the description of color feature many methods can be used like Color Histogram, Conventional Color Histogram, Invariant Color Histogram, Fuzzy Color Histogram, Geometric Moment, Average RGB, Color Moment, Color Correlogram, and Color Coherence Vector. Color moments have been successfully used in content-based image retrieval systems. It has been shown^[2] that characterizing one dimensional color distributions with the first three moments is more robust and runs faster than the histogram-based methods.

B. Texture Feature

Texture is one of the most significant features of normal images. There is no recognised definition for texture, but it can say that it provides the measure of properties. Texture can be represented by Grey Level Co-occurrence^[7]. To get texture information of image steering features were dragged out. The six image texture properties were coarseness, regularity, directionality, contrast, line likeness and roughness. Texture can be used two major methods Structural and statistical methods. Structural method describe texture by identifying structural primitives. And Statistical method uses statistical distribution of the image intensity^[8] to characterize the texture. Many different methods are proposed for computing texture but among those methods, no single method works best with all types of texture. Some common methods are used for texture feature extraction such as Discrete Wavelet Transform, Gabor Wavelet Transform, Haar Discrete Wavelet Transforms, Ranklet Transform, Fourier Transform, discrete cosine transform, Hadamard Transform, Gaussian Pyramid, Laplacian Pyramid, Steerable Pyramid, Gabor Filter^[2].

C. Shape Feature

One more important optical feature is Shape which is most powerful feature used for image classification, indexing and retrievals. Shape is the basic features used to describe image content. Shape properties play a significant role in content based image database systems invented by computer visualisation researchers^[9]. Choosing Shape feature for describing an object is for the reason that its inherent properties like identifiability, reliability etc. and retrieval of image can be performed^[9]. Shape can be characterised based on two classes Boundary Based and Region Based. Boundary Based shape is used for shape representation and region-based shape used for describing shape^[10]. There are some shape Descriptor methods like Geometric Moments Geometric Moments, Zernike Moments, Fourier Descriptor, Grid Method and Shape Matrix.

LITERATURE REVIEW

B. Ramamurthy, K.R. Chandran^[5] provide medical image data retrieval from large medical database using image content like shape. Also provide efficient tool for retrieving efficient medical image from large medical image database.

Researcher has proposed^[11] a system called Photo-to-Search which permits users to input multimodal queries. Research has been conducted on combination of number of techniques from different fields, containing identical image detection, content-based image retrieval, and text-based Web image search to provide an achievable explanation to support multimodal queries from mobile devices.

The JustPictures application^[12] permits the user to browse the photograph album on the web, it displays EXIF data, and it habitually informs the user of album updates,

confirmation of users to access remote albums. But there is no search interface at that time the user has quiet to know where to arrival of an image. JustPictures displays EXIF data for photos, but there is no opportunity to browse the photos by particular EXIF feature.

R F Xiang Yuan; Chang-Tsun Li^[13] uses CBIR method to retrieve image. Leading to used canny edge detector to extract information from the image. Then, Hough transform is useful to edge map for retrieving image from large scale image database. Then used band-wise matching (BWM) is used to calculate centroid of the Hough peaks. And finally, CBIR ranks the image in the database and retrieves number of images with maximum rank.

To establish personal photo collections on mobile devices is by time information as main principle for imagining and communication^[14]. But time information must not be the only characteristic, as browsing and searching by features can offer additional opportunities.

Jacobs et al.^[15] use a feature vector of 60 Haar wavelet coefficients to represent painted images and 40 coefficients to represent scanned images. Their work is implemented in ImgSeek, an open source program that uses these wavelet coefficients.

Jia et al.^[16] propose an architecture to query the Internet using images taken from mobile systems.

Noda et al. in^[17] show how CBIR can be used in flower recognition.

Xiang-Yang Wang, Hong-Ying Yang, Dong-Ming Li^[18] proposed a new Content Based Image Retrieval technique using color and texture information for higher retrieval efficiency. Firstly, the image is transformed from RGB space to the independence of the color contents of an image by using Zernike chromaticity distribution moments from the chromaticity space. Then the texture attributes are extracted using a rotation-invariant and scale-invariant image descriptor. Finally, the combination of the color and texture information provides a dynamic feature for color image retrieval. And the experimental results proposed color image retrieval is more accurate and efficient in retrieving the image.

Rao, Srihari, and Zhang^[19] presented three types of Spatial Color Histogram, which are the Annular, Angular, and Hybrid Color Histogram. All of these three techniques use color histogram due to the spatial information. These various color-spatial histograms provide a way to explore a particular range of color in spatial domain.

Chan and Chen^[20] considered mean value is calculated separately for each R, G, and B color component for each block. The benefit of considering the mean value is that effects from noises in the images and the dissimilarities in sizes of images are expressively reduced.

Yamamoto^[21] proposed an account of the spatial information of colors by using multiple histograms. Researcher has divides two rectangular sub images using a straight line vertically or horizontally. In each sub-image, the division process continues until each region become small.

S. Nandagopalan, Dr. B. S. Adiga, and N. Deepak^[22] proposed a technique for image retrieval based on semantic contents. The assemblage of three low level feature extraction methods color, texture, and edge histogram. There is a requirement to contain new features in future for better retrieval effectiveness. Any combination of these techniques, which is more suitable for the application, can be used for retrieval.

Heng Chen and Zhicheng Zhao^[23] defined relevance feedback method for image retrieval. This is an efficient method of CBIR. Relevance feedback (RF) is an efficient method for content-based image retrieval (CBIR). SVM-based Relevance feedback (RF) scheme is proposed to improve performance of image retrieval. This scheme is accepted to balance the proportion of positive and negative samples and then synthesis scheme for multiple classifiers based on the final query results.

CONCLUSION

In this paper survey has been done and some different types of techniques are described. Some techniques are given in paper are the best to individual. These techniques are used by other researchers to bring out different output. Here the discussion on techniques of an image retrieval based on low level features like Color, Shape and Texture for efficient and accurate image retrieval are provided by literature study. So, this paper gives summarization of the different features of images with their functionality with dissimilar researchers for content-based image retrieval systems.

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