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Content Based Image Retrieval Using Color and Edge Feature Extraction

Charul Dongre, Sujeet Mishra
Department of EC, Sanghvi Institute of Management and Science,
Indore, M.P., India

Abstract—Color feature is one of the important low level features extraction technique used in image retrieval. In content based image retrievals systems solitary color features often provide poor results because in many cases, image with similar color do not have similar content. The solution of this complication described in this paper additionally a novel algorithm for content based image retrieval on color and edge detection using Gabor filter is proposed. This method is dissimilar from the existing histogram based methods. The proposed method generates feature vectors that combine both color and edge features. This approach uses Gabor filter for extracting edge features from an image. Gabor filters have been greatly used in pattern analysis applications. The robustness of the system is also tested against query image alteration such geometric deformation and noise addition etc.

Keywords— YCBCR; RGB; Canny Edge Detection; Color Edge Detection; Gabor filter; Haar; Precision; Recall;

I. INTRODUCTION

Image retrieval system is a computer application for searching and retrieving images from a large images database. It is traditional and common method for image retrieval. Some methods adding different information on images such as keywords or descriptions for accurate retrieval that is sometimes called annotation of image. Manual image annotation is slow, strenuous and expensive; to address this, there has been a large amount of research done on automatic image description.

On the other hand, increasing use in social web applications and the semantic web have inspired the development of several image annotation tools for Defining Image retrieval includes both low-level features and annotation. Addressing additional details for perceptual aspects and high-level semantic on general conceptual aspects. The appearance of multimedia technology and the rapid growth in the number and type of multimedia assets controlled by public and private things, as well as the sufficient range of image and video documents appearing on the web, have attracted significant research popgun in providing tools for effective retrieval and management of visual data. Image retrieval is based on the availableness of a representation strategy of image content. Image content descriptors may be visual features such as color, texture, shape, and semantic relationships, or semantic primitives Conventional information retrieval is based completely on text and these proceed towards to textual information retrieval have been transplanted into image retrieval in different types of ways, including the representation.

Advances in computer and network technologies combine with relatively cheap high volume data storage devices have brought tremendous growth in the aggregate of digital images. The digit contents are being generated with an exponential speed. Businesses, the media, government agencies and even amount of collections of digital images increases, the problem finding a covet image in the web becomes a hard task. There is a need to develop an efficient technique to retrieve digital images.

The users may require access to the images, based on classical features, such as color, texture or shape, or associated text. The technology to access these images has also gain momentum phenomenally. The current approaches are broad and interdisciplinary, mostly focused on three features of image research which are text-based retrieval, content-based retrieval and interactive based image retrieval. Whenever image retrieval using only features often provide very unsatisfactory result because in many cases image with similar color's do not have similar content. As the solution of this problem this paper narrate a novel algorithm for content based images retrieval based on color and edge detection using Gabor filter.

II. BACKGROUND

Image retrieval has two approaches Text-Based approach and Content- Based approaches, the most common way of doing this is by textual descriptions and classify images. This approach has some obvious shortcomings. Different peoples new categorize or describe the same image differently, leading to problems retrieving it again. It is also time dissipate when association with very large databases. Content based image retrieval (CBIR) is a way to get around these problems. Image retrieval systems help to search images based on features that extracted from image without manual description. In past decades many content based image retrieval systems have been developed, the common ground for them is to extract a required image. Comparing two images and deciding they are similar or not is relatively easy to do for a human. Obtaining a computer to do same thing effectively is matters

.A. Content based image retrieval:

Content-based image retrieval, also known query by image content (QBIC) and content-based visual information retrieval (CBVIR), which is the application of computer observation techniques to the image retrieval problem. Content-based image retrieval is hostile to traditional concept-based approaches. "Content-based image retrieval" is a technique that analyses content of the image slightly than the metadata or descriptions similar with image. The term "content" in this context might refer to color, shapes, textures, or any other instruction that can be derived from the image itself.

B. Text based image retrieval:

There have been many techniques which are developed for text-based information retrieval and they proved high success. Their success may also hut some light on the area of image retrieval, because the relatively adult theories and techniques of text-based information retrieval may be appropriate to the image domain. Text-based image retrieval uses conventional database techniques to manage images. Finished text descriptions, images can be systematic, by topical or semantic hierarchies to facilitate easy steering and browsing based on standard Boolean queries although text-based methods are fast and authentic when images are well annotated, they are incapable of searching in unannotated image collections. The generalization of the information retrieval from the text area to the image database is, however, non-trivial. The greatest barrier arises from the inherent difference between the text and image in representing and expressing information.

III. CONTENT BASED MODEL

We scrutinize models for content-based image retrieval with relevance feedback. Three search algorithms for effective searches based on the user models are evaluated. In the First model a user queries a database for the most relevant image. The user gives response to the system by selecting the most pertinent image from a number of images presented by the system. In this second model we consider a Filtering task where relevant images should be extracted from a database and provide to the user. The feedback of the user is a binary Classification of each presented image as relevant or irrelevant. While these models are related, they diverge significantly in the kind of feedback provided by the user.

A. Relevant feedback model:

Content-based image retrieval with the relevance feedback can be divided into two sub-problems:

1. How we can conduct a particular search to Find a suitable image in as few iterations as possible, and
2. How we can learn a good similarity measure amid images based on long-term user feedback from a large number of user search sessions or user labels from datasets.

Active learning has been used to choice images around the decision boundary for user feedback, for speeding up the search process and to amplify amount of information which can be obtained from user feedback. However, images around the decision frontier are usually difficult to label.

While active learning tries to amplify the amount of information which can be obtained from user feedback mostly by asking the user about examples which are hard to differentiate this approach ignores these facts

(a) the user typically is not interested in borderline cases, and

(b) The user himself might find it difficult to distinguish between difficult examples, such that the user feedback stamina is fully noisy.

These matters and the noise from user feedback has not been explicitly modeled or taken into account in most precursory work. In contrast, explicit model the noisy user feedback and select images for according to the user can affect the performance of retrieval system.

B. Comparative feedback:

In this section we contemplate a model in which the search engine supports the user relevant image which matches need of user. In each iterations of the search, the search engine presents a set of images to the user and the user selects the most pertinent image from this set. Assume a given database D of images x, and in each iteration a Fixed number k of images is dispense to the user. The formal search protocol is as follows:

1. For each iteration i = 1,2,... of the search:
2. The search mechanism calculates a set of images xi,1,...,xi, k∈ D and presents the images to the user.
3. If one of the obtainable images matches the user's query sufficientlyably, then the user selects this image and the search terminates.
4. Otherwise the user chooses one of the image x∗ I as most relevant, according to a distribution D x∗ I = xi, j |xi,1,...,xi, k; t where t denotes the ideal target image for the user's query.

The crucial element of this model is the distribution D presumes, for the user's feedback, and how it can be used for an effective search algorithm.

C. Binary feedback:

In next feedback model we are considering a Filtering task, where relevant images shall be presented to the user. The user gives a binary classification to per capita presented image as either relevant or irrelevant. The goal of the search engine in this model is to present largely relevant images to the user, and only a small number of irrelevant images.

We distinguish two structures for this binary feedback model. In the First scenario, in each iteration a set of k images becomes obtainable and the search engine has to decide, which single image out of the k available images should be dispensed to the user. In the second scenario, the search engine needs to select relevant images $x \in D$ from a database D .We will argue that the difference between these scenarios is rather minor.

IV. REVIEW

This section describes different efforts and contributions that are placed in order to refine the image retrieval.

ManimalaSingha et al [1]dispense the content based image retrieval, using features like texture and color, called WBCHIR.The texture and color features are extracted along wavelet transformation and color histogram. The combination of these features is vigorous, to scaling and translation of objects in an image. This system has demonstrated a promising and fester retrieval technique on a WANG image database containing 1000 general-purpose color images. The performance has been evaluated by differentiate with existing systems in the literature.

Deepak S. Sheteet al [2]present a review of different techniques in content-based image retrieval. The paper starts with analyze the fundamental details of CBIR. Features for Image Retrieval like color, texture and Feature are discussed next. We briefly discuss the similitude measures based on which matches are made and images are retrieved. One more important matter in content-based image retrieval is effective indexing and fast searching of images placed on visual features. Dimension reduction and indexing arrangements are also discussed. For content-based image retrieval, user interaction with the retrieval system is pivotal since flexible formation and modification of queries can only be obtained by tennis the user in the retrieval procedure. Lastly Relevance feedback is discussed which helps in improving the performance of a CBIR system.

Mr.Milind et al [3] present paper content-based image retrieval system that uses color and texture as visual features to describe the content of an image area. Our contributions are we use Gabor filters to extract texture features from unpredictable shaped regions separated from an image after distribution to increase the system effectiveness. In our simulation analysis, we supply, a comparison between retrieval results based on features extracted from color the complete image, and features extracted from the Texture some image regions. That approach is more effective and efficient way for image retrieval.

Hechao Yang et al [4] present in paper, a survey of content based image retrieval techniques is given. Image retrieval method based on shape is analysedessentially; the description and match based on shape are discussed and differentiate. And relevance feedback is also introduced at last we put forward the problems in this field and suggest the directions of future development.

Babita Singh et al [5] present paper Content-based image retrieval (CBIR) is significance of computer vision techniques to the image retrieval problem, that is, the complication, of searching for digital images in big databases. The term "content" in this context might refer to colors, shapes, textures, or any other instruction that can be derived from the image itself. CBIR has been used to delineate the process of retrieving desired images from a big collection on the basis of syntactical image features. CBIR is sensible because most web-based image search engines trust purely on metadata and this produces a lot of garbage in the outcome. Also having humans physically enter keywords for images in a large database can be inefficient, exorbitant and may not capture each keyword that describes the image. This paper describes a system that can filter images based on their content and provide superior indexing and return more accurate results.

MettyMustikasari et al [6] presents a technique to retrieve images centered on color feature using local histogram. The image is separated, into nine sub blocks of equal size. The color of every sub-block is extracted by estimate the HSV color space into 12x6x6 histogram. In this retrieval method Euclidean distance and City block distance are used to calculate similarity of images. This algorithm is tested by using Corel image database. The presentation of retrieval system is measured in terms of its recollect and precision. The usefulness of retrieval system is also resolute based on AVRR (Average Rank of Relevant Images) & IAVRR (Ideal Average Rank of Relevant Images) it is planned by Faloutsos. The experimental results present that the retrieval system has a good performance and the estimation results of city block has achieved prominent retrieval performance than the evaluation results of the Euclidean distance.

V. REVIEW SUMMARY

TABLE 1 REVIEW SUMMARY

S. No.	Author name & Publication & year	Paper Title	Remark (advantage disadvantage)
1	ManimalaSingha and K. Hemachandran, "An International Journal (SIPIJ) ", February 2012	Content Based Image Retrieval using Color and Texture	1.Computational stages are reduced by use of wavelet transform 2.Increase retrieval speed
2	Deepak S. Shete, Dr. M.S. Chavan, (IJET September 2012)	Content Based Image Retrieval: Review	1.effective indexing 2.fast searching
3	Mr.Milind V. Lande Prof .Praveen bhanodiya Mr.Pritesh Jain, (IJSE June-2013)	Efficient Content form Image Retrieval apply color and Texture	1.effective and efficient 2.calculating color feature attributes along with efficient implementation.
4	Hechao Yang, Xuemei Zhou (ISECS -July 2010)	Research of Content Based Image Retrieval Technology	1 An effective approach is to strengthen the multi-feature image retrieval method for an integrated, in order to the further improving of the

			image retrieval results..
5	Babita Singh, Waseem Ahmad,(IJCSMC- 2014)	Content Based Image Retrieval	1.better indexing and return more accurate results.
6	MettyMustikasari, SarifuddinMadenda, EriPrasetyo, DjatiKerami, Suryadi Harmanto5, (IJER)ISSN:- Aug 2014	Content Based Image Retrieval Using Local Color Histogram	1. good performance 2.the evaluation results of city block has achieved prominent retrieval performance than the evaluation results of the Euclidean distance..

VI. FEATURE EXTENTION TECHNIQUE

Feature extraction is the premise of content-based image retrieval. In a broad sense, features may include both text-based features (key words, annotations) and perceptible features (color, texture, shape, faces).

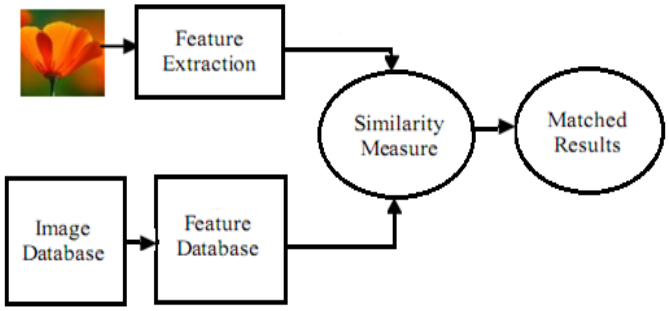

Figure 1 Feature Extraction Technique

However, since there already exist prosperous, literature on text-based feature extraction in the DBMS and information retrieval research communities, we will enclose ourselves to the techniques of visual feature extraction. Within the visual feature spread, the features can be additional classified as general features and domain- specific features. The former include color, texture, and shape features while the latter is application-contingent on, and may include, for example, human faces and Finger prints. The domain-specific features are better enclosed in pattern recognition literature and may involve.

A. Color

Color is a penetration, which depends on the response of the human visual system to light and the interaction of light with body. It is ainvention of the illuminate, surface spectral reflectance and sensor sensitivity (i.e. of digital devices or of cones in the human eye). Color is one of the most widely used visual features in content-based image retrieval. It is relatively strong to background complication and independent of image size and orientation. The key issues in color feature extraction involve the color space, color quantization, and the choice of similarity function. Various studies of color perception and color spaces have been suggested. Each pixel of the image can be represented as a point in a 3D color space. If we want to delineate an image by its color features, we have to first determine the color space to use. There occur different space models such as RGB, HSV, CIE L*a*b*, CIE L*u*v* or opponent color. The best representation depends on the special requires of the application.

B. Texture

Texture refers to the perceptible patterns that have properties of homogeneity that do not result from the presence of only a single color or intensity. It is a natural personality of virtually all surfaces, including clouds, trees, bricks, hair, and fabric. It carries important information about the structural arrangement of surfaces and their relationship to their surrounding environment.Texture representation technique can be classified into three categories:

1 Statistical methodsdescribe texture using the statistical properties of the gray altitudes of the pixels comprising an image. Normally, in images, there is cyclical occurrence of certain gray levels. The spatial distribution of gray levels is calculated.
2 Structural techniques characterize texture as being collected of Texel's (texture elements). These Texel's are arranged regularly on a surface according to some specific agreement rules.
3 Spectral techniques are based on properties of the Fourier spectrum and delineate global periodicity of the grey levels of a surface by identifying high-vitalitypeaks in the Fourier spectrum.

Statistical techniques are most important for texture classifying because it is these techniques that outcome in computing texture properties. Few of the statistical representations of texture are tempura features, co-occurrence matrices, and multi-resolution filtering techniques serving as Gabor and wavelet transform.

C. Shape

Defining the structure of an object is often very difficult. Shape is usually represented verbally or in figures, and people use terms such as enlarge, rounded etc. Computer-based processing of shape requires describing even very complicated shapes exactly and while many practical shape description methods exists, there is no generally accepted methodology of

shape description. Shape is an important visible feature and it is one of the primitive features for image content description. It carry all the geometrical information of an object in the image which does not change generally change even when orientation or position of the object are changed. Some simple shape features are the perimeter, area, eccentricity, symmetry, etc.

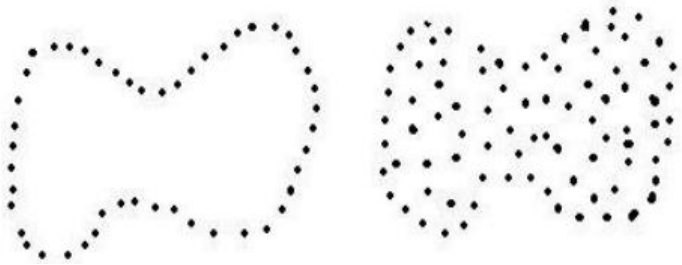

Figure 2 shape features

VII. PROPOSED WORK

With the help explosive growth in internet and the image Records retrieval image form a large scale image database become one of the most active research field.

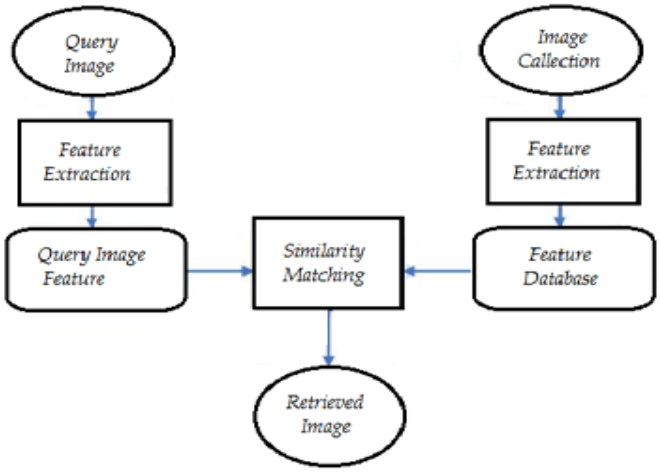

Figure 3 A general model of CBIR system

A lot of research work has been carried out on image retrieval during last decade .due to large number of image records to give decennary. Due to the large number of image records to give all image text annotation manually is become very tedious and impractical and it generates the need of an efficient image retrieval system. content based image retrieval measure the visual similarity between a query image and database image visual content commonly called as feature are used by CBIR to search image from large scale image, visual content, commonly called as feature are used by CBIR to search image from large scale image database according in the form of a query image .the main advantage of CBIR is that it does not suffer from the subjective-ness of textual description.CBIR has various applications in internet, multimedia, medical image archives, crime prevention, entertainment, and digital libraries and it is a dominant field in image processing. A number of previous works have been done addressing different techniques of image retrieval.

VII. CONCLUSIONS

In this paper a novel approach for content based image retrieval is presented which combines the color and texture feature the proposed algorithm uses color edge detection technique and Gabor filter for the feature extraction. The combination both technique provided computational steps are effectively reduced with use of simplest Gabor filter for texture extraction which help in improving the search speed.

REFERENCES

[1] W. Lin et al. (Eds.): Multimedia Analysis, Processing & Communications, SCI 346, pp. 59–79. springerlink.com c Springer-Verlag Berlin Heidelberg 2011

[2] Bucademy of science cybernetics and information technologies • Volume 10, No 3 Sofia • 2010

[3] Peter Auer and Alex Po Leung Department Mathematik und Informationstechnologie, Montanuniversit¨atLeoben Franz-Josef-Straße 18, 8700-Leoben, Austria {auer,alex.leung}@unileoben.ac.at

[4] B. Dinakaran1, J. Annapurna2, Ch. Aswani Kumar Interactive Image Retrieval Using Text and Image Content School of Information Technology and Engineering (Presently with Cognizant Technology Solutions, India) School of Computing Sciences and Engineering, VIT University, Vellore, India. E-mail: aswanis@gmail.com

[5] Darshak G. Thakore 1 , A. I. Trivedi 2 Content based image retrieval techniques – Issues, analysis and the state of the art 1 B V M Engineering College, VallabhVidyanagar, Gujarat 2 IEEE Member, M. S. University, Vadodara, Gujarat

[6] Mr. Milind V. Lande, Prof .Praveen bhanodiya, Mr. Pritesh Jain Efficient Content Based Image Retrieval Using Color and Texture International Journal of Scientific & Engineering Research, Volume 4, Issue 6, June-2013 121 ISSN 2229-5518

[7] Swati agrawalA.kvermaNitin dixit content based image retrieval using color edge detection and discrete wavlet transform 978-1-4799-2900-9/14/$31.002014 IEEE

[8] ManimalaSingha& K. Hemachandran, "Content Based Image Retrieval using Color and Texture", An International Journal (SIPIJ), No.1, February 2012

[9] Deepak S. Shete, and Dr. M.S. Chavan "Content Based Image Retrieval: Review" International Journal of Emerging Technology & Advanced Engineering (ISSN 2250-2459, Issue 9, September 2012)

[10] Hechao Yang, Xuemei Zhou "Research of Content Based Image Retrieval Technology" International Symposium on Electronic Commerce and Security ,July 2010

[11] Babita Singh, Waseem Ahmad "Content Based Image Retrieval" IJCSMC, May 2014

[12] MettyMustikasari, SarifuddinMadenda, EriPrasetyo, DjatiKerami, SuryadiHarmanto "Content Based Image Retrieval Using Local Color Histogram" IJER 01 Aug 2014

[13] Yong Rui and Thomas S. Huang Image Retrieval and Shih-Fu Chang Journal of Visual Communication and Image Representation 10, 39–62 (1999) Article ID jvci.1999.0413, available online at http://www.idealibrary.com on

[14] AmandeepKhokher, Rajneesh Talwar Content-based Image Retrieval: Feature Extraction Techniques and Applications International Conference on Recent Advances and Future Trends in Information Technology (iRAFIT2012) Proceedings published in International Journal of Computer Applications® (IJCA)

