© 2017 IJSRSET | Volume 3 | Issue 5 | Print ISSN: 2395-1990 | Online ISSN : 2394-4099
Themed Section: Engineering and Technology

A Review on Content Based Image Retrieval Techniques

Dahale Sunil V[1], Dr. S. B. Thorat[2] , Dr. P. K. Butey[3]
[1]MGM's College of Computer Science & Information Technology, Nanded, (MS), India
[2]SSBES Institute of Tech. & Management, Nanded, (MS) India
[3]Head of Department CS, Kamla Nehru Mahavidyalaya, Nagar, (MS), India

ABSTRACT

Content based image retrieval (CBIR) has been one of the furthermost significant research areas in computer science for the last period. A retrieval method which associations color and texture feature is proposed in this. Computer vision and digital image processing are valuable for content based image retrieval. Basically, computer vision systems try to retrieve an image to a user-defined description or pattern (e.g., shape sketch, image color etc.). The objective of computer vision is to provision image retrieval based on content properties like; shape, color, textures usually en coded in the form of feature vectors. In this paper following CBIR techniques discussed Relevance Feedback, Semantic Template, Wavelet Transform, Gabor Filter and Support Vector Machine.

Keywords : Content-Based Image Retrieval (CBIR), Feature Extraction, Wavelets, Gabor, Vector Machine.

I. INTRODUCTION

With the progress of the multimedia network technology and the increase of image data, the retrieval of image data based on pictorial queries is becoming an interesting and challenging problem. CBIR has become a hot spot of technical research. In a CBIR system, it extracts the visual features from images and uses them to index images, such as color feature, texture feature and shape feature. As long as the content of an image does not change, the extracted features are always consistent. Color feature is one of the most widely used features in low-level feature [1]. Compared with shape feature and texture feature, Color feature shows better stability and is more insensitive to the rotation and zoom of image. Color histogram [2] is widely used to represent color feature. In this paper, histogram based search method is investigated in two different color spaces. In addition, in CBIR system, the texture also plays an important role in computer vision and pattern recognition, especially in describing the content of image. Texture feature currently used in the CBIR system are mainly derived from Gabor wavelets [3], the conventional discrete wavelet transform [4] (DWT) and discrete wavelet frames. In this paper, we use DT-CWT for decomposing an image into six band pass sub images that are strongly oriented at six different angles and two low pass sub images, and then calculate the means and standard deviations of these sub images and form the feature vector. The vast growth of Internet and digital contents of Internet creates much interest on automated image indexing and retrieval techniques. Content Based Image Retrieval is a technique used for extracting similar images from an image database. There are numerous methods for content base image classification and retrieval has been addressed in last decades and attracted more attention in recent years. Color histogram is one of the furthermost important methods in Content Based Image Retrieval. The color histogram technique is effectual to compute and effective in probing results. The weakness of this method is that the space information will be missing. It means, the color histogram will not say where that color was originally present in that image. It will not fully explain the nature of color distribution in the image at various places which actually makes that image.

II. LITERATURE SURVEY

By MVHAMMAD HAMMAD ME MON et.al. [5] Present that present days data retrieval systems get additional attention because of the growing multimedia technologies use. This paper demonstrates an image retrieval system based on multiple regions that provide a client interface for helping to identify watershed regions-of-interest inside of an input image. The

relationship between semantic ideas and visual elements is established through supervised Bayesian learning from positive bags. On standard datasets the proposed algorithm has been using and accomplishes great annotation performance [5].

By Pushpalatha S. Nikkam et.al.[6] present that CBIR is a procedure to found a desired image from a substantial database. A template for shape based hierarchical feature matching method for CBIR system. It uses a combination of global feature for shape based templates. In this work a novel learning technique is put forth which is based on hierarchal data decomposition. The proposed technique founds learning algorithm where feature extraction procedure is executed to detect edge, orientations and dataset images shape. The classification of dataset is taken care through support vector machine. Algorithm with the 99.09 % accuracy. The retrieval outcomes of proposed model are illustrated in terms of precision and recall, enhanced efficacy of retrieval is compared to other present models [6].

By CHAWKI Youness et.al.[7] present retrieval systems are typically based on the key words for image search, but in numerous case it cannot meet demands for various user with numerous view. A new CBIR method is presented, which is based on image frequency content. Indeed, we have used the 2-D ESPRIT technique to mine from image the frequency content for constructing the vector descriptor. This method is applied to the Coil_100 database and experimental outcomes present that this approach increases the image retrieval precision [7].

By Ekta Gupta et.al.[8] present that CBIR uses visual image contents for example global features-color feature, shape feature, texture feature, and local features spatial domain present to indicate and image index. CBIR technique combines global and local features. In this paper for classification procedure, SVM used. The experimental outcomes present enhanced outcomes in comparison to earlier approach. In this paper, proposed a calculation which consolidates the advantages of some various calculations to enhance the exactness and execution of recovery [8].

By KAMLESH KUMAR et.al.[9] present since last few years, CBIR system has got additional attention from its generic to particular use. CBIR depends upon visual low-Ievel feature extraction i-e color, texture, shape and spatial layout. In this paper, LBP has been employed for texture and image analysis and also it is compared with average RGB color image descriptor technique. And then a complementary feature extraction method applying average RGB color and LBP texture technique has been proposed for CBIR. Euclidean distance is used as similarity measure for finding similar images in the database. The experimental outcomes are created applying MATLAB. The obtained outcomes proved that accuracy and efficiency of proposed technique in terms of overall precision, recall, measure and retrieval time are quite enhance than single color and texture feature extraction method [9].

By Vrushali A. Wankhede et.al.[10] present that Content-based video retrieval is most interesting point where it can be used in our daily life. Video retrieval is regarded as one of the most important in multimedia research. The development of multimedia data kind there is demand of video retrieval system. Video retrieval can be used for video search and browsing which are valuable in web applications. Selection of extracted features performs an important role in content based video retrieval. The main goal of this paper is that, user can give the two different types of input in the form of image query and the text query. First one is that provide the input in form of image query and retrieved image which is similar to the query image through applying CBIR algorithm. In this paper provide a detail description of a system developed for retrieving images similar to a query image from a various huge image set. Second one is that provide the input in the form of text query and retrieved image through applying ABIR method. Annotation is never complete [10].

By Radu Andrei Stefan et.al.[11] presents that a study on the effectiveness of hierarchical clustering techniques application and classification for imaging context in CBIR. The study has the purpose to compare obtained outcomes from applying various hierarchical clustering algorithms with numerous input parameters and configurations. The aims are also to highlight performance improvements and the costs brought up through integration of such approach in the CBIR [11].

By Katta Sugamya et.al. [13] present that This paper proposes a new two-step strategy in which first step is feature extraction using low level features (color, shape and texture) while SVM classifier is used in the second step to handle the noisy positive examples. Thus, an

efficient algorithm of image retrieval based on color-correlogram for color feature extraction, wavelet transformation for extracting shape features and Gabor wavelet for texture feature extraction is proposed. Further, multiple features and different distance metrics are combined to obtain image similarity using SVM classifier. Results based on this approach are found encouraging in terms of color, shape and texture image classification accuracy [13].

By M. Eitz et.al. [18] Defined general benchmark for evaluating the performance of any SBIR system. For matching pictures SBIR system uses the information contained in the designed 3D shape.
M. Eitz, K. Hildebrand, T. Boubekeur et al., introduces Spark feature for specialized SBIR in a Bag of Visual Words (BoVW) framework, GF-HOG is an image descriptor suitable for Sketch based Image Retrieval (SBIR). It treats sketches edges as a set of points, rather than describing image patches, describe lines and their relationships to extract image from dataset. It is much slower patch correlation based approach of Self-Similarity [18].

III. CBIR TECHNIQUES

There is few methods CBIR system used for image retrieval in numerous applications.

A. Relevance Feedback

As per time varies many users may have various requirement. User follows the following classical scenario for relevance feedback in the CBIR:

- Machine provides initial image retrieval outcomes.
- User provides his opinion that whether retrieved image is relevant or not.
- Machine receives user feedback and again search for images according to user query Crime.
-

B. Semantic Template

The increasing reliance of modern medicine on diagnostic techniques such as radiology, this method is created to support high level image retrieval and not so extensively used. This method is typically defined as representative feature of concept calculated from a sample images collection.

C. Wavelet Transform

Wavelet transform is diminutive waves based called as limited duration and variable frequency wavelet. Discrete Wavelet transform distributes images into four various parts namely higher frequency part (HH), High Low Frequency part (HL), Low High Frequency part (LH), and Lower frequency part (LL). After doing vertical parts as 1-level images decomposition, it computes moments of each part and store and use it as feature to find images.

D. Gabor Filter

It is extensively used for texture analysis because of its similar characteristics with human perception. A 2D Gabor function g(x, y) consists of a sinusoidal plane wave of some frequency and orientation (Carrier), and 2D translated. Gaussian Envelope is used to modulate it [20].

E. Support Vector Machine

It is supervised learning method in which information is analyzed and identify pattern used for classification purpose. In classification it takes input set, read it and forms output for all desired input and if output is continuous then regression is performed [19].

IV. IMAGE RETRIVAL SYSTEM

A feature is described as capturing a various visual image property. In common, image features can be either global or local. The global features describe the visual content of the full image, whereas local features define regions or image content objects. The global mining benefit is its high speed for both computing similarity and extracting features. However, global features are often too rigid to represent an image. Local-feature method provides slightly higher retrieval efficient than global features.. While local methods provide additional robust knowledge, they are additional exclusive computationally because of high dimensionality of their feature spaces and typically requirement nearest neighbor's approximation to achieve points matching [20].

Color Features

The color has extensively been used in IR systems, because of its fast and easy computation. Color is also

an intuitive feature and performs an important role in the image matching. Color histogram is generally used color feature representation in the image retrieval. The original idea to use histogram for retrieval comes from Swain and Ballard, who realized the power to identify an object applying color, is much higher than that of a gray scale. Although feature of global color is easily to calculate and can provide reasonable discriminating power in the image retrieval. It tends to provide too many false positives when image set is huge. Various research outcomes suggested that applying color layout is an image retrieval higher solution. To extend global. Color feature to a local one, a natural method is to divide full image into sub-blocks and mine color features from all of the sub-blocks. The advantage of this method is its accuracy while drawback is the usual complex problem of reliable image segmentation.

Figure 1. Color feature in CBIR

Texture Features

Texture is a property that represents the picture surface and constitution. Texture will also be defined as a typical repetition of sample and aspect on a surface. Picture textures are complex visual patterns composed of regions or entities with sub-patterns with traits of brightness, color, form, measurement and so on. The generally known texture descriptors are Wavelet Transform, Gabor-filter, and Tamura features.

Figure 2. Texture feature in CBIR

Shape Features

Shape can commonly be described as position of object regardless description, orientation, and size. In the direction of applying shape as feature of an image, it is necessary to object or region boundaries define in the image and this is a challenge. Since robust and correct image segmentation is complex to achieve, the use of shape features for image retrieval has been limited to special applications where regions or objects are readily available. More commonly, the form representations can also be divided into two classes, boundary-centered that makes use of most effective the outer shape boundary and vicinity-centered that makes use of the entire shape vicinity. Essentially the most effective representatives for these two extraordinary classes are Fourier descriptor and moment invariants.

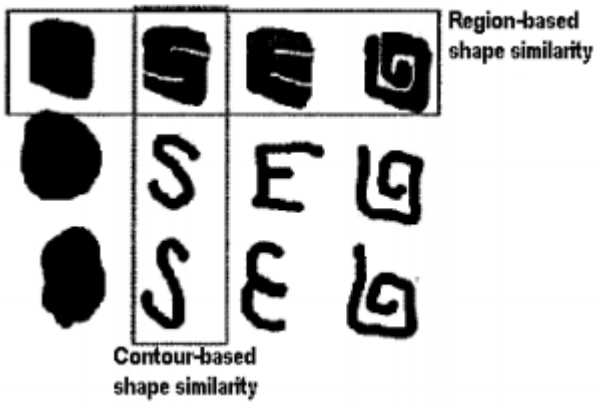

Figure 3. Shape feature in CBIR

Spatial Location Features

Spatial location is also important and is region segmentation used.. Such as, sea and sky may have the same characteristics of color and texture but spatial data is not similar. Sky classically represents above portion whereas sea is at the below image portion. Hence, spatial multiple objects data in image extracts important

images retrieval data. Most spatial information is presented in terms of 2D strings. The 2-D representation [20].

Local Image Features

Local features are small square, sub-images extracted from the original image. They can be considering having two different types:

The Patches

They extracted from the images at salient points and dimensionality reduced using Principal Component Analysis (PCA) transformation.

SIFT Descriptors

They extracted at Harris interest points. To use local features for image retrieval, three different methods are available:

Direct Transfer

The local elements extracted from each database picture and from the question snapshot. Then, the nearest neighbors for each of the neighborhood facets of the question searched and the database portraits containing all these neighbors returned.

LFIDM

The local features from the query snapshot in comparison with the neighborhood elements of every image of the database and the distances between them summed up. The images with the lowest total distances are returned. • Histograms of local features: A reasonably large amount of local features from the database is clustered and then each database image represented by a histogram of indices of these clusters. These histograms are then compared using the Jeffrey divergence.

V. CONCLUSION

CBIR system can be executed using MATLAB and the performance of the system in terms of precision can be validated with images from SIMPLIcity. Survey paper reviews the fundamental theories of CBIR algorithms and development in this field. These algorithms retrieve digital image from significant image database. Snapshot is retrieved from the low degree visible content elements of query image that's color, texture, form and spatial area. We review the visible content material description of image and then the essential schemes for CBIR are discussed.

VI. ACKNOWLEDGMENT

We wish to thank Dr. S. B. Thorat, Director, ITM, Nanded. I also thankful to Dr. P. K. Butey head of computer science department.

VII. REFERENCES

[1] Th.Gevers (2001). "Color Based Image Retrieval" .Springer Verlag GmbH. pp.886-917

[2] M.J. Swain, D.H. Ballard (1991). "Color indexing" Int. J. Comput.Vis. 7 11-32.

[3] B.S. Manjunath and W.Y. Ma (1996). "Texture features for browsing and retrieval of image data", IEEETrans. Pattern Anal. Mach. Intell, vol. 8, no. 8, pp. 837-842.

[4] M. N. Do and M. Vetterli (2002). "Wavelet-based texture retrieval using generalized Guassian density and Kullback-leibler distance". IEEE Trans.Image Process,vol. 11, no. 2, pp. 146-158.

[5] Mvhammad hammad me mon!, jian-ping li!, Imran memon, Riaz ahmed shaikw and Farman alimangi," Efficient Object Identification and Multiple Regions of Interest using CBIR Based on Relative Locations and Matching Regions", 2015 ieee, pp: 247-250.

[6] Pushpalatha S. Nikkam, Dr. Nagaratna P. Hegde and Dr. B. Eswar Reddy," Decomposition-Based Shape Template Matching for CBIR System", 2015 IEEE International Conference on Computational Intelligence and Computing Research.

[7] CHAWKI Youness, EL ASNAOUI Khalid, OUANAN Mohammed and AKSASSE Brahim," CBIR using the 2-D ESPRIT Method: Application to Coil_100 Database", 2015 IEEE.

[8] Ekta Gupta and Rajendra Singh Kushwah," Combination of Global and Local Features using DWT with SVM for CBIR", 2015 IEEE.

[9] KAMLESH KUMAR, JIAN-PING LI and ZAINUL-ABIDIN," COMPLEMENTARY

FEATURE EXTRACTION APPROACH IN CBIR",2015 IEEE, pp: 192-197

[10] Vrushali A. Wankhede and Prakash S. Mohod," Content-based Image Retrieval from Videos using CBIR and ABIR algorithm", 2015 IEEE, pp: 767-771.

[11] Radu Andrei Stefan, Ildikó-Angelica Szöke and Stefan Holban," Hierarchical clustering techniques and classification applied in Content Based Image Retrieval (CBIR)", 10th Jubilee IEEE International Symposium on Applied Computational Intelligence and Informatics • May 21-23, 2015 • Timis , oara, Romania, pp: 147-152.

[12] Satish Tunga, D. Jayadevappa and C. Gururaj," A Comparative Study of Content Based Image Retrieval Trends and Approaches", International Journal of Image Processing (IJIP), Volume (9) : Issue (3) : 2015, pp: 127-155.

[13] KattaSugamya,SureshPabboju, Dr.A.VinayaBabu, "A CBIR CLASSIFICATION USING SUPPORT VECTOR MACHINES" 978-1-4673-8810-8/16/$31.00 ©2016 IEEE [14]. Syntyche Gbèhounou, François Lecellier, Christine Fernandez-Maloigne, "Evaluation of local and global descriptors for emotional impact recognition". 2016 Elsevier.

[14] Shu Wang, Jian Zhang, Senior Member, IEEE, Tony X. Han, Member, IEEE, and Zhenjiang Miao, Member, IEEE, "Sketch-Based Image Retrieval Through Hypothesis-Driven Object Boundary Selection With HLR Descriptor", vol. 17, no. 7, pp 1045-1057, july 2015.

[15] K. Bozas and E. Izquierdo, "Large scale sketch based image retrieval using patch hashing," Adv. Visual Comput., vol. 7431, pp. 210–219, 2012.

[16] R. Zhou, L. Chen, and L. Zhang, "Sketch-based image retrieval on a large scale database," in Proc. 20th ACM Int. Conf. Multimedia, 2012,pp. 973–976.

[17] M. Eitz, K. Hildebrand, T. Boubekeur, and M. Alexa, "A descriptor for large scale image retrieval based on sketched feature lines," in Proc. 6th Eurograph. Symp. Sketch-Based Interfaces Modeling, 2009, pp. 29–36.

[18] Priyanka Malode and Prof. S. V. Gumaste," A Review Paper on Content Based Image Retrieval", International Research Journal of Engineering and Technology (IRJET) Volume: 02 Issue: 09 | Dec-2015.

[19] Mohammed Alkhawlani, Mohammed Elmogy and Hazem El Bakry," Text-based, Content-based, and Semantic-based Image Retrievals: A Survey", International Journal of Computer and Information Technology (ISSN: 2279 – 0764) Volume 04 – Issue 01, January 2015, pp: 58-66.

[20] Pooja Devi, Mahesh Parmar, "A SURVEY ON CBIR TECHNIQUES AND LEARNING ALGORITHM COMPARISON", International Journal of Latest Trends in Engineering and Technology Vol.(8)Issue(1), pp.197-205 DOI: http://dx.doi.org/10.21172/1.81.026 e-ISSN:2278-621X.