ISSN (Online) 2394-2320

International Journal of Engineering Research in Computer Science and Engineering (IJERCSE)
Vol 5, Issue 3, March 2018

Color based Wavelet and Curvelet Transform Image Retrieval

[1] D.Saratha, [2] R.Kanagaselvi
[1] Final year PG Student Computer Science and Engineering, [2] Assistant Sr.Professor / CSE
[1][2] Sree Sowdambika College of Engineering, Aruppukottai, Tamilnadu State, India

***Abstract* – The system proposes new approach in extension with local color and Fast curvelet transform and entropy measurement in RGB Space. Discrete curvelet transform is one of the most powerful approaches in capturing edge curves in an image. The project presents the robust object recognition using texture and directional feature extraction. The system proposes texture descriptors such as Fast Discrete Curvelet Transform (FDCT) based entropy feature which represents better texture and edges and Local Directional Pattern (LDP) which provides textural details about all eight directions. By using these methods, the category recognition system will be developed for application to image retrieval which proves Low computational complexity and high compatibility.The tests are performed more than 12 seat stamp regular scene and shading surface picture databases, for example, Corel-1k, MIT-VisTex, USPTex, Hued Brodatz, et cetera.**

Keywords—Image retrieval, local patterns, multichannel, LBP, color, texture

1. INTRODUCTION

Nowadays, due to the availability of large storage spaces ,huge number of images have been produced and stored around the world. With this huge image database, people want to search it and make use of the images in it. Here comes the challenge of image retrieval and researchers try to find out accurate ways of searching images. Basically, images can be retrieved in two ways, firstly, text based and secondly, content-based or query by example based. Text based retrieval approach is very well known and widely used. In this process users are provided a text area to enter the key words on the basis of which image searching is done. It is widely used in Google web based image searching technique.

The IR (image retrieval) is a way to search the images from a huge collection of database. Therefore an important problem that needs to be addressed is fast retrieval of images from large databases. To find images that are similar to a query image, image retrieval systems attempt to search through a database. IR can greatly enhance the accuracy of the information being returned and is an important alternative and complement to traditional text-based image searching. For describing image content, color, texture, and frequency based features have been used(16).These approaches are introduced basically for gray images, in other words only for one channel and performed well but most of the times in real cases the natural color images are required to be characterize which are having multiple channel. A performance evaluating of color descriptors such as color SIFT (we have termed mSIFT for color SIFT in this paper), Opponent SIFT, etc. are made for object and scene Recognition in [39]. These descriptors first find the regions in the image using region detectors, then compute the descriptor over each region and finally the descriptor is formed by using bag-of-words (BoW) model.

A.IMAGE RETRIEVAL :

Basically database having collection of images and an image retrieval system is nothing but it returns a set of images from a database to meet user's demand with similarity estimations such as image content similarity, edge pattern similarity, color similarity, etc. In the real-time applications, an image retrieval system produces an systematic way to retrieve, access and browse a set of similar images. Several approaches have been developed directly for computing the image features from an image for capture the information of image contents.

B.IMAGE CONTENT DESCRIPTOR

To describe the content of visual image some concepts have been developed. Most of them are dealing with the MPEG-7 Visual Content Descriptor. To establish the international standard for the CBIR task the MPEG-7 Visual Content Descriptor is used, which includes Color Descriptors (CD), Texture Descriptor (TD) and Shape Descriptor. In the CBIR research field, the shape descriptor offers a great advantage, and that is benchmark database, comparative study between several CBIR tasks, etc, can be easily conducted by sharing the image features descriptor, which is a important aspects and this is possible only by using these standard features. In the

IFERP
connecting engineers... developing research

ISSN (Online) 2394-2320

International Journal of Engineering Research in Computer Science and Engineering (IJERCSE)
Vol 5, Issue 3, March 2018

distributed system the standard features provides a great benefit, in which user can remotely modify the image content descriptor. In this scenario, there is a modification and recalculation of image descriptor but not necessary to transferred original image over different locations.

In this paper, a new texture feature based on curvelet transform is proposed. The technique makes use of curvelet transform which represents the latest research result on multi-resolution analysis [12, 13, 14]. By combining the advantages of the two methods, image edge information is captured more accurately than conventional spectral methods such as wavelet and Gabor filters. Curvelet was originally proposed for image denoising and has shown promising performance. As it captures edge and linear information accurately, it has also shown promising results in character recognition recently [15, 16]. Ni and Leng attempted an initial application of curvelet on color image retrieval, but it was not implemented properly and no meaningful result was reported. In this paper, we describe the theory and implementation of curvelet, apply curvelet transform to a standard image database, and compare its retrieval result with the best texture features in literature—Gabor filter feature and wavelet feature.

II. PROPOSED SYSTEM

Modules: Implementation of Proposed System The system is implemented in the form of three main modules. 1. color, histogram based on image retrieval. 2. Wavelet transform. 3Curvelet transform.

Module 1: color, histogram based on image retrieval
In this image retrieval based on color it includes more part histogram and color histogram system and we areusing these methods to find similarity distance. Below steps shows how color retrieval works.

- Firstly we should be select color space.
- After that quantization of the color space will be finished.
- Next we will remove the elements of color.
- After that compute the similarity matches.

For object identification and feature extraction of color we are utilising the color attributes that is principle procedure of this CBIR, it can also help to watch performance of system of multiple measurements on the single pixel of the image. The bins are represented by bars of color histogram and bins presented by the x-axis. The number of bins will be totally dependent on the number of colors in an image. The numbers of pixels of each bin are signified by y-axis.

The proposed scheme uses color edge detection technique and haar wavelet transformation based feature extraction process. The proposed algorithm extract edges from luminance part of the color RGB image by converting the target RGB image into HSV color spaces. Also we can get edges from R, G and B channels and find the number of connected edges, regions of the particular edges and co-relation matrix from that color edges , Which will help to get the feature vector of color descriptor. Also we have another feature to extract called color feature, This feature is obtained by extracting the R, G and B color channels and apply histogram and reduces the number of the feature vector length by using haar wavelet transform.

Similarity Matching :
As a similarity measure we use the Mahalanobis standard which takes into account different magnitudes of different components.The similarity measure by a given query image involves searching the database for similar curvelet coefficients as the input query. Mahalanobis Distance is suitable and effective method over Euclidean distance measurement .The retrieved images are ranked by their similarities distance with the query image. The similarity distance measure between the vectors of query image and the database image shows the mahalanobis distance measurement expression, Where D is the mahalanobis distance . The computed distance is ranked according to closest similar in addition, if the distance is less than a certain threshold set, the corresponding original image is close or match the query image.

Euclidean distance measures the similarity between two different feature vectors using the formula,Where , FV1 and FV2 are feature vectors of query and database images

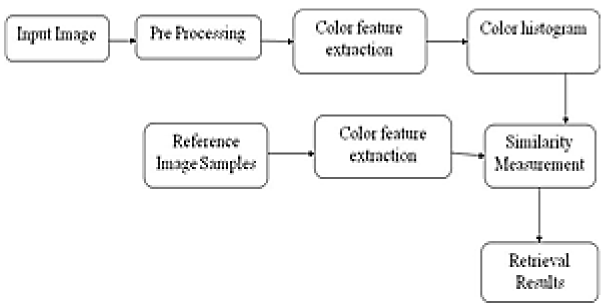
$$ED = \sqrt{\sum_{j=0}^{J}(FV_{1,j} - FV_{2,j})^2}$$

Entropy measurement : Entropy is a scalar value representing a statistical measure of randomness that can be used to characterize the texture of the input image. Entropy is defined as

$$S = -\sum_{i=1}^{\Omega} P_i \log_2(P_i)$$

ISSN (Online) 2394-2320

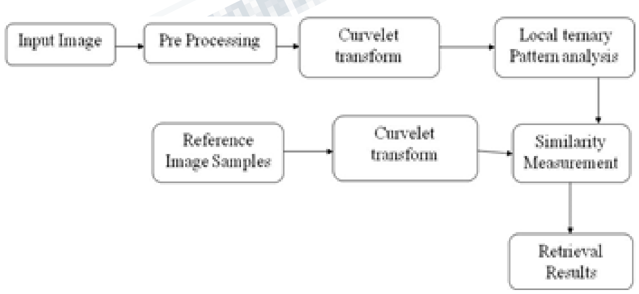
International Journal of Engineering Research in Computer Science and Engineering (IJERCSE)
Vol 5, Issue 3, March 2018



Color based image retrieval

Module2:DWT: Feature extraction on the basis of frequency by using DWT and DFT 1. Decomposing the signal using DWT into N levels using filtering and decimation to obtain the approximation and detailed coefficients. 2. Extracting the features from the DWT coefficients The features extracted from the Discrete wavelet transform(DWT)coefficients of ultrasonic test signals are considered useful features for input into classifiers due to their effective time– frequency representation of non stationary signals.

Module3:DCT: The system based on category recognition can extend with the technique of, Fast discrete Curvelet transform and entropy measurement in RGB Space .The product in the Fourier domain is obtained by the convolution of the Curvelet with the image in the spatial domain. For the spectral product, we apply the inverse FFT to it and obtain the set of CURVLET coefficients at the end of computation process. Curvelet takes the form of basic elements which exposes very high directional sensitivity and is highly anisotropic.Therefore, curvelet transform represents edges better than wavelets and is well- suited for multi scale edge enhancement. We apply discrete curvelet transform on texture images and compute the low order statistics from the transformed images. Images are then represented using the extracted texture features.



Curvelet transform based image retrieval

III.RETRIEVAL PERFORMANCE TEST

In this section, we test the performance of the curvelet feature in terms of retrieval accuracy. The widely used standard Brodatz texture database is used in the test. The database consists of different categories of natural and manmade texture and color images, each image has the same size of84 X 84 pixels. In total, the image database consists of 100 images from different categories. We apply the curvelet feature extraction process described in section III to each of the 100 images in the database and index each of the images using the curvelet feature vector. For the discrete curvelet transform, two tests are experimented. In the first test, images are decomposed using4 levels curvelet transform. Based on the subband division, with 4 levels analysis, 81 (=1+16+32+32) subbands of curvelet coefficients are computed. However, curvelet at angle produces the same coefficients as curvelet at angle □π. As the result, 81 dimension feature vector is generated for each image in the database. In the second test, images are decomposed using 5 levels curvelet transforms. Based on the subband division, with 5 levels analysis, 147 (=1+16+32+32+64) subbands of curvelet coefficients are computed. Therefore, a 147 dimension feature vector is generated for each image in the database.

The commonly used performance measurement, precision-recall pair, is used for the evaluation of retrieval performance. Precision P is defined as the ratio of the number of retrieved relevant images r to the total number of retrieved images n, i.e. P = r/n. Precision P measures the accuracy of the retrieval. Recall R is defined as the ratio of the number of retrieved relevant images r to the total number m of relevant images in the whole database, i.e. R = r/m

Pre = Rp / N

N is represent the total no of retrieved Images Recall Rate

Rec = Rp / 20

Rp is represent Number of images retrieved positive Precision Rate

IV. EXPERIMENTAL ANALYSIS AND RESULTS

In this section, We presents the analysis based on the experiments and compare the performance of the system as compare to other systems that are proposed earlier. For experimental purpose , Wang image database is used. The exploited Wang's database contains total number of 500 images having 10 classes . Each class contains 50 images of the same type. Out of which 500 images we are randomly choose some test images for testing purposes.

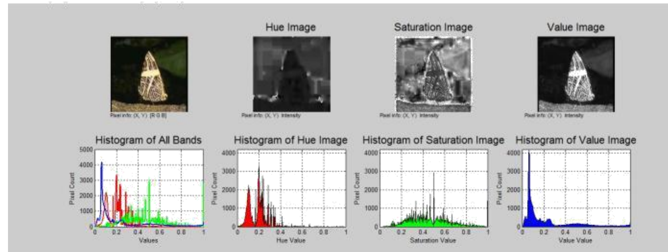
In the proposed scheme , A user who want to test this system needs to select the query image first and extract the features of the query image. Next step is to compare the similarity between the query image feature with the feature vector of the image database. In this paper we are chosen randomly total 5 images for experimental purpose as a testing images. These testing images are shown in fig. 4.

Fig. 4 Test images

We are taken some of the test images as a query image and the results of the proposed system is shown below . In Fig. 5 we are taken 435.jpg as query image of class 'Dinosaur' from Wang's database and first 20 images has been retrieved. Whereas in Fig. 6 we are taken 705.jpg as query image of class 'Horse' from Wang's database and first 20 images has been retrieved.

Fig. 5 Retrieval results for query image 435.jpg (Dinosaur)

Fig.6Retrieval result for query image (Bus)



Color histogram

ACKNOWLEDGMENT

This paper was supported by the Sree Sowdambika College of Engineering, Final Year PG CSE student Ms.D.Saratha (Reg.no:921816405014) guided by Asst. Sr. Prof of Computer Science and Engineering Mrs.R.Kanagaselvi. The authors thank to their colleagues for their help and support at different stages of the system development. Finally, we would like to thank the anonymous reviewers for their helpful comments.

CONCLUSION

In this paper, A new technique for content based image retrieval is presented that combines both the color and Wavelet, Curvelet transform features .Discrete curvelet transform is one of the most powerful approaches in capturing edge curves in an image. The project presents the robust object recognition using texture and directional feature extraction. The system proposes texture descriptors such as Fast Discrete Curvelet Transform (FDCT) based entropy feature which represents better texture. The proposed scheme uses color edge detection technique and haar wavelet transformation based feature extraction process. The proposed algorithm extract edges from luminance part of the color RGB image by converting the target RGB image into HSV color spaces. Also we can get edges from R, G and B channels and find the number of connected edges, regions of the particular edges and co-relation matrix from that color edges , Which will help to get the feature vector of color descriptor. Also we have another feature to extract called color feature, This feature is obtained by extracting the R, G and B color channels and apply histogram and reduces the number of the feature vector length by using haar wavelet transform.

REFERENCES

[1] F. Long, H. J. Zhang and D. D. Feng, Fundamentals of Content-based Image Retrieval,

In Multimedia Information Retrieval and Management, D. Feng Eds, Springer,2003.

[2] Elhabiby M, Elsharkawy A, El-Sheimy N. Second Generation Curvelet Transform Vs Wavelet Transforms and Canny Edge Detector for Edge Detection from World View-2 data, Int. J. Comput Sci. & Eng Survey (IJCSES) 2012; 3: 1-13.

[3] Jeena Jacob, K. G. Srinivasagan, and K. Jeya Priya, Local oppugnant texture pattern for image retrieval system. Pattern RecognitionLetters, vol.42 pp.72-78, 2014.

[4] D. Zhang, M. M. Islam, G. Lu, and I. J. Sumana. Rotation Invariant Curvelet Features for Region Based Image Retrieval. International Journal of Computer Vision, vol.2 pp.187-201, 2012.

[5] Fan-Hui Kong, and Harbin. Image retrieval using both color and texture. Proceedings in IEEE International Conference on Machine Learning Cybernatics, vol.4 pp. 2228 – 2232, 2009.

[6] Manimala Sinha, and K. Hemachandran. Content Based Image Retrieval using color and texture. International Journal of Signal and Image Processing, vol.3 pp. 39-56, 2012.

[7] M. Levine. Vision in Man and Machine. McGraw-Hill 1985. [23]Jing Yi Tou, Yong Haur Tay, and Phooi Yee Lau. One dimensional Grey-level Co-occurrence Matrices for texture classification, IEEE International symposium on. Information Technology, pp.1-6, 2008.

[8] M. Subrahmanyan Q. M. Jonathan, Wu, R. P. Maheshwari, and R. Balasubramanian. Modified color motif co-occurrence matrix for image indexing and retrieval. Computer. Electrical. Engineering, pp.1 762-774, 2013.

[9] F. Long, H. J. Zhang and D. D. Feng, Fundamentals of Content-based Image Retrieval, In Multimedia Information Retrieval and Management, D. Feng Eds, Springer, 2003.

[10] S. Bhagavathy and K. Chhabra, A Wavelet-based Image Retrieval System, Technical Report—ECE278A, Vision Research Laboratory, University of California, Santa Barbara, 2007.

[11] J. Maver, ―Self-similarity and points of interest,‖ IEEE Trans. Pattern Anal. Mach. Intell., vol. 32, no. 7, pp. 1211–1226, Jul. 2010. D. T. Nguyen, Z. Zong, P.

[12] Ogunbona, and W. Li, ―Object detection using non-redundant local binary patterns,‖ in Proc. IEEE Int. Conf. Image. Process., Sep. 2010, pp. 4609–4612.

[13] J. Zhang, J. Liang, and H. Zhao, ―Local energy pattern for texture classification using self-adaptive quantization thresholds,‖ IEEE Trans. Image Process., vol. 22, no. 131–42, Jan. 2012.

[14] P. Dollar, C. Wojek, B. Schiele, and P. Perona,―Pedestrian detection: An evaluation of the state of the art,‖ IEEE Trans. Pattern Anal. Mach. Intell., vol. 34, no. 4, pp. 743–761, Apr. 2012.

[15] Fernández, M. Álvarez, and F. Bianconi, ―Texture description through histograms of equivalent patterns,‖ J. Math. Imag. Vis., vol. 45, no. 1, pp. 1–27, 2012.

[16] Satpathy, X. Jiang, and H.-L. Eng, ―Visual object detection by parts-based modeling using extended histogram of gradients,‖ in Proc. IEEE Int. Conf. Image. Process., Sep. 2013, pp. 2738–2742.

ISSN (Online) 2394-2320

International Journal of Engineering Research in Computer Science and Engineering (IJERCSE)
Vol 5, Issue 3, March 2018

[17] J. Ren, X. Jiang, and J. Yuan, ―Noise-resistant local binary pattern with an embedded error-correction mechanism,‖ IEEE Trans. Image Process., vol. 22, no. 10,4049–4060, Oct. 2013.