A New Combined Angular, Radial And Diagonal Difference Binary Pattern For Texture Classification

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Abstract- *Widely spreader applications in different kinds of fields and a large amount of database in image here image extraction, retrieval techniques are developed and enhanced. The image retrieval is a very interesting and rapidly growing methodology in all fields. It is an effective and well-organized approach for retrieving the image. Image mining is the concept of extracting information from a large collection of image databases. It is a process of searching the information and discovering the knowledge from that data. These techniques deal with many other emerging techniques such as handling the hidden knowledge using extraction, data association, and finding the additional patterns. Here we proposed the Combined Angular Radial Diagonal Binary Pattern for texture classification.*

Keywords- Image Extraction, Image Mining, data association

I. INTRODUCTION

Textures play an important role in computer vision as they occur in many computer-based applications. Potential areas of application include medical image analysis, industrial inspection, analysis of satellite or aerial images, content-based retrieval from image databases, document analysis, biometric person authentication, scene analysis for robot navigation, texture synthesis for computer graphics and image coding. Intensive research has been carried out on texture analysis for over three decades. Texture classification is carried out by extracting features from the texture image and presenting those features to a classification process. Once classification is done the result can be further processed to a segmentation procedure. To extract features from an image by using Gabor Filters is a traditional technique. A set of filtered images is produced, where each pixel represents a local response with a given scale and orientation. Tactile texture refers to the tangible feel of a surface and visual texture refers to see the shape or contents of the image. In the image processing, the texture can be defined as a function of spatial variation of the brightness intensity of the pixels. Texture is the main term used to define objects or concepts of a given image. Texture analysis plays an important role in computer vision cases such as object recognition, surface defect detection, pattern recognition, medical image analysis etc. This work proposes a method of using Combined Angular Radial Diagonal Binary Pattern algorithm for Texture Classification.

II. RELATED WORKS

Chang S.K. and Hsu A. [1] proposed a conceptual framework for exploring the nature of multimedia data model and information system architecture and reviews the evolution of multimedia information systems. Ojala T, Pietikainen M, Harwood D [2] proposed a classification a method based on Kullback discrimination of sample and prototype distributions is used. S. Hiremath, JagadeeshPujari [3] proposed a Content Based Image Retrieval (CBIR) technique for image retrieval using features such as colour, shape and texture. Ordonez and E. Omiecinski [6] proposed a data mining algorithm to find association rules in 2-dimensional colour images. Zaiane and J. Han [7] proposed a multimedia data mining system prototype, Multimedia Miner for analysis of multimedia data, primarily based on visual content. Anthony J.T. Lee, Ruey-Wen Hong, et al [10] proposed a novel spatial mining algorithm, called 9DLT-Miner, to mine the spatial association rules from an image database, where every image is represented by the 9DLT representation. Pabboju, S. and gopal, R. [11] proposed an elegant and effective system for content-based image indexing and retrieval.

III. SYSTEM ANALYSIS

Existing System

The actual LBP descriptor takes 3x3 as the dimensions for the local spatial kernel window to produce LBP based on texture. This window size is very small if it is done for huge number of images, which considerably increases the computational time. Many techniques have been adapted in different algorithms to nullify this difficulty. But if we increase the window size, the existing pixel comparison technique to obtain LBP descriptor produces results with less accuracy.

Proposed System

We have proposed a modified algorithm in which we take a 5 x 5 matrix and compare the pixels with each other to construct a binary string. In order to construct a binary string, compare the pixel in a circular manner either in clockwise or anticlockwise. If the taken pixel value is greater than or equal to comparing pixels then the binary value 1 is considered, else 0 should be considered. We use CARDBP to represent the combination of all three binary descriptors: LBP, RDLBP, ADLBP. To increase the accuracy as we take a large scale of local region, we are constructing the binary pattern for the pixels. This must be repeated for the entire image to get an LBP representation which we can use for image retrieval.

IV. METHODOLOGY

Tactile texture refers to the tangible feel of a surface and visual texture refers to seeing the shape or contents of the image. In image processing, the texture can be defined as a function of spatial variation of the brightness i considered. The below figure fig 4.3 depicts the central pixel and neighbour pixels in a 5 x 5 matrix. Intensity of the pixels. Texture is the main term used to define objects or concepts of a given image. Texture analysis plays an important role in computer vision cases such as object recognition, surface defect detection, pattern recognition, medical image analysis etc. This work proposes a method for using Combined Angular Radial Diagonal Binary Pattern algorithm for Texture Classification.

i. The dataset that we have used is UIUC. The images in the dataset have been pre-processed based on the figure 4.1.

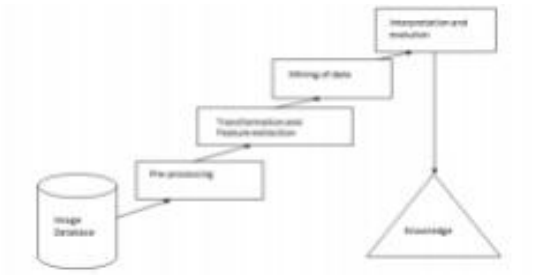


Fig.4.1 Flow Chart representation of data pre-processing

ii. The below figure represents the flow of our proposed system fig 4.2

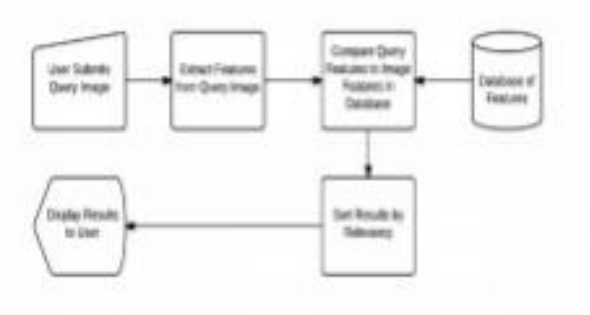


Fig 4.2 Flow Chart representation of our proposed system

iii. We have proposed a modified algorithm in which we take a 5 x 5 matrix and compare the pixels with each other to construct a binary string. In order to construct a binary string, compare the pixel in a circular manner either in clockwise or anticlockwise. If the taken pixel value is greater than or equal to comparing pixels then the binary value 1 is considered, else 0 should be

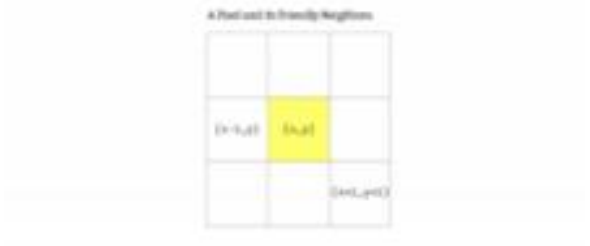


fig 4.3 Centre pixel and neighbour pixels

We use CARDBP to represent the combination of all three binary descriptors: LBP, RDLBP, ADLBP. In order to increase the accuracy as we take a large scale of local region, we are constructing the binary pattern for the pixels. This must be repeated for the entire image to get an LBP representation which we can use for image retrieval.

V. EXPERIMENTS & RESULTS

In this paper, 4 different classifiers with 3 different features are used to evaluate the best model for the system to identify the type of sentence. The outcome of each classifier is discussed in detail. The classifiers used are

1. Markov Random Field Texture Model
2. Binary Gabour Pattern
3. Hybrid Colour Local Binary Pattern
4. Combined Angular Radial Diagonal Binary Pattern

Markov Random Field Texture Model: Texture features obtained by fitting generalized Icing, auto binomial, and Gaussian Markov random fields (MRFs) to homogeneous textures are evaluated and compared by visual examination and by standard pattern recognition methodology. The MRF

model parameters capture the strong cues for human perception, such as directionality, coarseness, and/or contrast. This paper is a comparative study of MRF model-based features. A comparison of classifying natural textures and sandpaper textures using nearest neighbour (NN), quadratic, and Fisher classifiers, suggests that both texture feature extraction and classifier design should be simultaneously considered in designing an optimal texture classification system.

Binary Gabour Pattern:In the Binary gabour pattern method, the dictionary is a set of pre-defined rotation in variant binary patterns called “rotation invariant binary Gabor patterns (BGPris)”. BGP is strongly robust to image’s rotations and is theoretically gray-scale in variant. Experiments indicate that BGPri can achieve higher classification accuracy than the other methods evaluated, especially at the occasions where the training set is small.Compared with the other state-of-the-art methods, in addition to the higher classification accuracy, BGPri also has advantages of smaller feature size and faster classification speed, which makes it a more suitable candidate in real applications.

Hybrid colour Local Binary Pattern: The Hybrid colour local binary pattern method is a general operation to extract colour/texture features jointly, which can be used in many other image processing applications. Rotation invariant and low computational complexity are some of the main advantages of the Hybrid colour local binary pattern method, which make it useful for online applications. One of the big advantages of Hybrid colour local binary pattern is adapting with output images obtained using every kind of digital cameras such as single-sensor or three-sensor cameras.

Combined Angular Radial Diagonal Binary Pattern: CARDBP is a simple yet very efficient texture operator which labels the pixels of an image by thresholding the neighbourhood of each pixel and considers the result as a binary number. Due to its discriminative power and computational simplicity, CARDBP texture operator has become a popular approach in various applications. It can be seen as a unifying approach to the traditionally divergent statistical and structural models of texture analysis. Perhaps the most important property of the CARDBP operator in real-world applications is its robustness to monotonic gray-scale changes caused, for example, by illumination variations. Another important property is its computational simplicity, which makes it possible to analyse images in challenging real-time settings. Accuracy and precision have been compared with various other texture classification methods and the analysis that we have done for accuracy is shown in fig 5.1 and for precision it is shown in fig 5.2.

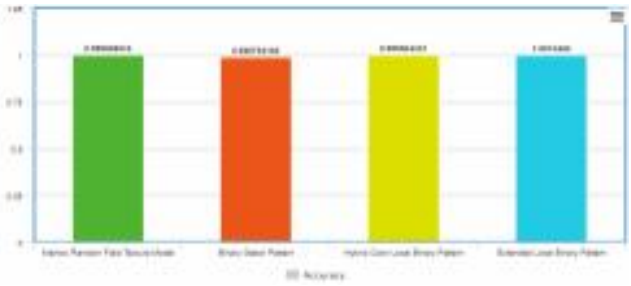


Fig 5.1 Accuracy Comparison

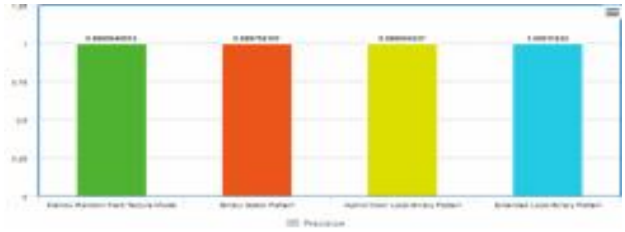
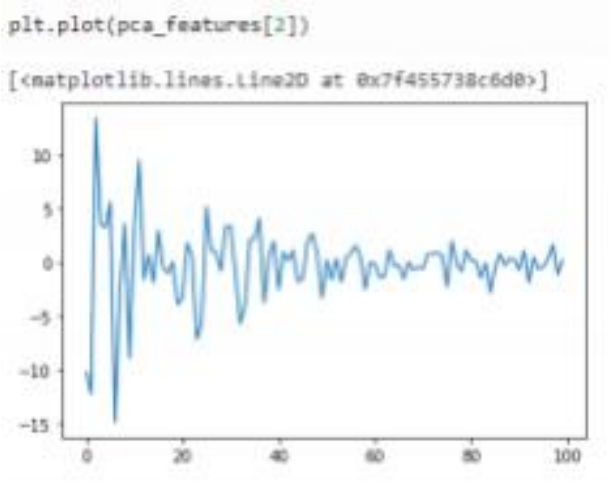
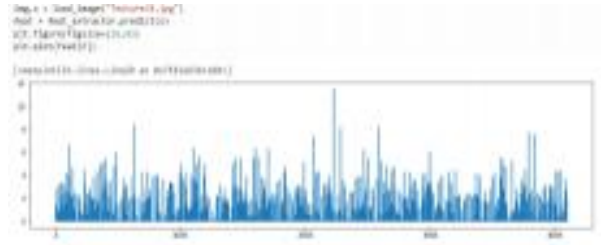


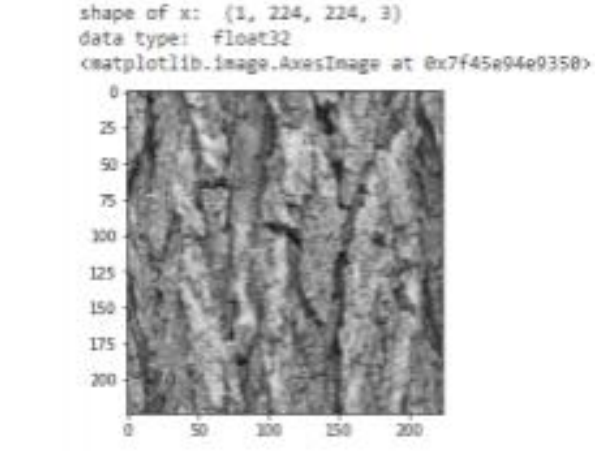
Fig 5.2 Precision Comparison

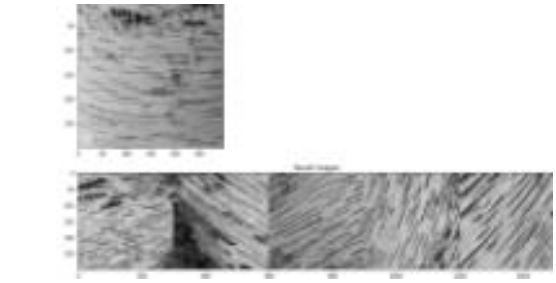
From both the figures, a clear comparison of Accuracy and precision for the four classification mechanisms are listed below.

Model	Accuracy	Precision
Markov Random Field Texture Model	0.999008674	0.9995040912
Binary Gabor Pattern	0.989752168	0.9997521070
Hybrid colour Local Binary Pattern	0.999504337	0.9995043370
Combined Angular Radial Diagonal Binary Pattern	1.001342400	1.0011232000









VI. FUTURE WORKS

There is nothing perfect in this world. It is true that this study even comes under that category. Since this computation is solely based on the images, it could be used in the field of classification of images. For example, classification of plant diseases based on affected leaf images. When the accuracy could be extended to considerable extent, it could be employed in medical fields as well like tumour cell detection and such relevant fields.

VII. CONCLUSION

In this paper, we proposed methods for texture analysis in the field of texture classification. In statistical category co-occurrence matrix and Local Binary Pattern Methods are more popular, and for Model based category the Fractal models is more famous, Gabor and Wavelet are more applicable through Transform based category. Our proposed system gives more accuracy compared to the previous system.

APPENDIX

It is optional. Appendixes, if needed, appear before the acknowledgment.

VIII. ACKNOWLEDGMENT

It is optional. The preferred spelling of the word “acknowledgment” in American English is without an “e” after the “g.” Use the singular heading even if you have many acknowledgments. Avoid expressions such as “One of us (S.B.A.) would like to thank ....” Instead, write “F. A. Author thanks” *Sponsor and financial support acknowledgments are placed in the unnumbered footnote on the first page.*

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