A COMPARATIVE FEATURE EXTRACTION STUDY USING TEXTURAL FEATURES TO EXTRACT VITAL INFORMATION FROM LUNG IMAGES

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Abstract

In the world-wide medical image processing play a vital role in the image processing field. Image retrieval is a fundamental requirement in today's world. Because a large number of dissimilar categories of imageries are included to the records from various bases for reclamation, various types of dispensation are essential to excerpt the appropriate topographies as of them. In this research work offerings a little overview over comparison of many different techniques like DWT, GLCM and local binary pattern of Texture feature extraction for low contrast and high contrast image. Feature extraction is a very significant area of image processing and object recognition. Features explain the realtion between the pixel and pattern of formation of the concern image and more information is in that portion only we have take few parameters like contrast, energy and correlation.

Keywords: DWT, GLCM, Local Binary Pattern

1. Introduction

Image processing has recently been used for multimedia databases for storing digital images, as well as imageries processing, which is the benefits of system-based procedures. On the basis of similarity measures, Image Recovery objectives to develop procedures for perusing huge imageries digital public library to determine whether an imagery or the imageries record holds the interrogation design issue to the manipulator. Text Based Image Reclamation (TBIR) [1] and Content Based Image Retrieval (CBIR) [2] are the two approaches to imageries recovery (CBIR). Text-based imageries explanation that offers the data provided for the imageries. Text-based imageries recovery methods are used on documented explanation of imageries and work in deuce stages: first, the imageries are

explained by transcript, and then the imageries are investigated used on the documented tags or keywords activities that users use to find such imageries. In comparison to text-based retrieval, imageries retrieval is faster and more dependable, then it is overly reliant on labelling, in this subject to social observation. There are various restrictions to Transcript Based methods due to their reliance on physical explanation; in the instance of huge datasets, this process becomes additional hard to invention out. To address the restrictions of TBIR, the perception of Contented Based Imageries Reclamation was projected, then it is now widely used, like Query Based Imageries Reclamation.

Contented Based Imageries Recovery (CBIR) [2] is a type of Imageries Recovery procedure that can figure out imageries such sketches in the same way that image databases can. Image features based on contented are extracted, and this topographies, such as colour and outline, it may be utilized to recover imageries from a huge record based on around resemblance procedures. Imageries may be recovered by interrogation called as Query by Imageries Contented and also called as Contented Based Pictorial Data it is the benefits of System Visualization methods for the problematic of penetrating digital imageries from huge imageries databases called as imageries recovery problematic in Content Based Imageries Recovery (CBIR). A distinctive Contented Based Imageries Recovery scheme is made up of quatern major stages. To begin, the greatest fundamental procedure of a Contented Based Imageries Recovery scheme is component removal, it extracts image topographies such as three-dimensional based on picture element. Second, the scheme determination characterise the chosen different parameter spaces and build the feature vectors. Finally, the query image's component vectors are compared to images stored in the database.

Features are main parameters in the image processing for the various application like image segmentation, image classification and object recognition etc. WT (Wavelet transforms) are precise device for examining information wherever components differ over dissimilar gages. For signals, components may be incidences changing grace period, transients, or gradually changing tendencies. For imageries, components comprise limits and textures. The WT (wavelet transforms) having the filter banks of LFP and HPF which will overcome the Fourier transform it exhibits both the time frequency information of the image. Figure 1 shows the two-level wavelet decompose of lung image.

P. Mohanaiah , P. Sathyanarayana , L. GuruKumar [3] exhibits the Gray Level Co-Occurrence Matrix (GLCM) for components removal in this paper they clearly define that the GLCm is the second order derivative function which lead many important feature and relation between the pixel to expose the important information in the imageries Gray Level Co-Occurrence Matrix (GLCM) has showed to be a general arithmetical technique of mining textural components from imageries. The to co-occurrence matrix, Haralick describes 14 textural components slow from the likelihood matrix to excerpt the features of consistency numbers

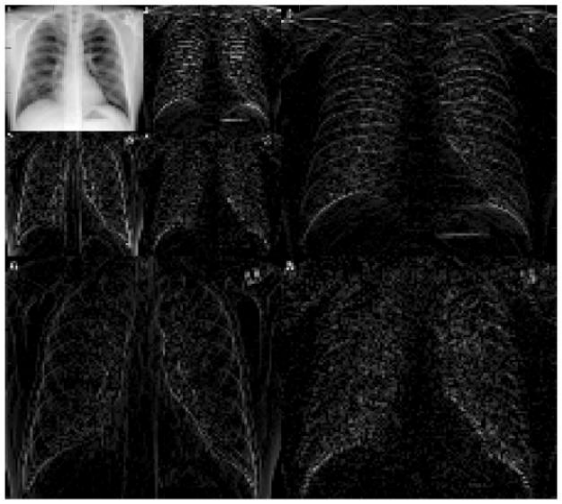


Fig. 1 Two level Wavelet decompose of Lung image

neighbour pixel value ---> ref pixel value:	0	1	2	3
0	0,0	0,1	0,2	0,3
1	1,0	1,1	1,2	1,3
2	2,0	2,1	2,2	2,3
3	3,0	3,1	3,2	3,3

Fig. 2 Gray Level Co-Occurrence Matrix (GLCM) Calculation.

Esa Prakasa [4] proposed that the local binary model (LBP) is a texture explanation machinist based on the symbols of the variances amongst neighboring picture element and central picture element. Figure 3 shows an sample of an LBP scheming. A binary cipher is obtained for each picture element value of the imageries by thresholding its proximity to the central picture element charge. The binary cypher may be measured as a binary model. The neighboring picture element is set to 1 if the picture element charge is greater than or equal to the threshold of and to 0 if the picture element charge is a smaller than the edge. A histogram is then created to find the occurrence cost of the bit designs. Every design epitomizes the option of a bit design create in the imageries. The amount of bins in the histogram based on the amount of picture element elaborate in the LBP calculation. If LBP utilize 8 pixels, the amount of bins in the histogram is 2 8 or 256.

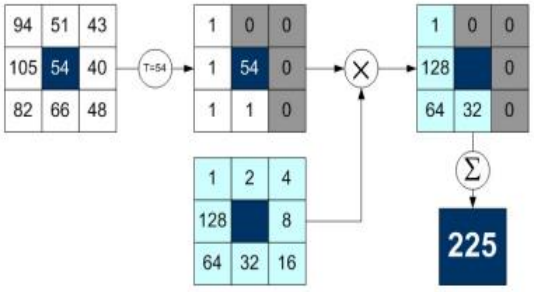


Fig. 3 Local Binary Pattern (LBP) Calculation.

2. Related Works

Yao et al., [5] projected a recovery scheme based GLCM (Gray Level Co-occurrence Matrix) and sobel sensor in 2003, edge finding being one of the approaches by surface separation because by seeing only texture possessions like coarseness energy, some data is vanished. As a result, they projected combination of both surface separation approaches edge recognition and surface possessions, outcoming in a high retrieval of accuracy value.

In 2009, Haying Zhao et al. [6] projected coarseness-based textural feature withdrawal. To advance recital, they utilized the coarseness textural component and

associated its outputs to the GLCM (Gray Level Co-occurrence Matrix) textural coarseness, Accurate measurement textural roughness, and Tamura textural pattern. Then they projected that, of the three, the tamura textural pattern performs the finest at relating coarseness.

Jing Zhang et al., [7] utilized component removal and projected Colour Co-occurrence (CCM) matrix based on GLCM (Gray Level Co-occurrence Matrix) to excerpt topographies from any one of the colour planes for every level and projected picture recovery by the multi-fusion on Gray Level Co-occurrence Matrix (GLCM) and colour, and recovered the texture features by the colour space HSV based imageries recovery, using similarity measures like Euclidean distance. They projected Co-occurrence (CCM) matrix texture topographies, and colour configuration with Co-occurrence (CCM) matrix recovers picture retrieval recital, it is a significant investigate value.

In 2014, N. Puviarasan et al. [8] projected Recovery of imageries from huge records using the CBIR method. Haralick features and Hu-invariant moments were projected as a grouping of texture and shape feature removal approaches. They first segmented the picture by means of Fuzzy C-means clustering and associated it to k-means, then removed topographies based on texture and shape and used a grouping of both. Investigation was approved out utilizing the Corel Imageries record. And for imageries retrieval, the resemblance quantity Euclidian distance was used.

Senthil kumar T et.al., operated on the spatial function of the imageries to implement sieving and image segmentation to compute the performance estimation components like as Se (Sensitivity), Sp (specificity) and accuracy [9]. Kumarganesh et.al. (2018) advised an Adaptive Neuro Fuzzy Inference System (ANFIS) classifying procedure for the arrangement of deserted portion from the basis images and conquered 96.0% of cataloguing accuracy [10]. Senthil Kumar T et.al., carried out the image enhancement using the global thresholding operation by conquering the higher pixel standards to produce well assessment constraints [11]. Kumarganesh et.al. (2016) recommended an Adaptive Neuro Fuzzy Inference System (ANFIS) classifier scheme for the cataloguing of deserted portion from the basis images and conquered 93.07% of Se (sensitivity), 98.79% of Sp (specificity), and 97.63% of cancer separation precision [12]. Senthil Kumar T et.al advised the grayscale morphological process for the better enrichment of the imageries [13]. Senthil kumar T et. al examined the Fuzzy c Means and Neuro Fuzzy approaches for categorizing the ROI in the goal imageries [14]. Thiyaneswaran B et al. (2020) used the k-mean clustering method and reached a mean accuracy of 90.0% [15]. A GA-based CNN cataloguing method was planned by Elayaraja et al. (2022) to segment the recognised area in the images, and it reached 99.37% Sensitivity (Se), 98.9 % Specificity (Sp), and 95.21 % Accuracy (Ac) [16]. Thiyaneswaran B et.al (2022), projected an AlexNet with ADAM solver attained a scheme precision of 98.21% [17-18].

3. Feature Extraction

Feature removal is dangerous in imageries retrieval schemes, and better

feature collection leads to maximum accuracy. Feature removal is the process of extracting pictorial data from an imageries and storing it in the form of component routes in a component record. This component values (or sets of standards) are referred to as image feature vectors and are used to extract image data from feature withdrawal. This component routes are utilized to comparation the query imageries to the database imageries. The arena of pattern acknowledgment, features are used to differentiate one class of entity from another. When topographies are removed in CBIR, the maximum significant problem is that the greatest applicable imageries are attained through feature selection.

DWT features

To decompose the magnitude response image, the DWT (Discrete Wavelet Transform) is register to every row & columns. First level of putrefaction yields 4 sub-bands: LL, HL, LH, and HH. L stands for minimum occurrence, and H stands for maximum occurrence. Furthermore, the LL sub-band is register to the 2nd level putrefaction of DWT, yielding four sub bands once more. The feature pattern is made up of all of these subbands. Figure 4 depicts the 1st and 2nd level decomposition of the Gabor magnitude rejoinder imageries.

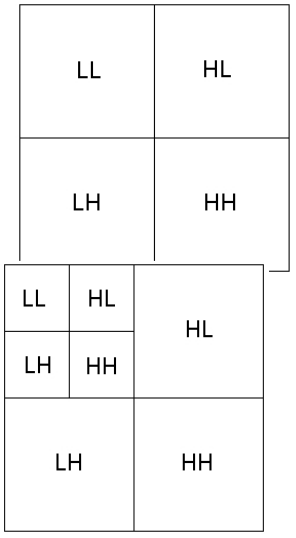


Fig. 4 a) First level decomposition; b) Second level decomposition.

GLCM Features

Texture properties are calculated in arithmetical surface investigation by the arithmetical delivery of intensity groupings observed at specific locations comparative to every other in the imageries. The datas are divided into 1st order, 2nd order, and higher-order numbers based on the amount of concentration marks (pixels) in every grouping. The GLCM technique (Gray Level Cocurrence Matrix) is a arithmetical removal technique for 2nd order texture properties.

Local binary pattern

The Gabor magnitude rejoinder imageries is subdivided, and LBP feature patterns are removed and concatenated into an improved component route that will be utilized as an image component signifier. The removed LBP component imageries from Gabor magnitude imageries is shows in Fig. **7**.

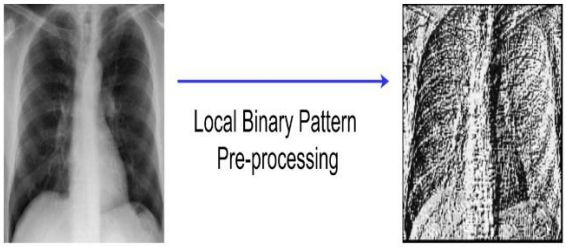


Fig. 5
Extracted LBP feature image.

4. Methodology

Pre-processing approaches in imageries are used in entire categories of imageries earlier evaluation them by the component removal from image records. For example, images are resized based on the region of interest for faster image retrieval. Further image processing will be sped up by deleting and removing complicated backgrounds. Figure 5 shows the illustration of dissimilar component removal.

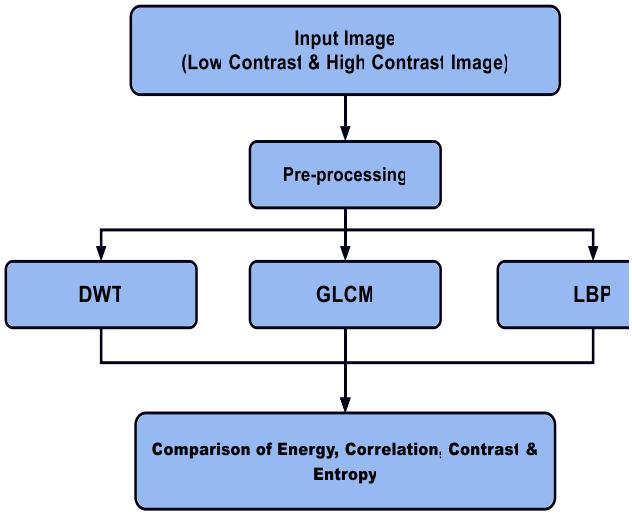
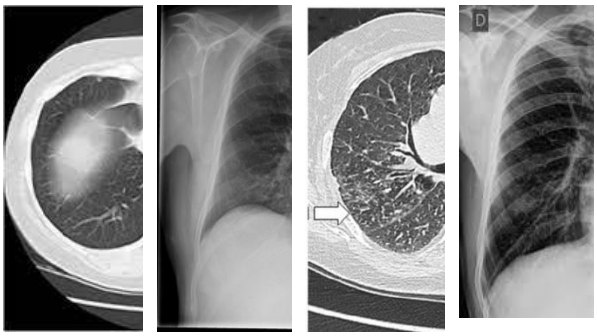


Fig. 6 Block diagram of different feature extraction

Texture [18], a feature with high discriminative power, is an important property in imageries and audiovisual recovery. Tamura's six texture properties, with directional being the extreme significant property in humanoid observation. As a result, which is critical to invention an efficient technique for calculating an image's directionality, and Tamura employs statistical measures to compute statistical features. As a result, we employ the outline instant issued by Hu [17], it is invariant. As a result, we extracted surface and outline properties and bonded this property routes of tamura and outline amalgamations for a improved outcome. Figure 6 shows the Low and High contrast Input images.

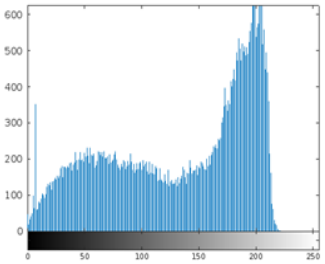


Low contrast image 1 | Low contrast image 2 | High contrast image 1 | High contrast image 2

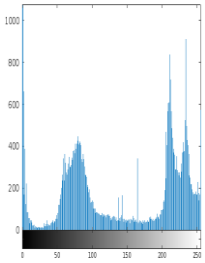
Fig. 7 Low and High contrast Input images

5. Experimental Results

The projected technique is validated by he Broadtz [20] image records, it is easily obtainable to investigators. Broadtz's grayscale image record includes groups such as blocks, gravels, grass, and so on. The recovery have been categorized as correct if, for a issued query imageries, the scheme recovered the most similar images from the database based on human perception. Based on the humanoid observation, the higher the accuracy price in image retrieval, the better the recital. Illustration 7 shows the Histogram of High contrast images.



Histogram for High contrast image 1



Histogram for High contrast image 2

Fig. 8 Histogram of High contrast images

Figure 8.a shows the Output Image after applying the Discrete Wavelet Transform for High contrast image contain (Low Low, Low High, High Low, High components). Figure 8.b shows the Output Image after applying the Discrete Wavelet Transform for Low contrast image contain (Low Low, Low High, High Low, High components).

(a) DWT of High contrast image

(b) DWT of Low contrast image

Fig. 9 DWT of High and Low contrast image

Table 2, 3 and 4 shows the Comparison of contrast, Correlation, Energy and Entropy using DWT, GLCM and LBP

Table 2. Comparison of contrast, Correlation, Energy and Entropy using DWT

Parameter	Discrete Wavelet Transform			
	Low contrast Image		High contrast Image	
	Image 1	Image 2	Image 1	Image 2
Contrast	126.16	120.1	126.16	126.16
Correlation	0.984	0.89	0.984	0.984
Energy	5.893	4.68	0.89	0.89
Entropy	0.3121	0.25	0.3121	0.3121

Table 3. Comparison of contrast, Correlation, Energy and Entropy using GLCM

Parameter	GLCM (Gray Level Co-Occurrence Matrix)			
	Low contrast Image		High contrast Image	
	Image 1	Image 2	Image 1	Image 2
Contrast	53.16	6.969	**314.027**	126.16
Correlation	0.960	0.987	0.966	0.984
Energy	0.010	**7.466**	3.39	5.893
Entropy	**0.414**	0.397	0.226	0.3121

Table 4. Comparison of contrast, Correlation, Energy and Entropy using LBP

Parameter	Local Binary Pattern			
	Low contrast Image		High contrast Image	
	Image 1	Image 2	Image 1	Image 2
Contrast	53.16	6.969	314.027	126.16
Correlation	0.960	0.987	0.966	0.984
Energy	0.010	**7.466**	3.39	5.893
Entropy	**0.414**	0.397	0.226	0.3121

The result got from the three methods for the four parameters like contrast, energy, Entropy correlation its clearly explains the behavior of DWT, GLCM and the LBP are varied with few values in the contrast and the entropy and there is no high variation in the contrast for all the image. The maximum Contrast is achieved for low contrast image in GLCM and the maximum Correlation is obtained in DWT, GLCM and LBP and Maximum Energy is yield in LBP and the Maximum Entropy got in LBP from.

6. Conclusion

In this work Various surfaces and component removal methods are deliberated. The foremost impartial of this paper is contented based imageries recovery is to progress is an effective imageries recovery system. A assessment is made among various textural and components that are a grouping of GLCM, DWT, and LBP textural components. As we concluded in this work by comparing all the three methods the Local binary pattern will provide better result in three parameters so the for the feature extraction the comparatively LBP is good among the DWT and GLCM in the DWT due to filter bank they may be a loss of data will be happened.

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