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Skin Infection Recognition using Curvelet

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Abstract:-*This thesis identifies a novel space to address the problem of analyzing magnitude of skin infection from still images. This is based on the PCA space of the features extracted by a new multiresolution analysis tool called curvelet Transform. Curvelet Transform has better directional and edge representation abilities than widely used wavelet transform. Inspired by these attractive attributes of curve lets , we introduce the idea of decomposing images into its curvelet sub bands and applying PCA (Principal Component Analysis) on the selected subbands in order to create a representation feature set.A comparative study with wavelet – based and traditional PCA technique is also presented High accuracy rate achieved by the proposed method for two well-known database indicates the potential of this curvelet based feature extraction method.*
Keywords:- *Curvelet,Wavelet,Pca,Eczima, Image Processing*

I. Introduction

The skin infection detection has been studied extensively for than 20 year. Since the beginning of 90's the subject has became a major issue; mainly due to its importance in real world applications areas like Diagnosis of bone,joints,soft tissue[1] .Multiresolution analysis tools notably wavelet have been found quite useful for analyzing the information content of images; hence they enjoyed wide – spread popularity in areas like image processing , pattern recognition and computer version. Over the past two decades , following wavelets , other multi resolution tools like contourlets , ridelets etc were developed.'Curvelet Transformer' is a recent addition to the list of multiscale transforms. It has already been used to resolve image processing problems like image compression [2],texture classification [3],image denoising [4]; but not much work has been done to explore potential of curvelet transform to solve pattern recognition problems. In some recent work majumdar shared that curvelets can serve the basis for pattern recognition problems like charater recognition [5].The focus of the study is on the use of image processing in medical area. The presented work is about the skin infection detection in infected images. There are different kind of infection as well as different formats of medical images.

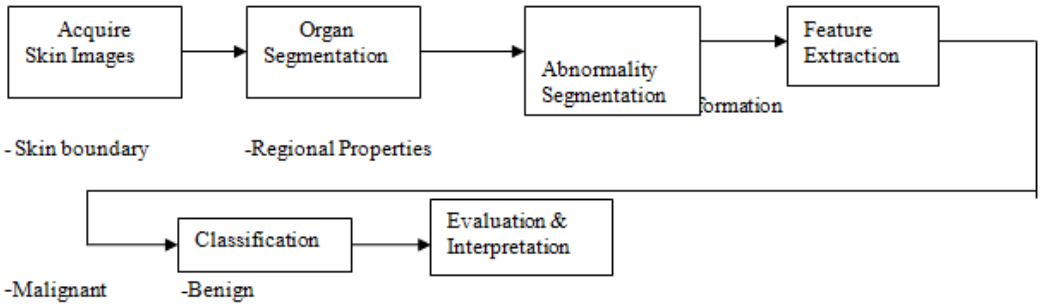


Figure 1.Basic steps of Image Processing

Digital image processing refers to the processing of digital images by means of digital computers. This process, whose inputs are images and outputs, may be images or extracted features of different attributes of images including reorganization of individual objects. Fig 1 shows, basic steps involved in the processing of digital images. Image Acquisition, Pre-processing, Image Segmentation, Wavelet, PCA,Curvelet . Due to limited scope of this paper, we are unable to delve into mathematical details of curvelet transform.

II. Related Research

In our previous work curvelet transform has been employed to extract features from bit quantized facial images and we showed that curvelets can indeed supersede the performance of wavelets.The development of Curvelet Transform by Candes and Donoho in 1999 was motivated by the need of image analysis . Curvelets present highly anisotropic behavior as it has both variable length and width. At fine scale the relationship between width and length can be expressed as width= length2; anisotropy increases with decreasing scale, in

keeping with power law. Second generation curvelet transform has two different digital implementations: curvelets via USFFT (Unequally Spaced Fast Fourier Transform) and curvelets via Wrapping. These new discrete curvelet transforms are simpler, faster and less redundant compared to their first generation version. The curvelet transform has been proposed as a multiscale geometric analysis tool, which can show the image features both at each scale and different directions. It takes no time to realize the features of the face images include curves, which form the curved singularities of the face images. Hence the use of curvelet transform for facial feature extraction is reasonable.Tanaya Mandal and Q. M. Jonathan introduce the idea of decomposing images into its curve let sub bands and applying PCA (Principal Component Analysis) on the selected sub bands in order to create a representative feature set. A comparative study with wavelet-based and traditional PCA techniques is also presented. We have introduced a new feature extraction technique from still images using PCA on curvelet domain which has been evaluated on two well-known databases.

III. Literature Review

Many researchers have done work in skin infection detection in different human organs.In previous work [6] Curvelet transform has been employed to extract Features from bit quantized facial images and we showed that curvelets can indeed suppressed the performance of wavelets.

Mrs.N.G.Chitaliya , Prof.A.I.Trivedi proposes feature extraction and classification method using Wavelet. The feature images constructed from Wavelet Coefficients are used as a feature vector for the further process. The Principal Component Analysis (PCA) is used to reduce the dimensionality of the feature vector. It also provides low dimensionality to reproduce and compare the result.The method is very fast and suitable for real time application for motion analysis. Wavelet transform is used for image compression and cleaning (noise and blur reduction). The wavelet transform of the image is computed, the wavelet representation is then modified.PCA was invented in 1901 by Karl Pearson Now it is mostly used as a tool in exploratory data analysis and for making predictive models. PCA can be done by eigen value decomposition of a data covariance matrix or singular value decomposition of a data matrix, usually after mean centering the data for each attribute. The results of a PCA are usually discussed in terms of component scores .

IV. Proposed Approach

In the present work we have improved the accuracy by using curve let based on PCA.The following steps are proposed to achieve the above mentioned objectives:

1. Study of Skin Infection Recognition System.
2. Study of file format for storing skin images.
3. Design and implementation of color detection algorithm.
4. Study and implementation of color to gray conversion, gray histogram equalization algorithm.
5. Study and implementation of laplacian edge detection algorithm, thinning & smoothing algorithm.
6. Design and implementation of Skin Infection localization using wavelet based approaches
7. Check the developed Skin Infection recognition system with different skin images.
8. Deducing conclusion at end.

The proposed work is about the detection of Skin infection in the Medical Images. The complete work is divided in four main phases.

Pre-Processing

Infection Detection

Post Processing

Analysis

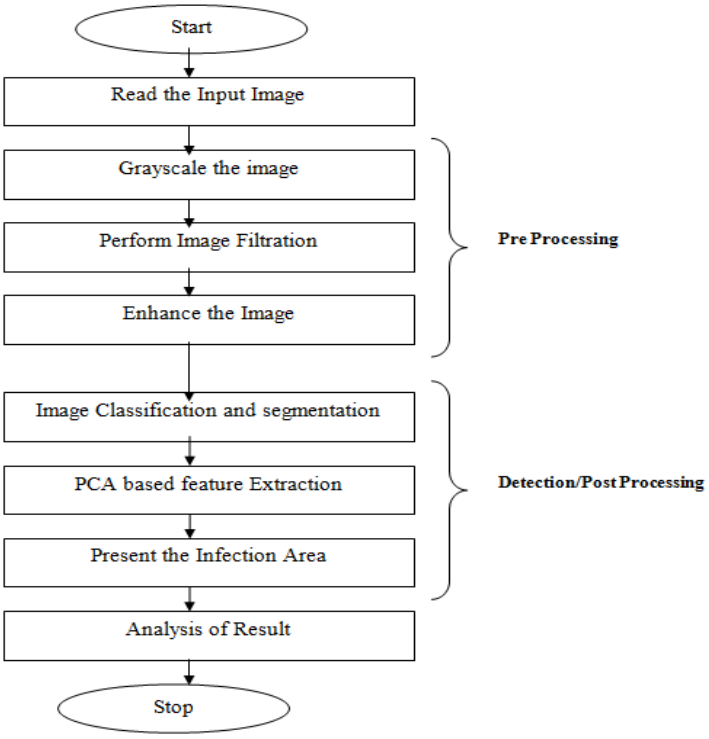
In pre-processing stage different filters are used in combination so that the resulting image is better for the use of segmentation. There are totally five filters that are used in pre-processing stage.

Next step in the pipeline is use of region of interest . The next step involved is image contrast enhancement using adaptive median filter.

The last step in the pre-processing stage is use of Sobel and Prewitt edge detection filters. To achieve better results in the segmentation process it is really important to retaining the edges. Edge detection refers to the process of identifying and locating sharp discontinuities in an image

When the input data to an algorithm is too large to be processed and it is suspected to be redundant (much data, but not much information) then the input data will be transformed into a reduced representation set of features. Transforming the input data into the set of features is called feature extraction .

FLOWCHART. 1



V. Results and Discussions

Here fig.2 is showing the Source image. The image is showing the Ezima area and the inner part of the Skin area is showing the infection area. To perform the infection detection using proposed approach. In this image fig.3, the result image after the extraction process. Here the extraction is performed using Wavelet based approach. Here fig.4 is showing the Source image. The image is showing the Ezima area and the inner part of the Skin area is showing the infection area. To perform the infection detection using proposed approach.

Result Wavelet Based

Figure.2 Input Image

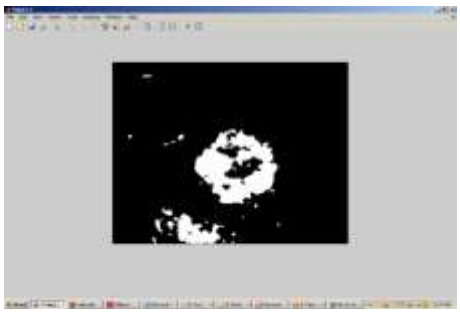


Figure.3 Eczima Extracted Image

Result curvelet Based

Figure.4 Input Image

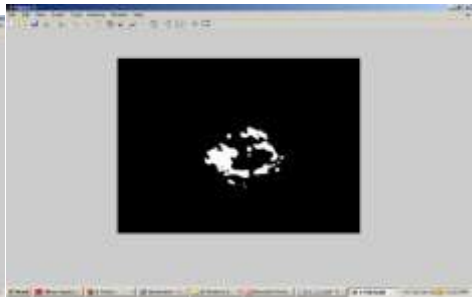
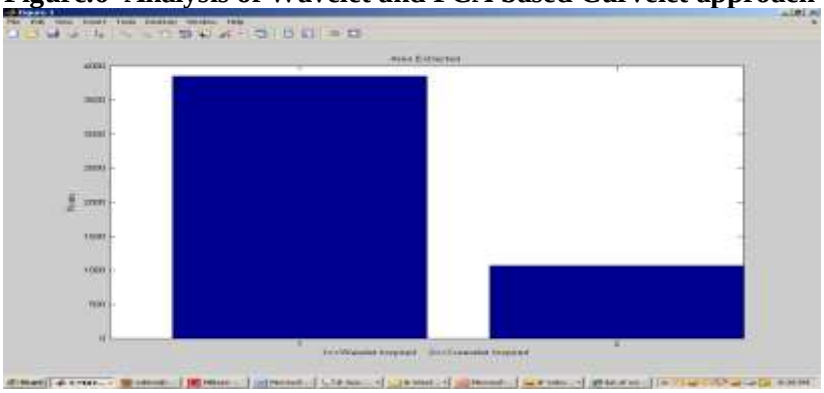


Figure.5 Eczima Extracted Image

In this image fig.5, the result image after the extraction process. Here the extraction is performed using Curvelet based approach. Here we in fig 6, Here we can see the output of the work in terms of size of area extracted from the image as the ezima part. Here we find the wavelet inspired approach has extracted about 3851 pixel count and in case of curvelet based image the extracted pixel count is 1070 pixels

Figure.6 Analysis of Wavelet and PCA based Curvelet approach



Results (Wavelet Inspired)

Here fig.7 is showing the Source image. The image is showing the Ezima area and the inner part of the Skin area is showing the infection area. To perform the infection detection using proposed approach. In this image fig.8, the result image after the extraction process. Here the extraction is performed using Wavelet based approach. Here fig.9 is showing the Source image. The image is showing the Ezima area and the inner part of the Skin area is showing the infection area. To perform the infection detection using proposed approach.

Figure.7 Input Image

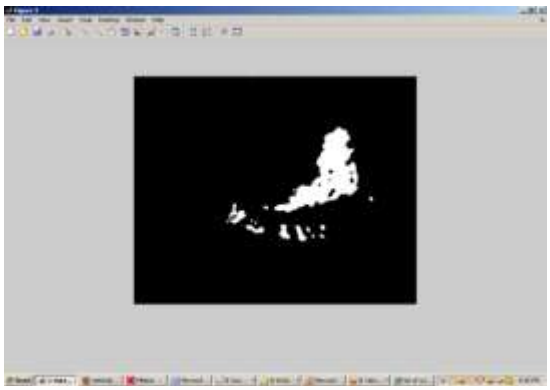


Figure.8 Eczima Extracted Image

Results (Curve let Inspired)

In this image fig.10, the result image after the extraction process. Here the extraction is performed using Cuvelet based approach.

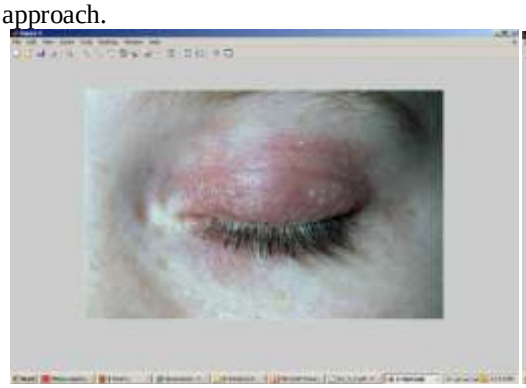
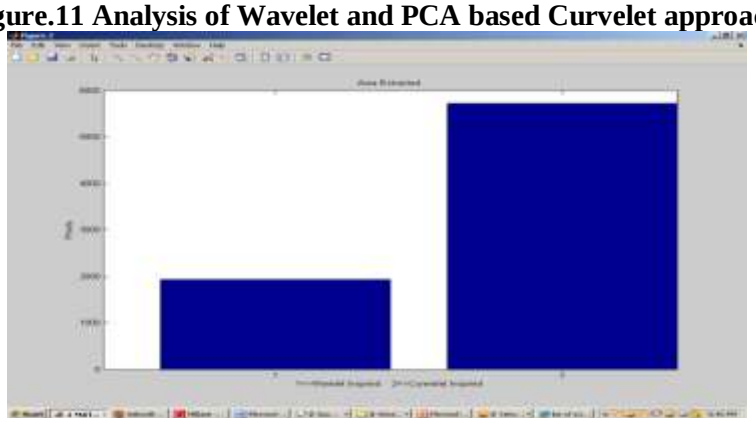


Figure.9 Input Image

Figure.10 Eczima Extracted Image

Here we can see the output of the work in terms of size of area extracted from the image as the ezima part. Here we find the wavelet inspired approach has extracted about 1924 pixel count and in case of curvelet based image the extracted pixel count is 5725 pixels. As we can see the obtained results in case of curvelet the ezima area is extracted in better way.

Figure.11 Analysis of Wavelet and PCA based Curvelet approach



VI. Conclusion

We have introduced a new feature extraction technique from still images using PCA on curvlet domain which has been evaluated on two well-known databases. Our technique has been found to be robust against extreme expression variation as it works efficiently. The subjects in this dataset make grimaces, which form edges in the eczema images and curvelet transform captures this crucial edges information. The proposed method also seems to work well for ORL databases, which shows significant variation in illumination nd infection details. The promising result indicate that curvelet transform can emerge as an effective solution to skin infection recognition problems in future. We have investigated the possibility of curvelet transformation to be used in combination with one linear analysis tool. Futher work is suggested towards the infection detection is performed on 2D images, the work can be implanted for the 3D images. We can also enhance the work by performing the implementation of sequence images

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