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Human Skin Texture Analysis Using GLCM Technique

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***Abstract*— The skin properties like skin dryness, fungus and allergic symptoms i.e. etching kind of problem correlation with skin texture profile is discussed in the proposed thesis work. In the existing scenario, the skin images are analyzed in frequency domain. However, it is observed that the skin colour in texture images does not vary over a wide range. Hence, the histogram profile of the skin texture remains almost flat. In the proposed work, we have shifted the skin texture analysis towards the gray level profile analysis. The gray colour profile of the skin texture may give fair idea about the skin sensitivity and is a new emerging skin texture analysis tool. In the proposed work, skin gray colour profile has been taken as the input parameter in order to ascertain the skin profile. In the proposed thesis work, Gray Level Co-occurrence Matrix of the skin image is computed. The GLCM functions characterize the texture of an image by calculating how often pairs of pixel with specific values and in a specified spatial relationship occur in an image, creating a GLCM, and then extracting statistical measures from this matrix. Further, the image entropy and energies are also computed in order to correlate the skin symptoms to the skin texture images.**

***Index Terms*— GLCM, Gray Level Co-occurrence Matrix Introduction**

1. INTRODUCTION

According to dermatologist, the skin texture has close relation with the individual's diets, hormones, hydration and any allergic symptoms. Therefore, by analyzing the skin texture by acquiring the skin texture image by exposing the human skin to imaging devices, the skin's health may be defined. Texture analysis in image processing is an important tool in analyzing the image of textural nature. In the digital image processing, several methods have been developed to classify images and define statistical distances among them, with the aim to decide whether, in a set of many images, there exist some which are close to any arbitrary image previously encountered.

The texture discrimination can be obtained by choosing a set of attributes, the texture features, which account for the spatial organization of the image.The reproduction of human skin colour and texture may be considered the most important function of various imaging systems.Texture analysis is one of the fundamental aspects of human vision by which we differentiate between surfaces and objects. Texture refers to visual patterns or spatial arrangement of pixels. The regional intensity or colour alone cannot sufficiently describe the skin diseases. Texture classification is concerned with identifying a given textured region from a given set of texture classes. Each of these regions has unique texture characteristics.

As skin ages, it becomes thinner and more easily damaged, with the appearance of wrinkles. In the digital image processing, several methods have been developed to classify images and define statistical distances among them, with the aim to decide whether, in a set of many images, there exist some which are close to any arbitrary image previously encountered. The texture discrimination can be obtained by choosing a set of attributes, the texture features, which account for the spatial organization of the image A method is proposed that tracks the skin's recovery optically from an initial strain made using a mechanical indenter, diffuse side-lighting and a CCD video-capture device. Using the blue color plane of the image it is possible to examine the surface topography only, and track the decay of the imprint over time.

Two algorithms are discussed for the extraction of information on the skin's displacement and are analyzed in terms of reliability and reproducibility According to dermatologist, the skin texture has close relation with the individual's diet, hormones, hydration and any allergic symptoms. Therefore, by analyzing the skin texture by acquiring the skin texture image by exposing the human skin to imaging devices, the skin's health may be defined. Texture analysis in image processing is an important tool in analyzing the image of textural nature

2. PROBLEM STATEMENT

Skin feature extraction**:** It is a statistical method for skin texture analysis. It is only used for spot detection of the skin texture image by using ROI (Region of interest).Using the Region of interest, we cannot extract the full skin diseases in the texture image. It is one of the main disadvantages of this method but In the GLCM and WDM methods, we can choose the image in any random pixels value, also we can use spot detection. We can choose any pixel value of the skin texture image and diagnose the diseases using the skin texture image.

Bidirectional imaging**:** It is also known as skin imaging method. This method captures significantly more properties of appearance than standard imaging. The observed structure of the skins surface is greatly dependent on the angle

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of incident illumination and angle of observation. Specific protocols to achieve bidirectional imaging are presented and used to create the Rutgers Skin Texture Database (clinical component). In GLCM and WDM methods, the texture image does not depend on the incident illumination and angle of observation. In case of replacement of this method, we use Diffusion polarization method.

Diffusion polarization**:** This method deals with detecting regions of damage and disease in the texture of different types of fruit and vegetable images. In this method, moments are used to estimate the components of the polarization image (mean intensity, polarization and phase) from images obtained with multiple polarizer angles. Using the polarization information and Fresnel theory, characterization of the surface reflectance based on spherical harmonic coefficients will be developed. We use the normalized cut method to segment surfaces into different regions depending on their surface reflectance properties.

OBJECTIVE

- The features of the test image and reference image is analyzed using gray level co-occurrence matrix method and comparing both features of the test and reference image and finally result is obtained.
- By using the skin texture analysis method in image processing technique the other tests can be avoided and the detection of the diseases can be done earlier.
- Time can be saved by this technique.
- It is also used in remote area where the doctor is not available.

3. REVIEW OF LITERATURE

Dr. G. P. RAMESH Kumar “Skin Texture Analysis For Medical Diagnosis Using Image Processing Techniques”.This paper deals with the Skin texture analysis.In this paper we introduce the various types of skin diseases are affecting human life like skin dryness, fungus, and allergic symptoms. The objective of this paper is to analyze the skin disease using texture analysis of skin image and by comparing the test image to a defined images or reference images. The matching of test and reference images compared that yields the percentage of skin diseases in the captured skin texture image.

A. Sparavigna and R. Marazzato “An Image Processing Analysis of Skin Textures” In this paper we introduce the skin texture is the appearance of the skin smooth surface. To the features of this texture, many factors are occurring, for instance diet and hydration, amount of collagen and hormones, and, of course, skin care. A gradual decline in skin is moreover superimposed by age. As skin ages, it becomes thinner and more easily damaged, with the appearance of wrinkles. The deterioration is also accompanied by a darkening of skin colour for an over absorption of the natural colouring pigment, melanin, by the top most cell layer in skin.

4. METHODOLOGY

A statistical method of examining texture that considers the spatial relationship of pixels is the grey level co-occurrence matrix. The GLCM function characterize the texture of image by calculating how often pair of pixel with specific value and in a specified spatial relationship occur in an image, creating a GLCM and then extracting statistical measure from matrix.

The work is divided into following steps:

- Image acquisition
- Conversion to grey scale image
- Image enhancement using histogram equalization
- Histogram computation of enhanced image
- Computation GLCM matrix of skin texture image
- Computation of contrast
- Computation of Entropy
- Computation of energy
- Computation of homogeneity
- Correlation with skin symptom

5. GRAY LEVEL CO-OCCURRENCE MATRIX:

GLCM is a popular statistical method for texture analysis. GLCM indicates the probability of gray-level i occurring in the neighbourhood of gray-level j at distanced and direction y.[1] GLCMs can be computed from texture images using different values of d and y.[7] A gray level co-occurrence matrix (**GLCM**) contains information about the positions of pixels having similar gray level values.For texture characterization, we consider a set of features derived from four directional normalized symmetrical GLCMs: contrast (C), mean (M), entropy (N), and variance (V), standard deviation (SD), range(R).[1]

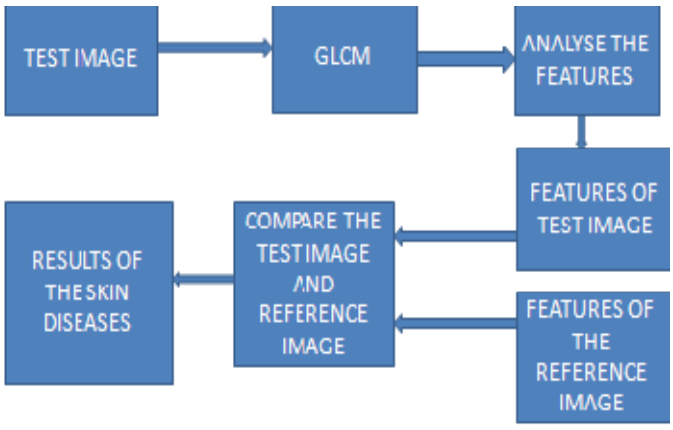

Fig.1 Methodology used in GLCM technique

Here the features of the test image and reference image is analyzed using gray level co-occurrence matrix method And comparing both features of the test and reference image predict the percentage of the skin diseases.

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Fig.2 Input Image

Here the test image is colour image it is converted into a gray scale image because the gray level co-occurence matrix and wavelet decomposition matrix using a gray scale image.

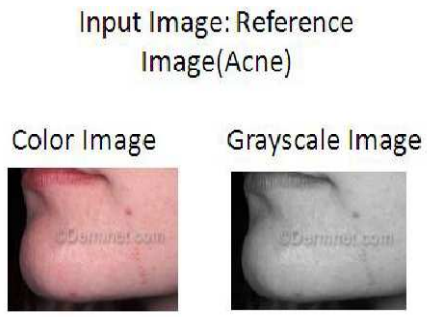

Fig.3 Reference Image

Here the test image is colour image it is converted into a gray scale image because the gray level co-occurence matrix and wavelet decomposition matrix using a gray scale image.

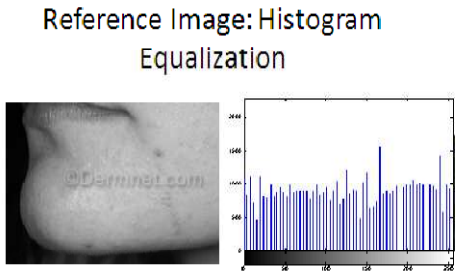

Fig 4 Histogram Equalization for Reference Image

For the reference image histogram equalization is obtained this method usually increases the global contrast of gray scale images and also for accomplishes the most frequent intensity values.

CONCLUSION

The main focus of this paper is on analysing the texture of skin thereby using it to diagnose the skin diseases. Various skin diseases can be analysed based on the combination of feature vector set of contrast, correlation, energy and homogeneity. The future work will be based on developing algorithms to identify various other skin diseases, to improve the overall efficiency and also to further reduce the computational time.

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