AUTOMATIC DIABETIC DETECTION BY USING FOOT PATH IMAGES

Subashini k
Department of ETCE
SATHYABAMA UNIVERSITY
CHENNAI

Mary livinsa z
Department of ETCE
SATHYABAMA UNIVERSITY
CHENNAI

Abstract – To propose a strategy to recognize the Diabetes in individuals utilizing their impression picture by applying different picture preparing strategies.

I.INTRODUCTION

Support vector machine (SVM) - based wound classification method. Although the SVM classifier method led to good results on typical wound images, it is not feasible to implement the training process and the feature extraction on current Smartphone's due to its computational demands. The supervised learning algorithm requires a large number of training image samples and experienced clinical input, which is difficult and costly. To convert an ordinary Smartphone into a practical device for self- management of diabetic wounds, we need to address two tasks like develop a simple method for patients to capture an image of their foot ulcers and design a highly efficient and accurate algorithm for real-time wound analysis that is able to operate within the computational constraints of the Smartphone.

II. EXISTING SYSTEM DESIGN

Diabetes detection using thermal imaging system.

Peripheral neuropathy:

Peripheral neuropathy is nerve damage caused by chronically high blood sugar and diabetes. It leads to numbness, loss of sensation, and sometimes pain in your feet, legs, or hands. It is the most common complication of diabetes.About 60% to 70% of all people with diabetes will eventually develop peripheral neuropathy, although not all suffer pain. Yet this nerve damage is not inevitable.Studies have shown that people with diabetes can reduce their risk of developing nerve damage by keeping their blood sugar levels as close to normal as possible.

What causes peripheral neuropathy?

Chronically high blood sugar levels damage nerves not only in your extremities but also in other parts of your body. These damaged nerves cannot effectively carry messages between the brain and other parts of the body.This means you may not feel heat, cold, or pain in your feet, legs, or hands. If you get a cut or sore on your foot, you may not know it, which is why it's so important to inspect your feet daily. If a shoe doesn't fit properly, you could even develop a foot ulcer and not know it.

Thermoregulation Model:

The process of homeostasis can be modeled as control system. A control system model allows one to describe the dynamical behavior of thermal regulation in order to analyze its behavior under different experimental conditions. Because of the non-linear nature of thermal regulation, this problem is better suited to an alternative form of control and systems model, the state space model. The proposed state space representation of thermal regulation in the plantar foot is a first order differential equation. Such models occur naturally in mathematical models of metabolism and signaling pathways. Moreover, the state space form accommodates nonlinear dynamical features such as those that appear routinely in biology/physiology. This paper addresses the more demanding aspects, which are determining whether the model structure is valid (structure identification) and determining the numerical value of the various model parameters (parameter estimation).

The preprocessing stage consists of 5 steps:
1) Position normalization: all the target feet were flipped to be in the left position.
2) Subsampling: the videos were recorded using a rate of 9 frames per second during 15 minutes (7715 frames). Processing all frames is time consuming and variations in temperature between frames at such a high temporal resolution are not significant for the analysis. Therefore, videos were subsampled at 5 second intervals for minutes (121 frames).
3) Registration: three reference points, the heel, the big toe, and the little toe, were used to perform an affine registration, which is a 2d geometric transformation that maps the information by applying translation, rotation, scaling and shearing.

4) Orientation normalization: we binaries the first frame of the subsampled video. Then, we fitted a line between the heel and the toes area and calculated its angle with respect to the horizontal plane. To normalize all of the frames, we rotated the same angle found in the first frame to the remaining frames.
5) Size normalization: the final step was to crop only the area of interest and resize it to 150x60 pixels so the same ROI in different subjects correspond to the same area of analysis. D. Selection of ROIs We selected six regions of interest (ROIs) using the sensation/skin template foot evaluation form.

III. PROPOSED SYSTEM

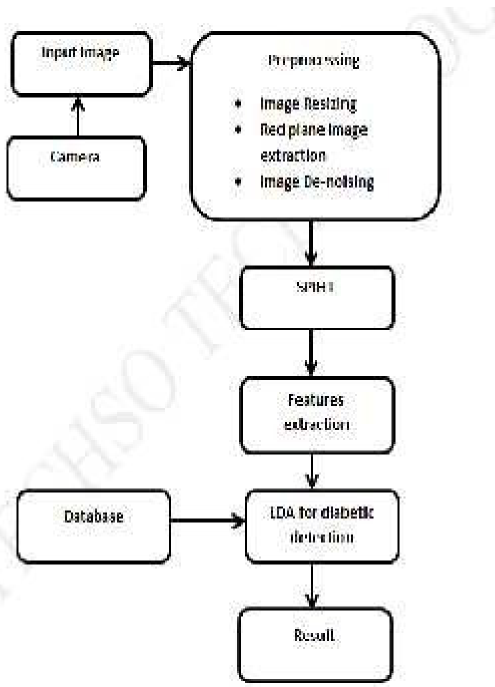


Fig. 3.1 Flowchart Of Proposed System

1.PRE-PROCESSING:

Image resizing:

Image resizing is necessary when you need to increase or decrease the total number of pixels, whereas remapping can occur when you are correcting for lens distortion or rotating an image. Zooming refers to increase the quantity of pixels, so that when you zoom an image, you will see more detail.

Image de-noising:

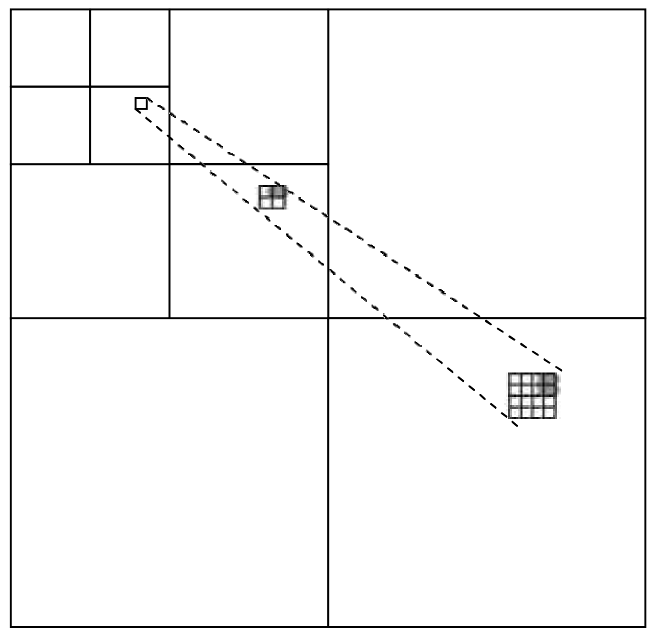
To remove speckles or dots on an image. Dots can be modeled as impulses (salt-and-pepper or speckle) or continuously varying (Gaussian noise) .Can be removed by taking mean or median values of neighboring pixels

2. SPHIT:

Set partitioning in hierarchical trees (SPIHT) is an image compression algorithm that exploits the inherent similarities across the sub bands in a wavelet decomposition of an image. Image quantization is done using DWT.Spectral density of image is calculated for the decomposed image.

The SPIHT technique is based on three concepts:

1) Partial ordering of the transformed image elements by magnitude, with transmission of order by a subset partitioning algorithm that is duplicated at the decoder,
2) ordered bit plane transmission of refinement bits,
3) Exploitation of the self-similarity of the image wavelet transform across different scales.



3. FEATURES EXTRACTION:

Features such as shape, texture, color are used to describe the content of the image

4. LD AND QD ANALYSIS AND CLASSIFICATION:

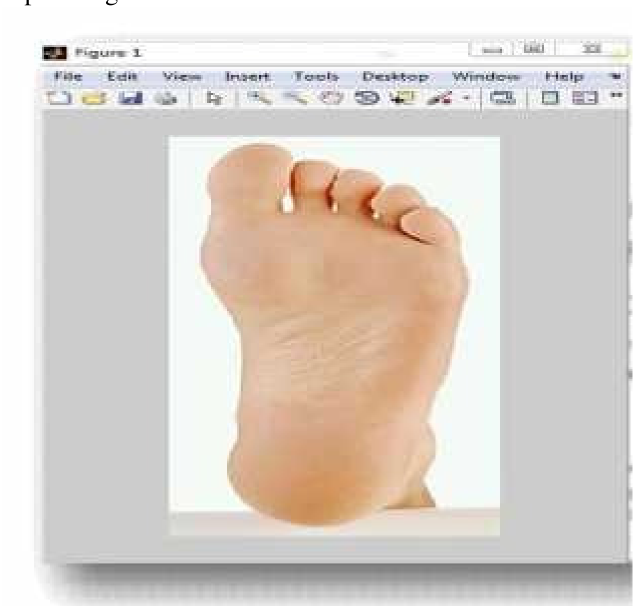
Linear discriminant analysis (LDA) is a generalization of Fisher's linear discriminant, a method used in statistics, pattern recognition and machine learning to find a linear combination of features that characterizes or separates two or more classes of objects or events.

A quadratic classifier is used in machine learning and statistical classification to separate measurements of two or more classes of objects or events by a quadric surface. It is a more general version of the linear classifier.

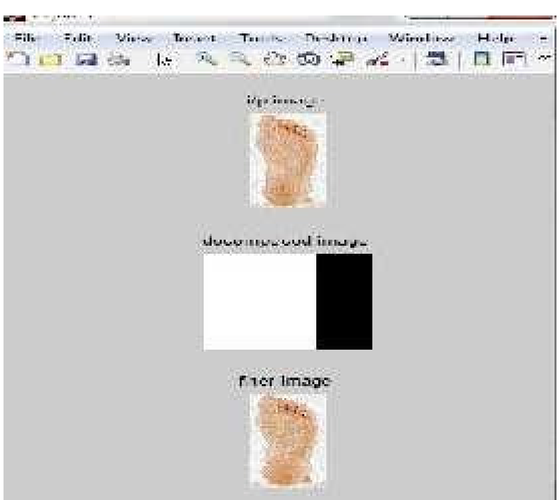
IV. SOFTWARE REQUIREMENT

MATLAB (**mat**rix **lab**oratory) is a multi-paradigm numerical computing environment and fourth-generation programming language. Developed by Math Works, MATLAB allows matrix manipulations, plotting of functions and data, implementation of algorithms, creation of user interfaces, and interfacing with programs written in other languages, including C, C++, Java, FORTRAN and Python.

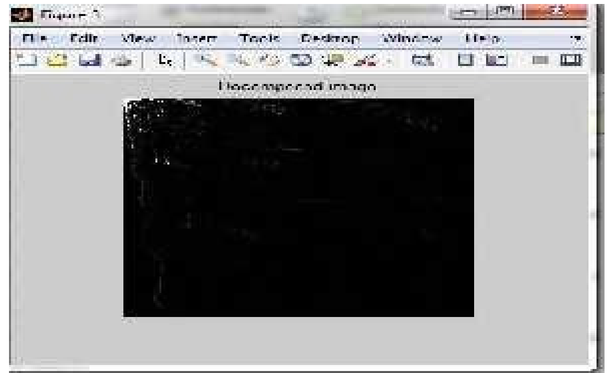
Input image:



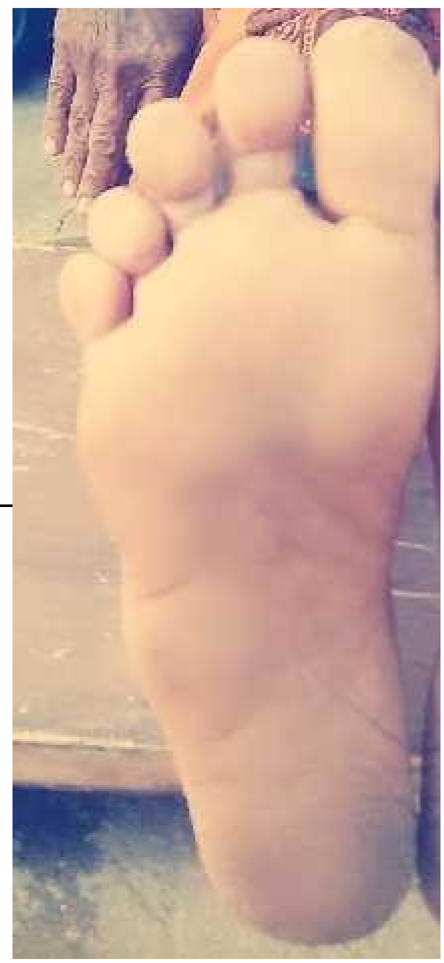
Filter image:

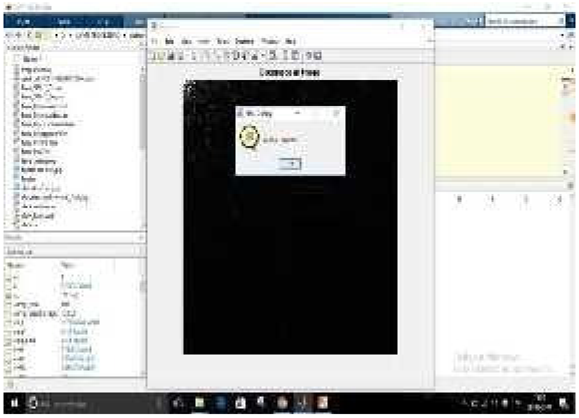


Decomposed image:



Affected image:





V. CONCLUSION

This report deals with the automatic diabetic detection by using foot path images. The diabetic detection is a very important application of medical image processing. . The main contribution of the work is to explore various techniques to detect diabetic in an efficient way. The literature survey has shown that the most of existing methods has ignored by their detection of diabetic inaccuracy manner. Also the most of the existing work on foot path analysis has neglected the use of thermal regulation model. This work has proposed a new SPIHT based diabetic analysis using along with the decision based on feature extraction. The technique has shown quite effective results infrared diabetic foot images analysis technique. The design and implementation of the LDA algorithm is done in MATLAB using image processing toolbox.

VI. REFERENCES

[1] Vilcahuaman, l. Early diagnosis of diabetic foot using thermal images, 3 dediciembre de 2013, Université D'Orléans, Orléans, Francia.

[2] FLUKE, Industrial/Commercial thermal imagers models: Ti32, Ti32R and Ti9 – Technical Data. 2010.

[3] Sun, P.C.; Jao, S.H.; Cheng, C.K. Assessing foot temperature using infrared thermography, Foot Ankle Int. 26 (2006) 847–853.

[4] Assessment of Signs of Foot Infection in Diabetes Patients Using Photographic Foot Imaging and Infrared Thermography". Constantijn E.V.B. Hazenberg, MD, Jaap J. van Netten, PhD, Sjef G. van Baal, MD, PhD, and Sicco A. Bus, PhD.

[5] Skin Temperature Monitoring Reduces the Risk for Diabetic Foot Ulceration in High-risk Patients. David G. Armstrong, DPM, PhD, Katherine Holtz-Neiderer, DPM, Christopher Wendel, MS, M. Jane Mohler, PhD, Heather R. Kimbriel,
Lawrence A. Lavery, DPM, MPH

[6] Plantar thermography is useful in the early diagnosis of diabetic neuropathy. Luciane Fachin Balbinot, Luis Henrique Canani, Caroline Cabral Robinson, Matilde Achaval, Milton Antonio Zaro.

[7] Predicting neuropathic ulceration: analysis of static temperature distributions in thermal images. Naima Kaabouch, Wen-Chen Hu, Julie Anderson, Yi Chen,
Rolf Paulson

[8] Home monitoring of foot skin temperatures to prevent ulceration. L. A. Lavery, K. R. Higgins, D. R. Lanctot et al. Journal Diabetes Care pg. 2642–2647, 2004

[9] An overview of temperature monitoring devices for early detection of diabetic foot disorders. K Roback.
Expert Rev. Med. Devices pg. 711-718, 2010

[10] Valverde Rebaza J. Detección de bordes mediante el algoritmo de Canny, Escuela Académico Profesional de Informática, Universidad Nacional de Trujillo

[11] Canny. A Computational Approach to Edge Detection, IEEE Trans. on Pattern Analysis and Machine Intelligence, 8(6), pp. 679-698 (1986).

