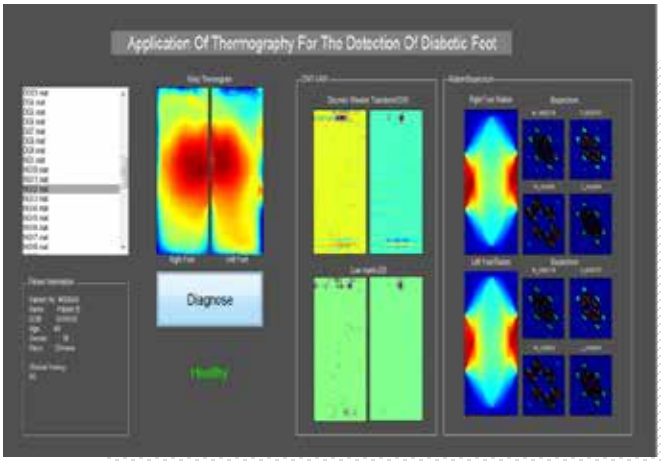
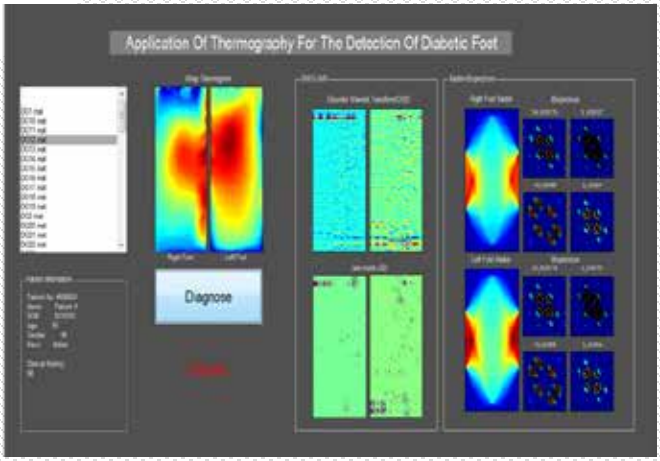
Detection of Diabetic Foot with Infrared Thermography

LUX PHOTONICS CONSORTIUM SINGAPORE

Technology Overview

§ Diabetic foot is a major complication.
§ Temperature variations on the plantar foot can be related to diabetic foot complications.
§ A computer aided detection (CAD) system developed for diabetic foot using plantar foot thermograms.
§ The developed system implements image processing methods that yielded 89.39% accuracy using only five nonlinear features.





Technology Features

1. Pre-processing
Plantar foot regions are segmented and then warped into uniform size.

2. Image decomposition
Warped foot images are decomposed using Discrete Wavelet Transform (DWT) and Higher Order Spectra (HOS).

3. Feature extraction
Entropies and texture features are extracted from decomposed bilateral foot images.

4. Feature selection
Student t-test is applied to select and rank the significant features.

5. Classification
Support Vector Machine (SVM) classifier for classification.

Potential Applications

§ Applicable to all healthcare industry related to detection of diabetic foot.
§ An adjunctive diabetic foot screening tool in clinic.
§ Extended to other diseases like cancers, wound healing, eye diseases, and bone fractures etc.

Benefits

§ Fast, non-invasive and non-contact.
§ Easily program and install in any clinician's laboratory.
§ Expert training is not preferred as results obtained are highly objective.
§ No inter-observer variability and reproducible as compared to manual diagnosis.

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