RETINOPATHY DISEASES SCREENING SYSTEM BASED ON ENHANCED IMAGE PROCESSING ALGORITHMS

RESEARCH MANAGEMENT INSTITUTE (RMI)
UNIVERSITI TEKNOLOGI MARA
40450 SHAH ALAM, SELANGOR
MALAYSIA

BY :
ASSOC. PROF DR HADZLI HASHIM

MEMBERS
ASSOC. PROF DR HADZLI HASHIM
SYED FARID SYED ADNAN
DR MISWANUDIN MUIZUDIN MAHYUDIN

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3. Acknowledgements

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4. Enhanced Research Title and Objectives

Original Title as Proposed:

Retinopathy Diseases Screening System Based on Enhanced Image Processing Algorithms

Improved/Enhanced Title:

Retinopathy Diseases Screening System Based on Enhanced Image Processing Algorithms

Original Objectives as Proposed:

- To investigate various image enhancing algorithms that can be used for retinopathy signature characterization of optic disk, blood vessels and lesions which include image filtering, image segmentations, edge detection and morphological techniques.
- To formulate degree of retinopathy severity index based on image processing for lesions parameters and developing a friendly Graphical User Interface vision system that can aid ophtalmologists in giving decision for early detection.

Improved/Enhanced Objectives:

- To study and evaluate various image processing techniques used to detect Diabetic Retinopathy.
- To produce image enhancing algorithms used for Diabetic Retinopathy signature characterization.
- To formulate degree of Diabetic Retinopathy (DR) numerical index based on image processing for exudates parameters and classify them into DR stages.
- To validate the DR stages using statistical inference method.

5. Report

5.1 Proposed Executive Summary

As a non-intrusive method to screen retinopathy, the color retinal images captured by digital fundus cameras have been used in clinical practice globally. From this retinal image (fundus image), expert person can tell about a person retinal, ophthalmic, and even systemic diseases such as diabetes, hypertension, and arteriosclerosis. Most of the diseases if left untreated can cause vision lost but through regular screening and timely treatment, this disease can be treated. There are several ways to determine the sign and severity of a disease, either comparing the patient's past and present retinal image (optic disk size) to observing the occurrence of retinal lesions (microaneurysms, exudates, haemorrhages,etc).In Malaysia, current practice for retinopathy screening is using direct ophtalmoscopy. Such method is labor intensive and time consuming. However, an alternative ophthalmological method using digital fundus camera to provide retinal image data that can be further use for retinopathy detection. Expert person in this area would apply the fundamental concept of learning, which is by looking at the image and tries to match its appearance to the closest appearance photo from a library text or apply certain morphological learning method to identify the disease. However, this method too costly as it needs expert person or specialist to be available. Furthermore, reference library text consist mainly Caucasian retina images that might degrade the diagnostic accuracy if the patients are from different homosapiens. Due to these setbacks, an improved screening process is needed by extracting and characterizing significance image signature from the fundus images that represent retinopathy. This research proposed extraction of image features particularly sign of optic disk, blood vessels and lesions by applying enhanced image processing technique and characterizing them using numerical analysis for retinopathy identification. This work will involve mathematical formulation, logic design and algorithm building. The expected outcome will be in terms of normalized index of lesions parameters that can represent the degree of retinopathy severity and later can provide research opportunities for developing an effective retinopathy screening model tool as well as improve the current procedures of early detection.