

NONINVASIVE AUTOMATED SYSTEM FOR IDENTIFICATION OF DIABETIC PATIENTS

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Diabetes has become one of the main health issues that people are facing due to changing life styles, eating habits and level of stress encountered each day. According to the year 2016, statistics of the World Health Organization 8.5% of the adult population of the world are suffering from Diabetes. In Sri Lanka as well, 8.5% of the adult population is suffering from diabetes according to year 2015 International Diabetes Federation reports and these numbers are on the rise. Diabetes causes many health issues with damage to blood vessels of the heart, brain, legs, eyes, kidneys and the nervous system, etc. In addition, Diabetes is one of the major causes of blindness and kidney failure as well. According to the year 2016 report of the world Health organization, 7% of total deaths in all age categories in Sri Lanka were due to Diabetes and related complications.

Diabetes can be successfully identified through present day medical tests such as checking blood pressure, random/fasting blood sugar tests and oral glucose tolerance test etc., after the disease reaches a certain level of maturity. At this stage management of the disease is a tedious life long process and it is often incurable. Therefore, early detection of Diabetes is one of the most sought after health requirements at present.

This paper explores a medical imaging method for the identification of Diabetes by analyzing the iris of the human eye related to the pancreas of the human body. The iris is the greenish-brown-yellow area surrounding the transparent pupil of the human eye. Since human eyes have the highest connection with the central nervous system compared to other organs of the body any changes in the organs of the body are clearly reflected in the iris. The Pancreas generates insulin and if this insulin is not properly utilized by the body it leads to Type 2 Diabetes.

The proposed method transforms an image of the iris into a new representation using image processing algorithms and analyses changes in patterns like colour pattern changes and broken tissues in the region of the iris corresponding to the pancreas. The obtained results are then compared with the iris chart and can make a diagnosis as to whether a patient has diabetes or not. The Regions of Interest (ROI) related to pancreas are on the position of 01:45 – 02:15 for the right eye and 07:15-7:45 for the left eye.

Localization of the boundaries of the iris will be done by active contour approach. Normalization will be done to transform the iris region into fixed dimensions. The center of the pupil will be considered as the reference point.

Image enhancement will be done to improve the clarity of the segmented iris and after that the corresponding features will be extracted. The classification will be done with the neural networks with back propagation. In the mean time for comparison purposes support vector machines too will be applied for classification.

Since there are no localized image databases in Sri Lankan context, it is planned to freshly collect a set of iris images of patients with and without diabetes because the colour of the iris of Sri Lankans varies from that of western people. Until the equipment are purchased, the proposed methodology will be tested with the UBIRIS free database.

Keywords: Diabetic, Feature extraction, Iris, Segmentation, alternative medicine, Artificial Neural Networks, Support Vector Machine, Computer Vision, Image Processing, Iridology

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