ABSTRACT

The patients who have had diabetes for more than five years, suffered from blindness due to the damages in the retina. The retina is affected by Diabetic Retinopathy and glaucoma. Among these diabetic retinopathy is major eye disease. This research work aims to develop a better solution for diagnosing both diabetic retinopathy and glaucoma, the literature study reveals that the sensitivity and specificity of the systems are less valuable and also no sufficient method to connect the fundus camera and GUI window. In our Method the diagnostic process will be fully automated and the performance could be improved by using an efficient algorithm and efficient classifier method. The process extraction of red and bright lesions, classification of Artery and vein and detection of Microanereuysms from the retinal image. Then the system finds the characteristics of diabetic retinopathy. The graphical user interface is a window for detecting two types of lesions including hard and soft exudates.

This Research work presents an automated system to analyze the retinal fundus image for the presence of diabetic retinopathy, which is one of the diseases that cause blindness if left unnoticed at their earliest stage. Diabetic retinopathy is asymptotic at their initial stages hence it is very difficult to identify them manually. So an automated system is designed, in which a retinal fundus image is fed to the system where it is subjected to various processes for the identification of diabetic retinopathy with high accuracy. Initially the image is subjected to pre-processing where the noises and other photographic artifacts are removed. Next, image segmentation is carried out to segment the area of interest. Although many segmentation algorithms have been designed earlier new algorithms are being proposed every day to improve the accuracy of segmentation and to decrease the computation time. MMAD model is used in this work to segment the lesion/exudates from the retinal images. In this model

the 2D histogram of the pre-processed image is converted to the 1D histogram through diagonal projection and that is subject to the segmentation which produces the accurate result and the computational time is greatly reduced when compared to various other algorithms. The final stage in this system is lesion classification where the most important properties of the lesion are taken and given to the system. Support vector machine classifier is used to classify the lesion with higher accuracy and the performance of the proposed work is analyzed with existing algorithms.

The second phase of the work has been developed to Increasing technology leading towards the development of digital imaging systems, it has brought a tremendous improvement in fundus imaging and analysis. Classifying blood vessels would be highly help full for various retinal diagnostic. Since there are many diseases with one symptom being an abnormal characteristics of arteries and veins. For example, in diabetic patients the veins are abnormally wide ratio, while diseases of the pancreas lead to narrowed arteries and high blood pressure results in thickened arteries. There are multiple types are available for the classification of blood vessels. But, each of them has its own pros and cons. A fully automated novel methodology is proposed for the classification of blood vessels. The methodology includes advanced pre-processing techniques such as CLAHE and better image segmentation procedures. Being a supervised image segmentation it utilizes trained and tested manually classified image data sets. Level set based segmentation with a statistical model supports noise suppressed image segmentation. The tested data results are compared with manually classified image data set and proven for providing better result

In the last phase of the work has been generated to Increasing necessity of finding a diabetic retinopathy as earliest would stop vision loss for the prolonged diabetes patient although suffered young’s. Severity of the

diabetic retinopathy disease is measured based on micro aneurysms, exudates detections and it grades as Non-proliferative (NPDR) or Proliferative diabetic retinopathy patient (PDR). A proposed machine learning approach such as a Convolution Neural Network (CNN) gives high accuracy in feature detection. Among other supervised and unsupervised learning algorithms involved, the proposed solution is to find a better and optimized way to detecting micro aneurysms, exudates or seeped blood vessels. CNN is flexible, deep, biologically-inspired variants of multi-layer perceptrons that have proven exceptional in image classifications. A deep cascaded layers yield around 93-94% accuracy and outperforms other existing supervised algorithms. A deep convolutional neural network layers are tested with the fundus image database such as DIARETDB0 are available publicly.

In this research work, the Detection of Red and bright lesions from Exudates, classification of artery/vein and detection of Micro aneurysms in concurrent process are analyzed and an automated system for diabetic retinopathy is presented.