Abstract

According to WHO, 347 million people worldwide have diabetes, more than 80% of diabetes deaths occur in different countries. WHO projects that diabetes will be the 7th leading cause of death in 2030. Diabetic Retinopathy is categorized in no of ways such as proliferative diabetic retinopathy (PDR), non-proliferative diabetic retinopathy (NPDR) etc. In this research work we mainly emphasizes on non-proliferative diabetic retinopathy. It is an early stage of diabetic retinopathy. In NPDR, tiny blood vessels within the retina leak blood or fluid and this leakage cause the damage of retina. The non-proliferative diabetic retinopathy categorize in three stages like mild, moderate and sever non-proliferative diabetic retinopathy. For extraction of NPDR lesions, fundus image database has taken. Total five database we have collected, SASWADE local database, collected from Dr. Manoj Saswade (Director, Saswade Netra Rugnalaya, Aurangabad). STARE, DRIVE, DiarectDB0 and DiarectDB1 are the online fundus image databases. For extraction of non-proliferative diabetic retinopathy lesions firstly, pre-processing is done. In pre-processing, we extract the mask of fundus images then remove optic disc, because exudates and optic disc may have the same structure, shape, and geometry. After pre-processing operations, we extract the lesions such as, microaneurysms, haemorrhages, exudates, cotton wool spots and retinal blood vessels statistical features (area, length, thickness, diameter and bifurcation points) by using digital image processing techniques. Afterwards proposed new wavelet (rrm) for extraction of NPDR lesions. After extraction of non-proliferative diabetic retinopathy lesions, we apply K-Means clustering and support vector machine for the classification of NPDR lesions. And for grading artificial neural network (MLP) were used. Also statistical techniques is calculated (mean, variance, standard deviation and correlation) for finding the correlations of the NPDR lesions. Performance analysis is done by applying receiver operating characteristic curve. On the basis of K-Means clustering, SVM, MLP, statistical techniques, ROC curve and confusion matrix overall we got 98% correct result.