The Diagnosis of Diabetic Retinopathy: An Evaluation of Different Classifiers with the Inception V3 Model as a Feature Extractor

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Abstract. Diabetic Retinopathy (DR) is a type of eye disease that is caused by diabetes mellitus. The elevated blood glucose level causes the expansion of the blood vessels that results in the leaking of the blood and other fluids. DR is a silent disease in which those inflicted with it are unaware until irregularities in the retina have advanced to the point where treatment is difficult or impossible to administer, resulting in them losing their sight completely. However, it is worth noting that early treatment can solve this problem. Hence, the purpose of this study is to develop a transfer learning pipeline for diagnosing DR. The data in the present study was obtained from the Kaggle database, and the pre-trained InceptionV3 model was employed to extract the features from the images acquired. The features are fed into the three different classifiers, namely, Support Vector Machine (SVM), *k*-Nearest Neighbour (*k*NN) and the Random Forest (RF). It was shown from the present investigation that the InceptionV3-SVM pipeline demonstrated the best performance by achieving 100%, 98% and 96% classification accuracy for the training, testing and validation dataset. The results further suggest the possible deployment of the pipeline for the diagnosis of DR.

Keywords: Transfer learning · Diabetic retinopathy · InceptionV3 · kNN · RF · SVM

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