

RDS-DR: An Improved Deep Learning Model for Classifying Severity Levels of Diabetic Retinopathy

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Abstract: : A well-known eye disorder called diabetic retinopathy (DR) is linked to elevated blood glucose levels. Cotton wool spots, confined veins in the cranial nerve, AV nicking, and hemorrhages in the optic disc are some of its symptoms, which often appear later. Serious side effects of DR might include vision loss, damage to the visual nerves, and obstruction of the retinal arteries. Researchers have devised an automated method utilizing AI and deep learning models to enable the early diagnosis of this illness. This research gathered digital fundus images from renowned Pakistani eye hospitals to generate a new “DR-Insight” dataset and known online sources. A novel methodology named the residual-dense system (RDS-DR) was then devised to assess diabetic retinopathy. To develop this model, we have integrated residual and dense blocks, along with a transition layer, into a deep neural network. The RDS-DR system is trained on the collected dataset of 9860 fundus images. The RDS-DR categorization method demonstrated an impressive accuracy of 97.5% on this dataset. These findings show that the model produces beneficial outcomes and may be used by healthcare practitioners as a diagnostic tool. It is important to emphasize that the system’s goal is to augment optometrists’ expertise rather than replace it. In terms of accuracy, the RDS-DR technique fared better than the cutting-edge models VGG19, VGG16, Inception V-3, and Xception. This emphasizes how successful the suggested method is for classifying diabetic retinopathy (DR).