Title: SwAV-driven diagnostics: new perspectives on grading diabetic retinopathy from retinal photography.

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Abstract: Diabetic Retinopathy (DR) is a serious eye condition that occurs due to high blood sugar levels in patients with Diabetes Mellitus. If left untreated, DR can potentially result in blindness. Using automated neural network-based methods to grade DR shows potential for early detection. However, the uneven and non-quadrilateral forms of DR lesions provide difficulties for traditional Convolutional Neural Network (CNN)-based architectures. To address this challenge and explore a novel algorithm architecture, this work delves into the usage of contrasting cluster assignments in retinal fundus images with the Swapping Assignments between multiple Views (SwAV) algorithm for DR grading. An ablation study was made where SwAV outperformed other CNN and Transformer-based models, independently and in ensemble configurations with an accuracy of 87.00% despite having fewer parameters and layers. The proposed approach outperforms existing state-of-the-art models regarding classification metrics, complexity, and prediction time. The findings offer great potential for medical practitioners, allowing for more accurate diagnosis of DR and earlier treatments to avoid visual loss.

Keyword: Diabetic Retinopathy, Contrasting Clustering, Swav, Convolutional Neural Network, Ensemble Learning, Transformer, Early Diagnosis.

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