An Intelligent Particle Swarm Optimization with Convolutional Neural Network for Diabetic Retinopathy Classification Model

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Diabetic retinopathy (DR), a major cause of vision loss and it raises a major issue among diabetes people. DR considerably affect the financial condition of the society specially in medicinal sector. Once proper treatment is given to the DR patients, roughly 90% of patients can be saved from vision loss. So, it is needed to develop a DR classification model for classifying the stages and severity level of DR to offer better treatment. This article develops a novel Particle Swarm Optimization (PSO) algorithm based Convolutional Neural Network (CNN) Model called PSO-CNN model to detect and classify DR from the color fundus images. The proposed PSO-CNN model comprises three stages namely preprocessing, feature extraction and classification. Initially, preprocessing is carried out as a noise removal process to discard the noise present in the input image. Then, feature extraction process using PSO-CNN model is applied to extract the useful subset of features. Finally, the filtered features are given as input to the decision tree (DT) model for classifying the set of DR images. The simulation of the PSO-CNN model takes place using a benchmark DR database and the experimental outcome stated that the PSO-CNN model has outperformed all the compared methods in a significant way. The outcome of the simulation process indicated that the PSO-CNN model has offered maximum results.

Keywords: Classification; Diabetic Retinopathy; Grading; Messidor; Transfer Learning

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