Deep Learning Fundus Image Analysis for Early Detection of Diabetic Retinopathy

Introduction

A diabetes condition that impacts the eyes is diabetic retinopathy. Damage to the blood vessels in the light-sensitive tissue at the back of the eye is what causes it (retina). Initially, diabetic retinopathy may not manifest any symptoms or may only result in minor vision issues. Deep learning is a key component in ophthalmology to diagnose critical disorders like diabetic retinopathy (DR). Diabetic retinopathy is a common disease that diabetic patients are diagnosed with.The analyst is responsible for manually detecting exudates, which takes time.

Litrature Survey

S.No	Author	Title	Objective
1.	Xiaogang Li et al. (2017)	Convolutional neural networks based transfer learning for diabetic retinopathy fundus image classification [1]	To implement transfer learning based on CNNs for diabetic retinopathy fundus picture classification. On 1014 and 1200 fundus pictures from the two publicly accessible DR1 and MESSIDOR databases, experiments are conducted.

2.	Saboora Mohammadian et al. (2017)	Comparative Study of Fine-Tuning of Pre-Trained Convolutional Neural Networks for Diabetic Retinopathy Screening [2]	In this study, pre-trained convolutional neural networks are used to automatically diagnose diabetic retinopathy. To circumvent the resource- and time-intensive training procedures required to create a convolutional neural network from scratch, pre-trained networks are used.
3.	ParhamKhojasteh et al. (2019)	Exudate detection in fundus images using deeply-learnable features [3]	This study looked into various deep learning techniques in order to increase sensitivity and specificity, . In this research, several deep learning techniques, including CNNs, pre-trained Residual Networks (ResNet-50), and Discriminative Restricted Boltzmann Machines, were evaluated with both supervised and unsupervised classifiers to improve the performance of autonomous exudate identification.

4.	Md Robiulislam et al. (2019)	Applying supervised contrastive learning for the detection of diabetic retinopathy and its severity levels from fundus images [4]	In this research a SCL approach, a two-stage training method with supervised contrastive loss function, to identify the DR and its severity stages from fundus images (FIs) using the "APTOS 2019 Blindness Detection" dataset was proposed. Experiments were carried out to further validate the performance of the model using the "Messidor-2" dataset.
5.	Muhammad Mateen et al. (2019)	Exudate Detection for Diabetic Retinopathy Using Pretrained Convolutional Neural Networks [5]	To detect exudate using a pretrained convolutional neural network (CNN)-based framework. In the suggested method, data pre-processing is done initially to standardise exudate patches.
6.	Laxmi Math et al. (2020)	Adaptive machine learning classification for diabetic retinopathy [6]	To develop a segment-based learning method for detecting diabetic retinopathy that simultaneously learns classifiers and features from the data and makes considerable progress in identifying the visual manifestations of the disease and its internal lesions.

7.	V. Deepa et al. (2022)	Automated grading of diabetic retinopathy using CNN with hierarchical clustering of image patches by siamese network [7]	To develop a feature extraction technique for DR grading based on deep learning convolutional neural network (CNN) using discriminative multi-sized patches.
8.	Mohamed Abdou BERBAR et al. (2022)	Diabetic Retinopathy Detection and Grading using Deep learning [8]	To provide a novel enhancing method to improve the quality of fundus images. Additionally, it suggests two convolutional neural network (CNN) model topologies. The first one divides DR images into two categories: normal and pathological. the second CNN architecture to categorise DR severity levels.

9.	AliKarsaz et al. (2022)	A modified convolutional neural network architecture for diabetic retinopathy screening using SVDD [9]	This study suggests automated approaches for diagnosing diabetic retinopathy to speed up examinations and assist doctors. Due to the retinal pictures' similar feature maps and slight variations in spatial domain, this method may not be the best for detecting diabetic retinopathy. Therefore, the classifier in this research proposes a new high level picture understanding employing a modified CNN architecture combined with a modified SVDD.
10.	Mohamed A. Berbar et al. (2022)	Features extraction using encoded local binary pattern for detection and grading diabetic retinopathy [10]	This study is to identify diabetic retinopathy in fundus pictures and assess the disease's severity with no lesion segmentation.

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