

Literature Survey

Team ID	PNT2022TMID05694
Project Name	Deep Learning Fundus Image Analysis for Early Detection of Diabetic Retinopathy

Abstract

Diabetic retinopathy (DR) is one of the leading causes of blindness globally. Earlier detection and timely treatment of DR are desirable to reduce the incidence and progression of vision loss. Currently, deep learning (DL) approaches have offered better performance in detecting DR from retinal fundus images. We, therefore, performed a systematic review with a meta-analysis of relevant studies to quantify the performance of DL algorithms for detecting DR.

Sl.No	Title	Author	Year	Method
1.	Diabetic Retinal Fundus Images: Preprocessing and Feature Extraction for Early Detection of Diabetic Retinopathy	Dilip Singh Sisodia, Shruti Nair and Pooja Khobragade	2017	The process flow of methodology adopted to carry out the present work. Subsequent subsections describe the pre-processing of retinal fundus images for extracting and ranking of useful features in the detection of diabetic retinopathy
2.	Early Detection of Diabetic Retinopathy by Using Deep Learning Neural Network	Mohamad Hazim Johari , Hasliza Abu Hassan , Ahmad Ihsan Mohd Yassin	2018	This project presents a method to detect diabetic retinopathy on the fundus images by using deep learning neural network. Convolution Neural Network (CNN) has been used in the project to ease the process of neural learning. The data set used were retrieved from MESSIDOR database and it contains 1200

				<p>pieces of fundus images. The images were filtered based on the project needed. There were 580 pieces of images types has been used after filtered and those pictures were divided into 2, which is Exudates images and Normal images. On the training and testing session, the 80 mixed of exudates and normal fundus images were divided into 2 sets which is training set and testing set. The result of the training and testing set were merged into a confusion matrix. The result for this project shows that the accuracy of the CNN for training and testing set was 99.3% and 88.3% respectively</p>
3.	<p>Computer-Assisted Diagnosis for Diabetic Retinopathy Based on Fundus Images Using Deep Convolutional Neural Network</p>	<p>Yu-Chien Chung, Shih-Jen Chen, Nai-Ning Yeh</p>	2019	<p>We propose an automatic DR detection algorithm, based on DCNN, fractional max-pooling [39], SVM [40], and teaching-learning-based-optimization (TLBO) [41]. Specifically, we train two DCNN networks with fractional-max-pooling, combining their prediction results using SVM and optimizing the SVM parameters with TLBO. The reason for training two distinct networks is that different network architectures may have their unique advantages in feature space representation. By training two DCNNs and combining their features, the prediction accuracy can be further enhanced. Another important factor impacting the recognition rate is the parameter of classifiers. We propose to optimize the SVM parameters using TLBO. We illustrate the image preprocessing methods</p>

4.	Machine Learning-based Diabetic Retinopathy Early Detection and Classification Systems- A Survey	Dathar A. Hasan; Subhi R. M. Zeebaree; Mohammed A. M. Sadeeq; Hanan M. Shukur; Rizgar R.	2021	Machine Learning (ML) is an artificial intelligence method that learns from data to build a prediction system that automates the data analysis without being programmed [3]. ML methods achieved admirable success in robotics, pattern recognition, natural language processing, data mining, share market prediction, and Computer-Aided Diagnosis (CAD) [4]. The absence of symptoms at the early stages of DR makes the detection task challenge. Traditionally, physicians interpret the retina image features to classify DR cases [5]. Recently, ML are very effective in medical imaging. Different types of entities such as lesions and organs in medical image processing can be too complicated and cannot be shown correctly by a simple mathematical solution [6]
5.	Deep Learning Techniques for Diabetic Retinopathy Classification: A Survey	Mohammad Z. Atwany , Abdulwahab H.Sahyoun , And Mohammad Yaqub	2022	This paper reviews and analyzes state-of-the-art deep learning methods unsupervised, self-supervised, and Vision Transformer setups, proposing retinal fundus image classification and detection. For instance, referable, non-referable, and proliferative classifications of Diabetic Retinopathy are reviewed and summarized. Moreover, the paper discusses the available retinal fundus datasets for Diabetic Retinopathy that are used for tasks such as detection classification, and segmentation.

Reference

1. Mohammad Z. Atwany , Abdulwahab H. Sahyoun , And Mohammad Yaqub, 2022, 'Deep Learning Techniques for Diabetic Retinopathy Classification: A Survey.'
2. Mohamad Hazim Johari , Hasliza Abu Hassan , Ahmad Ihsan Mohd Yassin, 2018, 'Early Detection of Diabetic Retinopathy by Using Deep Learning Neural Network.'
3. https://www.researchgate.net/publication/353860904_Machine_Learning-based_Diabetic_Retinopathy_Early_Detection_and_Classification_Systems-_A_Survey
4. https://www.researchgate.net/publication/352740808_Deep_Learning_for_Diabetic_Retinopathy_Detection_and_Classification_Based_on_Fundus_Images_A_Review
5. Eyenuk, Eyeart ai eye screening system. <https://www.eyenuk.com>