DETECTING DIABETIC RETINOPATHY STAGES USING TRANSFER LEARNING APPROACHES

A Specialization Project submitted in partial fulfillment of the requirements for the award of degree of

MASTER OF SCIENCE IN DATA SCIENCE

Submitted by

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BONAFIDE CERTIFICATE

This is to certify that the project work titled **'DETECTING DIABETIC RETINOPATHY STAGES USING TRANSFER LEARNING APPROACHES'** is being submitted to the Department of Data Science, Loyola College (Autonomous), Chennai-34 by **JOVITA V(20-PDS-012)** for the partial fulfillment for the award of degree of **MASTER OF SCIENCE IN DATA SCIENCE** is a bonafide record of work carried out by her, under my guidance and supervision.

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DECLARATION

I, **JOVITA V**, hereby declare that the project entitled **'DETECTING DIABETIC RETINOPATHY STAGES USING TRANSFER LEARNING APPROACH** submitted to the Loyola College, Chennai in partial fulfillment of the requirements for the award for the Degree of **M.Sc. DATA SCIENCE** is a record of original and independent project work done by me during 2021 – 2022 under the Supervision and Guidance of **Dr.P.Manikandan**, Assistant Professor, Department of Data Science, Loyola College, Chennai and it has not formed the basis for the award of any Degree / Diploma / Associateship / Fellowship or other similar title to any candidate in any University.

Date:

Signature of the Candidate

JOVITA V

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Abstract

Abstract

Diabetic Retinopathy (DR) is an ophthalmic disease in which the retinal blood vessels are damaged. If not detected early on, DR causes vision impairment and may even result in blindness. The presence of microaneurysms, exudates, neovascularization, and haemorrhages determines the severity of diabetic retinopathy disease. Diabetic retinopathy was divided into five stages: normal, mild, moderate, severe, nonproliferative (NPDR), and proliferative diabetic retinopathy (PDR).

This Project aims to classify the diabetic prediction stages using APTOS Datasets of fundus images. To encode the rich characteristics and improve classification for different stages of DR using an ensemble of four deep Convolution Neural Network (CNN) models (Resnet50, Xception, Dense121, Vgg16). Image processing with Gaussian Blur and contrast limited adaptive histogram equalization techniques are used in this study's solution method (CLAHE).

Transfer learning on pretrained Vgg16, ResNet50 and DenseNet121 models from ImageNet approach performs with kappa score for Diabetic Retinopathy classifications problems. The best result of the experiment was achieved by DenseNet121 with 87.24 % kappa score.

Keywords: Diabetic Retinopathy, Fundus Images, Convolution Neural Network(CNN), Contrast Limited Adaptive Histogram Equalization(CLAHE), Vgg16, Densenet121, ResNet50.

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S.NO	ABBREVIATION	EXPANSIONS/MEANING
1.	DR	Diabetic Retinopathy
2.	DL	Deep Learning
3.	CNN	Convolutional Neural Network
4.	VGG	Visual Geometry Group
5.	RESNET	Residual Neural Network
6.	CLAHE	Contrast Limited Adaptive Histogram Equivalent

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Introduction

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