# Chapter 7
# Classification of Diabetic Retinopathy Using Regularized Pre-Trained Models

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## ABSTRACT

*Diabetic Retinopathy is a serious sight-threatening complication of diabetes. Deep learning is a superior method for classifying medical images with high accuracy. Typically, we have classified diseases well using transfer learning on pre-trained models from other domains. It utilizes the parameters of a model that has been pre-trained for DR datasets rather than creating new CNN architectures for diverse classification tasks in different domains. The main objective of this chapter is to categorize the Diabetic Retinopathy disease based on its severity using pre-trained models namely ResNet50, VGG16, Alex Net, InceptionV3, Mobile Net and Squeeze Net, DenseNet-121, and XceptionNet and to proposed regularize Xception net experiment with various dropout values.*

## 1. INTRODUCTION

Patients who suffer from diabetic retinopathy have vision loss because of the damage to the blood vessels of the retina, a light-sensitive tissue located at the back of the eye. To diagnose diabetic retinopathy in a patient, a thorough dilated eye exam known as fluorescein angiography is performed in their presence by ophthalmologists and other medical professionals (Lahmar & Idri, 2022). Better

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options are being sought since the existing approach is time-consuming and dependent on the resources that are currently available (Deepa et al., 2022). Initially, diabetic retinopathy may not produce any symptoms and it may eventually result in serious visual impairment. This calls for automated tools for early diagnosis of DR (Kassani et al., 2019).

Recent studies by several academics suggest that deep learning is a superior method for classifying medical images with high accuracy (Jagan Mohan et al., 2021). Typically, researchers have classified diseases well using transfer learning on pre-trained models from other domains (Pamadi et al., 2022). It utilizes the parameters of a model that has been pre-trained for big datasets rather than creating new CNN architectures for diverse classification tasks in different domains (Saranya et al., 2022). This Proposed work describes about the transfer learning based classification of Diabetic Retinopathy using popular pre-trained models namelyResNet50, VGG16, Alex Net, InceptionV3, Mobile Net and Squeeze Net, DenseNet-121, and Xception Net.

## 2. LITERATURE REVIEW

Lahmar et al. (2022) suggested about diabetic retinopathy work detailed experimental validation of seven Convolutional Neural Networks (CNN) architectures for an automatic binary categorization of the type of referable diabetic retinopathy. It made use of the Inception ResNet V2, Inception ResNet V3, ResNet50, VGG16, VGG19, MobileNet V2, and DenseNet201 architectures. The Borda count voting method and the Scott Knott test were examined and compared to find that they both achieve an accuracy of 93.09% (Lahmar & Idri, 2022).

Deepa et al. (2022) investigated a group of multi-stage classifiers for the automated grading of diabetic retinopathy. For the purpose of precise DR prediction utilizing fundus images, this suggested study develops an ensemble of deep convolutional neural network models. Four separate input images are split into each CNN model (InceptionV3, Xception) for training. To find the pertinent characteristics, CNN models are used shallow-dense layers. The model is assisted in learning the important data from DR images by the mix of shallow and dense layer characteristics. The improvement in total classification accuracy of 89.8% is provided by the suggested ensemble technique of multi-stage deep learning mode (Deepa et al., 2022).

Kassani et al. (2022) developed modeified Exception Architecture aggregates multilevel features from several Xception architecture convolutional layers using deep layer aggregation. The effectiveness of the proposed method was assessed using four deep feature extractors: InceptionV3, Mobile Net, ResNet50, and the original Xception architecture. The integration of deep CNN layers may successfully fuse

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