Report-1

**Problem Statement:-**Diabetic Retinopathy Detection MobileNet Binary Classifier. Diabetic retinopathy is a retinal disease that is affected by diabetes on the eyes. The main risk of the disease can lead to blindness. Detection the disease at early stage can rescue the patients from loss of vision. The only solution for this problem is through the use of a retinal screening system that would diagnose the retinal damage at an early stage. Mobilenet is a lightweight architecture. It uses depth wise separable convolutions which basically means it performs a single convolution on each color channel rather than combining all three and flattening it.

**Introduction:-**

Diabetes mellitus, commonly known as diabetes, is a metabolic disorder that causes high blood glucose level over a prolonged period. On the basis of the epidemic estimation, more than 370 million people worldwide will be affected by diabetes mellitus by 2030 .

Individuals who suffer from diabetes mellitus have higher risk of developing Diabetic Retinopathy (DR) due to damages of the retina blood vessels caused by the high blood glucose level aforementioned. In order to provide appropriated therapy and prevent visual loss, it is extremely important to categorize diabetic retinopathy based on the severity.Based upon the findings of the Early Treatment Diabetic Retinopathy Study and the Wisconsin Epidemiologic Study of Diabetic Retinopathy, International Clinical Diabetic Retinopathy and Diabetic Macular Edema Disease Severity Scales, one of the widely-used standard, is proposed by Wilkinson in 2003 to classify diabetic retinopathy into 5 stages, including: 1) Stage I: No apparent retinopathy, 2) Stage II: Mild None-Proliferative Diabetic Retinopathy (NPDR), 3) Stage III: Moderate NPDR, 4) Stage IV: Severe NPDR, and 5) Stage V: Proliferative diabetic retinopathy. The disease severity level of the five diabetic retinopathy stages based on the findings observable by the ophthalmoscopy with the pupil dilated (a.k.a. fundoscopy).

**Literature Survey:-**

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| Index | Title | Description |
| 1 | Diabetic Retinopathy Detection and Classification using Pre-trained  Convolutional Neural Networks | In this paper, they have  applied pre-trained Convolutional Neural Network (CNN) models VGG16 and MobileNetV1. The test accuracy achieved by VGG16 is 89.51% and MobileNetV1 is 89.77%. |
| 2 | Using MobileNetV2 to Classify the Severity of Diabetic Retinopathy | In this paper, they have proposed a lightweight mobile  network and tested the performance of our classifier built using MobileNetV2 – a lightweight, mobile friendly architecture, which is  trained using retinal fundus dataset. they have achieved an accuracy of 91.68% The macro precision, recall, and f1-scores are 77.6%, 83.1%,  and 80.1% respectively. |
| 3 | Diabetic Retinopathy Classification Using an Efficient Convolutional Neural Network | In this paper, they proposed a computationally efficient classification system based on efficient CNNs. It can be seen that the proposed Model Ensemble achieves a QWK score of 0.852 |
| 4 | Mobile Assisted Diabetic Retinopathy Detection using Deep Neural Network | This paper focuses on detection aspects of a mobile application developed to perform DR screening in real time. The application is powered by a tensorflow deep neural network architecture that is trained and tested on 16,798 fundus images. The final accuracy of the model is 73.3%. |

**Strength:-**

1. The MobileNet Network models maintain the rise of the depth of the convolutional neural network, as the use of small convolutional kernels gives great impact on the final classification result.
2. We have build a binary classifier. The overall accuracy of  the model is 0.96 with a good result in confusion metrics and with a kappa score of 0.93
3. The developed model achieves promising results and can be deployed as a mobile application for clinical testing.

**Weakness:**-

1. The MobileNet Network models it is seen that the performance of model is dropped.
2. We not yet to test the model on android application.
3. We may also experiment with other variations of the MobileNet architecture and compare their effectiveness amongst each other and hence improve the current model.