**Dataset:** Aptos 2019 dataset with 35670 images original. This entire dataset is split into 75% of training, 10% validation and 15 % of testset. The dataset had 5 classes of diabetic retinopathy images.

**Data Preprocessing:** The trainset is then augmented with rotation of +45 to -45 degrees, scaling the existing images to 80%(zoom out) to 120%(zoom in). Images are flipped by a factor of 50% on the horizontal axis and by 20% on the vertical flip in total. Gaussian noise has been introduced in 10% of the images. This final train set is fed into the MobileNetV2 network.

**Hyperparameters:**

Learning rate = 0.001

optimizer: Adam

Batch Size = 32

Epochs = 20 with early stopping callback.(20 for fine-tuning)

Dropout is 0.5

**MobileNetV2 architecture:** The network uses pre-trained weights of ImageNet. The final top layer trained for the ImageNet classes is removed and replaced by Global average pooling and 3 dense layers and a final classification layer with 5 class output.

**Results:**

Network trained for 21 epochs – 11 normal and 10 epochs with unfreezed layers

**Confusion matrix report://diagonals have the true positive – correctly classified iputs**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Confusion Matrix | | True/Actual labels | | | | |
| 0 | 1 | 2 | 3 | 4 |
| Model predictions | 0 | **1458** | 66 | 41 | 23 | 16 |
| 1 | 12 | 283 | 14 | 8 | 5 |
| 2 | 24 | 41 | 777 | 35 | 7 |
| 3 | 5 | 8 | 13 | 130 | 10 |
| 4 | 6 | 8 | 7 | 16 | 227 |

**Multi class Classification final report:**

precision recall f1-score support

0 0.96877 0.90898 0.93792 1604

1 0.69704 0.87888 0.77747 322

2 0.91197 0.87896 0.89516 884

3 0.61321 0.78313 0.68783 166

4 0.85660 0.85985 0.85822 264

accuracy 0.88735 3240

macro avg 0.80952 0.86196 0.83132 3240

weighted avg 0.89891 0.88735 0.89100 3240

**Results**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Models/Metrics | Accuracy | Precision | Recall | Specificity | Kappa Score | AUC |
| MobileNetV2  (w=1.4) | 88.73 | 80.95 | 86.19 | 96.65 | 83.33 | 0.9289 |

Epochs --- 20 epochs