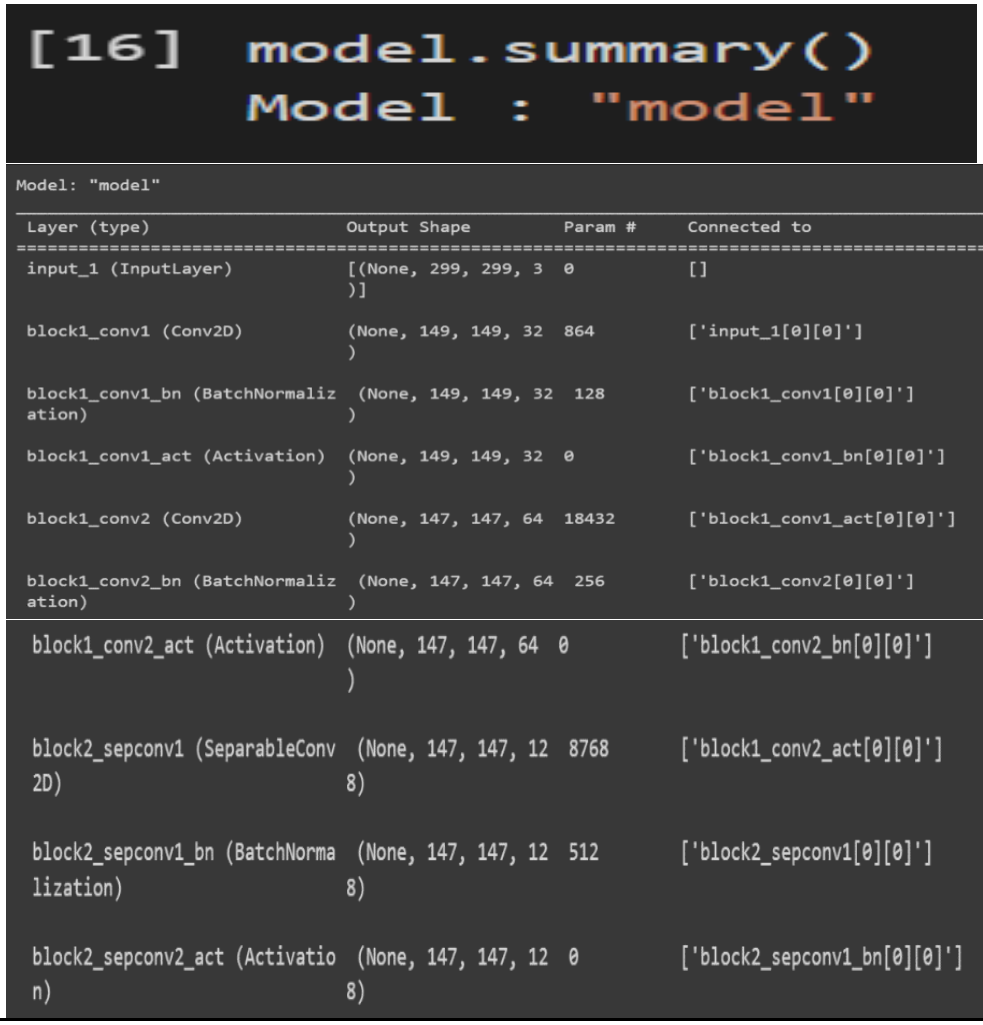
Project Development Phase
Model Performance Test

Date	17 November 2022
Team ID	PNT2022TMID34131
Project Name	Deep Learning Fundus Image Analysis for Early Detection of Diabetic Retinopathy
Maximum Marks	10 Marks

Model Performance Testing:

Project team shall fill the following information in model performance testing template.

S.No.	Parameter	Values	Screenshot
1.	Model Summary	-	

```
block2_sepconv2 (SeparableConv  (None, 147, 147, 12  17536      ['block2_sepconv2_act[0][0]']
2D)                             8)

block2_sepconv2_bn (BatchNorma  (None, 147, 147, 12  512        ['block2_sepconv2[0][0]']
lization)                       8)

conv2d (Conv2D)                 (None, 74, 74, 128)  8192       ['block1_conv2_act[0][0]']

block2_pool (MaxPooling2D)      (None, 74, 74, 128)  0          ['block2_sepconv2_bn[0][0]']

batch_normalization (BatchNorm  (None, 74, 74, 128)  512        ['conv2d[0][0]']
alization)

add (Add)                       (None, 74, 74, 128)  0          ['block2_pool[0][0]',
                                                                 'batch_normalization[0][0]']

block3_sepconv1_act (Activatio  (None, 74, 74, 128)  0          ['add[0][0]']
n)

block3_sepconv1 (SeparableConv  (None, 74, 74, 256)  33920      ['block3_sepconv1_act[0][0]']
2D)

block3_sepconv1_bn (BatchNorma  (None, 74, 74, 256)  1024       ['block3_sepconv1[0][0]']
lization)

block3_sepconv2_act (Activatio  (None, 74, 74, 256)  0          ['block3_sepconv1_bn[0][0]']
n)

block3_sepconv2 (SeparableConv  (None, 74, 74, 256)  67840      ['block3_sepconv2_act[0][0]']
2D)

block3_sepconv2_bn (BatchNorma  (None, 74, 74, 256)  1024       ['block3_sepconv2[0][0]']
lization)

conv2d_1 (Conv2D)               (None, 37, 37, 256)  32768      ['add[0][0]']

block3_pool (MaxPooling2D)      (None, 37, 37, 256)  0          ['block3_sepconv2_bn[0][0]']

batch_normalization_1 (BatchNo  (None, 37, 37, 256)  1024       ['conv2d_1[0][0]']
rmalization)
```

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add_1 (Add)                    (None, 37, 37, 256)  0           ['block3_pool[0][0]',
                                                                 'batch_normalization_1[0][0]']

block4_sepconv1_act (Activatio (None, 37, 37, 256)  0           ['add_1[0][0]']
n)

block4_sepconv1 (SeparableConv (None, 37, 37, 728)  188672      ['block4_sepconv1_act[0][0]']
2D)

block4_sepconv1_bn (BatchNorma (None, 37, 37, 728)  2912        ['block4_sepconv1[0][0]']
lization)

block4_sepconv2_act (Activatio (None, 37, 37, 728)  0           ['block4_sepconv1_bn[0][0]']
n)

block4_sepconv2 (SeparableConv (None, 37, 37, 728)  536536      ['block4_sepconv2_act[0][0]']
2D)

block4_sepconv2_bn (BatchNorma (None, 37, 37, 728)  2912        ['block4_sepconv2[0][0]']
lization)

conv2d_2 (Conv2D)              (None, 19, 19, 728)  186368      ['add_1[0][0]']

block4_pool (MaxPooling2D)     (None, 19, 19, 728)  0           ['block4_sepconv2_bn[0][0]']

batch_normalization_2 (BatchNo (None, 19, 19, 728)  2912        ['conv2d_2[0][0]']
rmalization)

add_2 (Add)                    (None, 19, 19, 728)  0           ['block4_pool[0][0]',
                                                                 'batch_normalization_2[0][0]']

block5_sepconv1_act (Activatio (None, 19, 19, 728)  0           ['add_2[0][0]']
n)

block5_sepconv1 (SeparableConv (None, 19, 19, 728)  536536      ['block5_sepconv1_act[0][0]']
2D)

block5_sepconv1_bn (BatchNorma (None, 19, 19, 728)  2912        ['block5_sepconv1[0][0]']
lization)

block5_sepconv2_act (Activatio (None, 19, 19, 728)  0           ['block5_sepconv1_bn[0][0]']
n)

block5_sepconv2 (SeparableConv (None, 19, 19, 728)  536536      ['block5_sepconv2_act[0][0]']
2D)
```

			block5_sepconv2_bn (BatchNorma (None, 19, 19, 728) 2912 ['block5_sepconv2[0][0]'] lization) block5_sepconv3_act (Activatio (None, 19, 19, 728) 0 ['block5_sepconv2_bn[0][0]'] n) block5_sepconv3 (SeparableConv (None, 19, 19, 728) 536536 ['block5_sepconv3_act[0][0]'] 2D) block5_sepconv3_bn (BatchNorma (None, 19, 19, 728) 2912 ['block5_sepconv3[0][0]'] lization) add_3 (Add) (None, 19, 19, 728) 0 ['block5_sepconv3_bn[0][0]', 'add_2[0][0]'] block6_sepconv1_act (Activatio (None, 19, 19, 728) 0 ['add_3[0][0]'] n) block6_sepconv1 (SeparableConv (None, 19, 19, 728) 536536 ['block6_sepconv1_act[0][0]'] 2D) block6_sepconv1_bn (BatchNorma (None, 19, 19, 728) 2912 ['block6_sepconv1[0][0]'] lization) block6_sepconv2_act (Activatio (None, 19, 19, 728) 0 ['block6_sepconv1_bn[0][0]'] n) block6_sepconv2 (SeparableConv (None, 19, 19, 728) 536536 ['block6_sepconv2_act[0][0]'] 2D) block6_sepconv2_bn (BatchNorma (None, 19, 19, 728) 2912 ['block6_sepconv2[0][0]'] lization) block6_sepconv3_act (Activatio (None, 19, 19, 728) 0 ['block6_sepconv2_bn[0][0]'] n) block6_sepconv3 (SeparableConv (None, 19, 19, 728) 536536 ['block6_sepconv3_act[0][0]'] 2D)

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block6_sepconv2_bn (BatchNorma  (None, 19, 19, 728)  2912       ['block6_sepconv2[0][0]']
lization)

block6_sepconv3_act (Activatio  (None, 19, 19, 728)  0          ['block6_sepconv2_bn[0][0]']
n)

block6_sepconv3 (SeparableConv  (None, 19, 19, 728)  536536     ['block6_sepconv3_act[0][0]']
2D)

block6_sepconv3_bn (BatchNorma  (None, 19, 19, 728)  2912       ['block6_sepconv3[0][0]']
lization)

add_4 (Add)                    (None, 19, 19, 728)  0          ['block6_sepconv3_bn[0][0]',
                                                                'add_3[0][0]']

block7_sepconv1_act (Activatio  (None, 19, 19, 728)  0          ['add_4[0][0]']
n)

block7_sepconv1 (SeparableConv  (None, 19, 19, 728)  536536     ['block7_sepconv1_act[0][0]']
2D)
block7_sepconv1_bn (BatchNorma  (None, 19, 19, 728)  2912       ['block7_sepconv1[0][0]']
lization)

block7_sepconv2_act (Activatio  (None, 19, 19, 728)  0          ['block7_sepconv1_bn[0][0]']
n)

block7_sepconv2 (SeparableConv  (None, 19, 19, 728)  536536     ['block7_sepconv2_act[0][0]']
2D)

block7_sepconv2_bn (BatchNorma  (None, 19, 19, 728)  2912       ['block7_sepconv2[0][0]']
lization)

block7_sepconv3_act (Activatio  (None, 19, 19, 728)  0          ['block7_sepconv2_bn[0][0]']
n)

block7_sepconv3 (SeparableConv  (None, 19, 19, 728)  536536     ['block7_sepconv3_act[0][0]']
2D)

block7_sepconv3_bn (BatchNorma  (None, 19, 19, 728)  2912       ['block7_sepconv3[0][0]']
lization)

add_5 (Add)                    (None, 19, 19, 728)  0          ['block7_sepconv3_bn[0][0]',
                                                                'add_4[0][0]']
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block8_sepconv1_act (Activatio  (None, 19, 19, 728)  0          ['add_5[0][0]']
n)

block8_sepconv1 (SeparableConv  (None, 19, 19, 728)  536536     ['block8_sepconv1_act[0][0]']
2D)

block8_sepconv1_bn (BatchNorma  (None, 19, 19, 728)  2912       ['block8_sepconv1[0][0]']
lization)

block8_sepconv2_act (Activatio  (None, 19, 19, 728)  0          ['block8_sepconv1_bn[0][0]']
n)

block8_sepconv2 (SeparableConv  (None, 19, 19, 728)  536536     ['block8_sepconv2_act[0][0]']
2D)

block8_sepconv2_bn (BatchNorma  (None, 19, 19, 728)  2912       ['block8_sepconv2[0][0]']
lization)

block8_sepconv3_act (Activatio  (None, 19, 19, 728)  0          ['block8_sepconv2_bn[0][0]']
n)
```

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```
 add_11 (Add)                (None, 10, 10, 1024  0           ['block13_pool[0][0]',
                             )                                 'batch_normalization_3[0][0]']

 block14_sepconv1 (SeparableCon  (None, 10, 10, 1536  1582080    ['add_11[0][0]']
 v2D)                        )

 block14_sepconv1_bn (BatchNorm  (None, 10, 10, 1536  6144       ['block14_sepconv1[0][0]']
 alization)                  )

 block14_sepconv1_act (Activati  (None, 10, 10, 1536  0           ['block14_sepconv1_bn[0][0]']
 on)                         )

 block14_sepconv2 (SeparableCon  (None, 10, 10, 2048  3159552    ['block14_sepconv1_act[0][0]']
 v2D)                        )

 block14_sepconv2_bn (BatchNorm  (None, 10, 10, 2048  8192       ['block14_sepconv2[0][0]']
 alization)                  )

block14_sepconv2_act (Activati  (None, 10, 10, 2048  0           ['block14_sepconv2_bn[0][0]']
on)                            )

flatten (Flatten)              (None, 204800)       0           ['block14_sepconv2_act[0][0]']

dense (Dense)                  (None, 5)            1024005     ['flatten[0][0]']

==================================================================================================
Total params: 21,885,485
Trainable params: 1,024,005
Non-trainable params: 20,861,480
__________________________________________________________________________________________________
```

2.	Accuracy	Training Accuracy - Validation Accuracy -	```# fit the model r = model.fit_generator(training_set, validation_data=test_set, epochs=30, steps_per_epoch=len (training_set)//32, validation_steps=len(test_set)//32)``` ```Epoch 1/30 3/3 [==============================] - 58s 17s/step - loss: 12.1428 - accuracy: 0.3229 Epoch 2/30 3/3 [==============================] - 50s 14s/step - loss: 10.8191 - accuracy: 0.5521 Epoch 3/30 3/3 [==============================] - 51s 16s/step - loss: 9.6766 - accuracy: 0.4688 Epoch 4/30 3/3 [==============================] - 51s 16s/step - loss: 7.3417 - accuracy: 0.5833 Epoch 5/30 3/3 [==============================] - 49s 14s/step - loss: 5.9892 - accuracy: 0.5208 Epoch 6/30 3/3 [==============================] - 47s 14s/step - loss: 4.0807 - accuracy: 0.6771 Epoch 7/30 3/3 [==============================] - 49s 15s/step - loss: 3.9948 - accuracy: 0.6562 Epoch 8/30 3/3 [==============================] - 49s 15s/step - loss: 4.0479 - accuracy: 0.6250 Epoch 9/30 3/3 [==============================] - 50s 15s/step - loss: 4.3574 - accuracy: 0.6458 Epoch 10/30 3/3 [==============================] - 50s 15s/step - loss: 3.7197 - accuracy: 0.6146 Epoch 11/30 3/3 [==============================] - 47s 14s/step - loss: 5.1180 - accuracy: 0.5625```

			Epoch 12/30 3/3 [==============================] - 48s 14s/step - loss: 2.5951 - accuracy: 0.7188 Epoch 13/30 3/3 [==============================] - 51s 15s/step - loss: 3.6282 - accuracy: 0.7083 Epoch 14/30 3/3 [==============================] - 47s 14s/step - loss: 3.2756 - accuracy: 0.7083 Epoch 15/30 3/3 [==============================] - 40s 15s/step - loss: 4.7868 - accuracy: 0.6795 Epoch 16/30 3/3 [==============================] - 49s 14s/step - loss: 2.7478 - accuracy: 0.7604 Epoch 17/30 3/3 [==============================] - 47s 14s/step - loss: 4.2101 - accuracy: 0.5417 Epoch 18/30 3/3 [==============================] - 48s 14s/step - loss: 4.3796 - accuracy: 0.6875 Epoch 19/30 3/3 [==============================] - 54s 17s/step - loss: 5.3032 - accuracy: 0.5312 Epoch 20/30 3/3 [==============================] - 50s 15s/step - loss: 3.7652 - accuracy: 0.7083 Epoch 21/30 3/3 [==============================] - 48s 14s/step - loss: 2.8421 - accuracy: 0.7812 Epoch 22/30 3/3 [==============================] - 48s 15s/step - loss: 2.7402 - accuracy: 0.6979 Epoch 23/30 3/3 [==============================] - 49s 15s/step - loss: 2.7817 - accuracy: 0.6771 Epoch 24/30 3/3 [==============================] - 49s 15s/step - loss: 3.3278 - accuracy: 0.7083 Epoch 25/30 3/3 [==============================] - 49s 14s/step - loss: 3.9974 - accuracy: 0.6354 Epoch 26/30 3/3 [==============================] - 48s 14s/step - loss: 2.6000 - accuracy: 0.6979 Epoch 27/30 3/3 [==============================] - 48s 15s/step - loss: 3.0479 - accuracy: 0.6979 Epoch 28/30 3/3 [==============================] - 47s 14s/step - loss: 1.9773 - accuracy: 0.7708 Epoch 29/30 3/3 [==============================] - 49s 14s/step - loss: 2.6960 - accuracy: 0.7292 Epoch 30/30 3/3 [==============================] - 47s 14s/step - loss: 2.5824 - accuracy: 0.7708
3.	Confidence Score (Only Yolo Projects)	Class Detected - Confidence Score -	NA