Project Development Phase
Model Performance Test

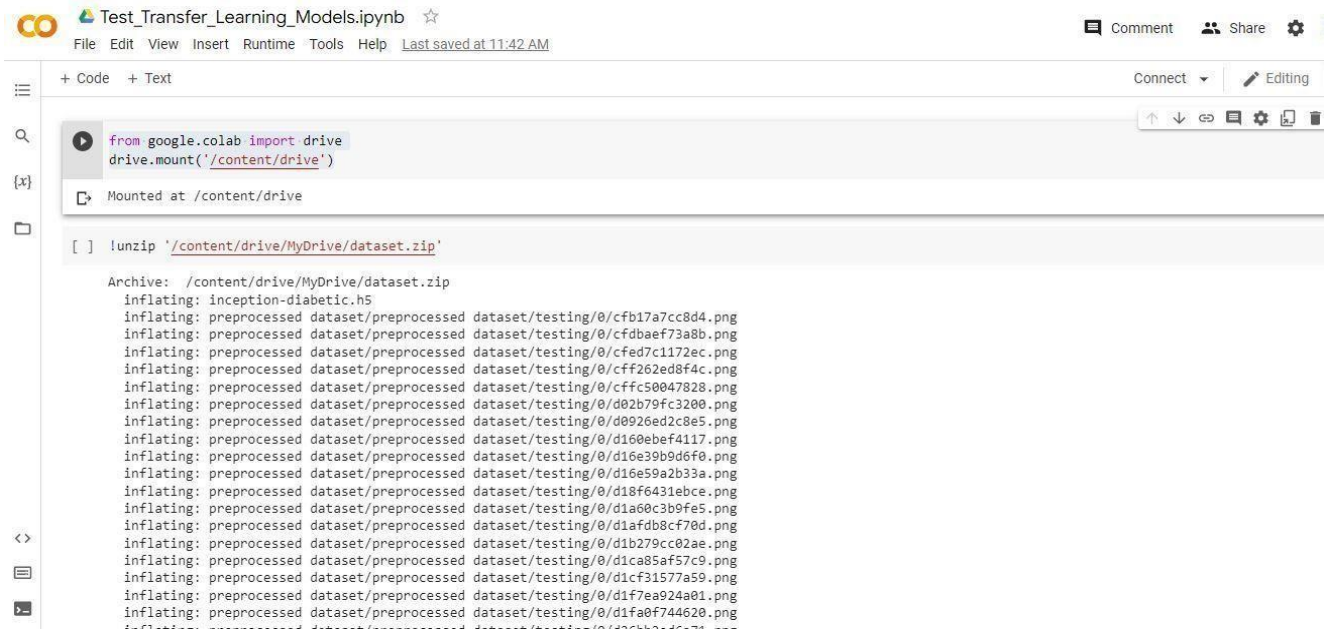
Date	18 November 2022
Team ID	PNT2022MID09991
Project Name	Deep Learning Fundus Image Analysis for Early Detection of Diabetic Retinopathy
Maximum Marks	10 Marks

Model Performance Testing:

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

S.No.	Parameter	Values	Screenshot
1.	Model Summary	Total params: 21,885,485 Trainable params: 1,024,005 Non-trainable params: 20,861,480	Attached below
2.	Accuracy	Training Accuracy - 72% Validation Accuracy - 59%	Attached below
3.	Confidence Score (Only Yolo Projects)	Class Detected - NILL Confidence Score - NILL	NILL

SCREENSHOTS :



Test_Transfer_Learning_Models.ipynb

File Edit View Insert Runtime Tools Help Last saved at 11:42 AM

Comment Share p

+ Code + Text Connect Editing

```
from tensorflow.keras.layers import Dense, Flatten, Input
from tensorflow.keras.models import Model
from tensorflow.keras.preprocessing import image
from tensorflow.keras.preprocessing.image import ImageDataGenerator, load_img
from tensorflow.keras.applications.xception import Xception, preprocess_input
from glob import glob
import numpy as np
import matplotlib.pyplot as plt
from tensorflow.keras.models import load_model
from tensorflow.keras.models import load_model
#import image class to process the images
from tensorflow.keras.preprocessing import image
from tensorflow.keras.applications.inception_v3 import preprocess_input
import numpy as np
```

```
[ ] imageSize = [299, 299]
```

```
[ ] xception = Xception(input_shape=imageSize + [3], weights='imagenet',include_top=False)
```

```
Downloading data from https://storage.googleapis.com/tensorflow/keras-applications/xception/xception_weights_tf_dim_ordering_tf_kernels_notop.h5
83683744/83683744 [==============================] - 1s 0us/step
```

```
[ ] # don't train existing weights
    for layer in xception.layers:
```

Test_Transfer_Learning_Models.ipynb

File Edit View Insert Runtime Tools Help Last saved at 11:42 AM

Comment Share

Code + Text Connect Editing

```
# our layers - you can add more if you want
x = Flatten()(xception.output)
```

```
] prediction = Dense(5, activation='softmax')(x)
```

```
] # create a model object
  model = Model(inputs=xception.input, outputs=prediction)
```

```
] # view the structure of the model
  model.summary()
```

```
Model: "model"
__________________________________________________________________________________________________
 Layer (type)                   Output Shape         Param #     Connected to
==================================================================================================
 input_1 (InputLayer)           [(None, 299, 299, 3  0           []
                                )]

 block1_conv1 (Conv2D)          (None, 149, 149, 32  864         ['input_1[0][0]']
                                )

 block1_conv1_bn (BatchNormaliz (None, 149, 149, 32  128         ['block1_conv1[0][0]']
 ation)                         )

 block1_conv1_act (Activation)  (None, 149, 149, 32  0           ['block1_conv1_bn[0][0]']
                                )
```

File Edit View Insert Runtime Tools Help Last saved at 11:42 AM

+ Code + Text

```
# tell the model what cost and optimization method to use
model.compile(
  loss='categorical_crossentropy',
  optimizer='adam',
  metrics=['accuracy']
)
```

```
[ ] train_datagen = ImageDataGenerator(rescale = 1./255,
                                       shear_range = 0.2,
                                       zoom_range = 0.2,
                                       horizontal_flip = True)

    test_datagen = ImageDataGenerator(rescale = 1./255)
```

```
[ ] training_set = train_datagen.flow_from_directory('/content/preprocessed dataset/preprocessed dataset/training',
                                                     target_size = (299, 299),
                                                     batch_size = 32,
                                                     class_mode = 'categorical')

    test_set = test_datagen.flow_from_directory('/content/preprocessed dataset/preprocessed dataset/testing',
                                                target_size = (299, 299),
                                                batch_size = 32,
                                                class_mode = 'categorical')
```

```
Found 3662 images belonging to 5 classes.
Found 734 images belonging to 5 classes.
```

Test_Transfer_Learning_Models.ipynb ☆

File Edit View Insert Runtime Tools Help Last saved at 11:42 AM

Comment Share

+ Code + Text Connect Editing

```
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
)
```

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:6: UserWarning: `Model.fit_generator` is deprecated and will be removed in a future version. Plea

Epoch 1/30
3/3 [==============================] - 36s 10s/step - loss: 11.1276 - accuracy: 0.3958
Epoch 2/30
3/3 [==============================] - 30s 9s/step - loss: 12.4058 - accuracy: 0.5833
Epoch 3/30
3/3 [==============================] - 30s 9s/step - loss: 9.2441 - accuracy: 0.4583
Epoch 4/30
3/3 [==============================] - 29s 9s/step - loss: 7.6886 - accuracy: 0.5938
Epoch 5/30
3/3 [==============================] - 31s 9s/step - loss: 4.8011 - accuracy: 0.6875
Epoch 6/30
3/3 [==============================] - 29s 9s/step - loss: 3.5280 - accuracy: 0.6562
Epoch 7/30
3/3 [==============================] - 31s 9s/step - loss: 5.4394 - accuracy: 0.6458
Epoch 8/30
3/3 [==============================] - 29s 8s/step - loss: 3.8816 - accuracy: 0.6562
Epoch 9/30
3/3 [==============================] - 29s 8s/step - loss: 5.4999 - accuracy: 0.6562
Epoch 10/30
3/3 [==============================] - 30s 9s/step - loss: 2.3537 - accuracy: 0.7708
```

Test_Transfer_Learning_Models.ipynb

File Edit View Insert Runtime Tools Help Last saved at 11:42 AM

Comment Share

+ Code + Text

Connect Editing

```
[ ] model.save('Updated-Xception-diabetic-retinopathy.h5')
```

```
#load saved model file
model=load_model('Updated-Xception-diabetic-retinopathy.h5')
```

```
[ ] #load one random image from local system
    img=image.load_img(r'/content/drive/MyDrive/d1ca85af57c9.png',target_size=(299,299))
```

```
[ ] x=image.img_to_array(img)
```

```
[ ] import matplotlib.pyplot as plt
```

```
[ ] x.shape
```

```
(299, 299, 3)
```

```
[ ] import numpy as np
    x=np.expand_dims(x,axis=0)
    img_data=preprocess_input(x)
    img_data.shape
```

```
(1, 299, 299, 3)
```

Test_Transfer_Learning_Models.ipynb

File Edit View Insert Runtime Tools Help Last saved at 11:42 AM

Comment

+ Code + Text

Connect

```
[ ] img_data.shape
```

```
(1, 299, 299, 3)
```

```
[ ] model.predict(img_data)
```

```
1/1 [==============================] - 1s 1s/step
array([[1.0000000e+00, 3.2964899e-14, 1.6276460e-19, 2.8887498e-18,
        1.2188903e-15]], dtype=float32)
```

```
[ ] output=np.argmax(model.predict(img_data), axis=1)
```

```
1/1 [==============================] - 0s 262ms/step
```

```
[ ] output==0,output==1,output==2,output==3,output==4
```

```
(array([ True]),
 array([False]),
 array([False]),
 array([False]),
 array([False]))
```

```
[ ] index=['No Diabetic Retinopathy', 'Mild DR', 'Moderate DR', 'Severe DR', 'Proliferative DR']
    result = str(index[output[0]])
    result
```

```
'No Diabetic Retinopathy'
```