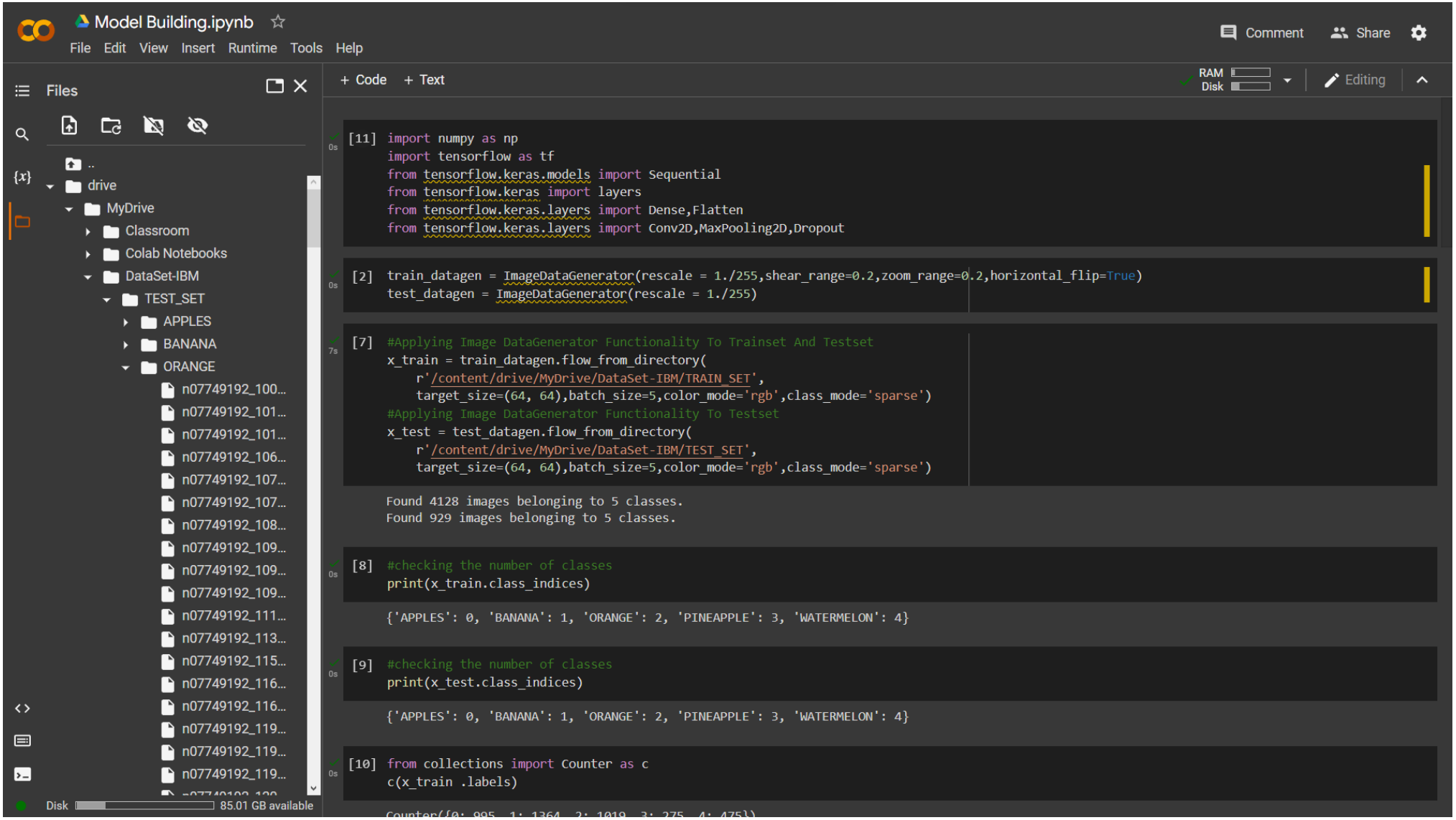
Model Building

Date	5 November 2022
Team ID	PNT2022TMID13870
Project Name	Project - AI-Powered Nutrition Analyzer for Fitness Enthusiasts

Model Building


Model Building.ipynb
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TEST_SET
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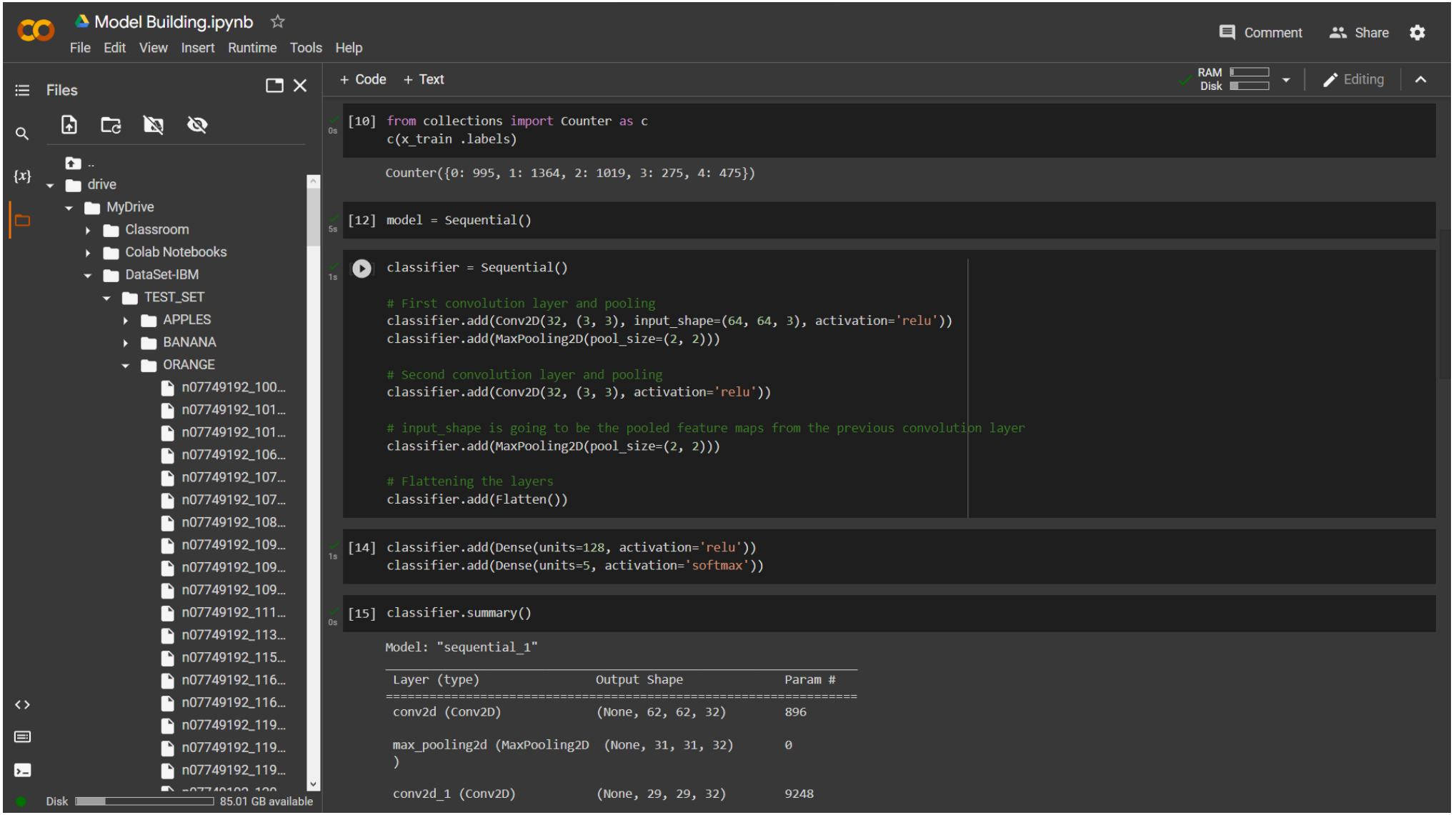
[11] import numpy as np
import tensorflow as tf
from tensorflow.keras.models import Sequential
from tensorflow.keras import layers
from tensorflow.keras.layers import Dense,Flatten
from tensorflow.keras.layers import Conv2D,MaxPooling2D,Dropout
[2] train_datagen = ImageDataGenerator(rescale = 1./255,shear_range=0.2,zoom_range=0.2,horizontal_flip=True)
test_datagen = ImageDataGenerator(rescale = 1./255)
[7] #Applying Image DataGenerator Functionality To Trainset And Testset
x_train = train_datagen.flow_from_directory(
r'/content/drive/MyDrive/DataSet-IBM/TRAIN_SET',
target_size=(64, 64),batch_size=5,color_mode='rgb',class_mode='sparse')
#Applying Image DataGenerator Functionality To Testset
x_test = test_datagen.flow_from_directory(
r'/content/drive/MyDrive/DataSet-IBM/TEST_SET',
target_size=(64, 64),batch_size=5,color_mode='rgb',class_mode='sparse')
Found 4128 images belonging to 5 classes.
Found 929 images belonging to 5 classes.
[8] #checking the number of classes
print(x_train.class_indices)
{'APPLES': 0, 'BANANA': 1, 'ORANGE': 2, 'PINEAPPLE': 3, 'WATERMELON': 4}
[9] #checking the number of classes
print(x_test.class_indices)
{'APPLES': 0, 'BANANA': 1, 'ORANGE': 2, 'PINEAPPLE': 3, 'WATERMELON': 4}
[10] from collections import Counter as c
c(x_train .labels)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[10] from collections import Counter as c
c(x_train .labels)
Counter({0: 995, 1: 1364, 2: 1019, 3: 275, 4: 475})
[12] model = Sequential()
classifier = Sequential()
# First convolution layer and pooling
classifier.add(Conv2D(32, (3, 3), input_shape=(64, 64, 3), activation='relu'))
classifier.add(MaxPooling2D(pool_size=(2, 2)))
# Second convolution layer and pooling
classifier.add(Conv2D(32, (3, 3), activation='relu'))
# input_shape is going to be the pooled feature maps from the previous convolution layer
classifier.add(MaxPooling2D(pool_size=(2, 2)))
# Flattening the layers
classifier.add(Flatten())
[14] classifier.add(Dense(units=128, activation='relu'))
classifier.add(Dense(units=5, activation='softmax'))
[15] classifier.summary()
Model: "sequential_1"
Layer (type) Output Shape Param #
conv2d (Conv2D) (None, 62, 62, 32) 896
max_pooling2d (MaxPooling2D (None, 31, 31, 32) 0
)
conv2d_1 (Conv2D) (None, 29, 29, 32) 9248
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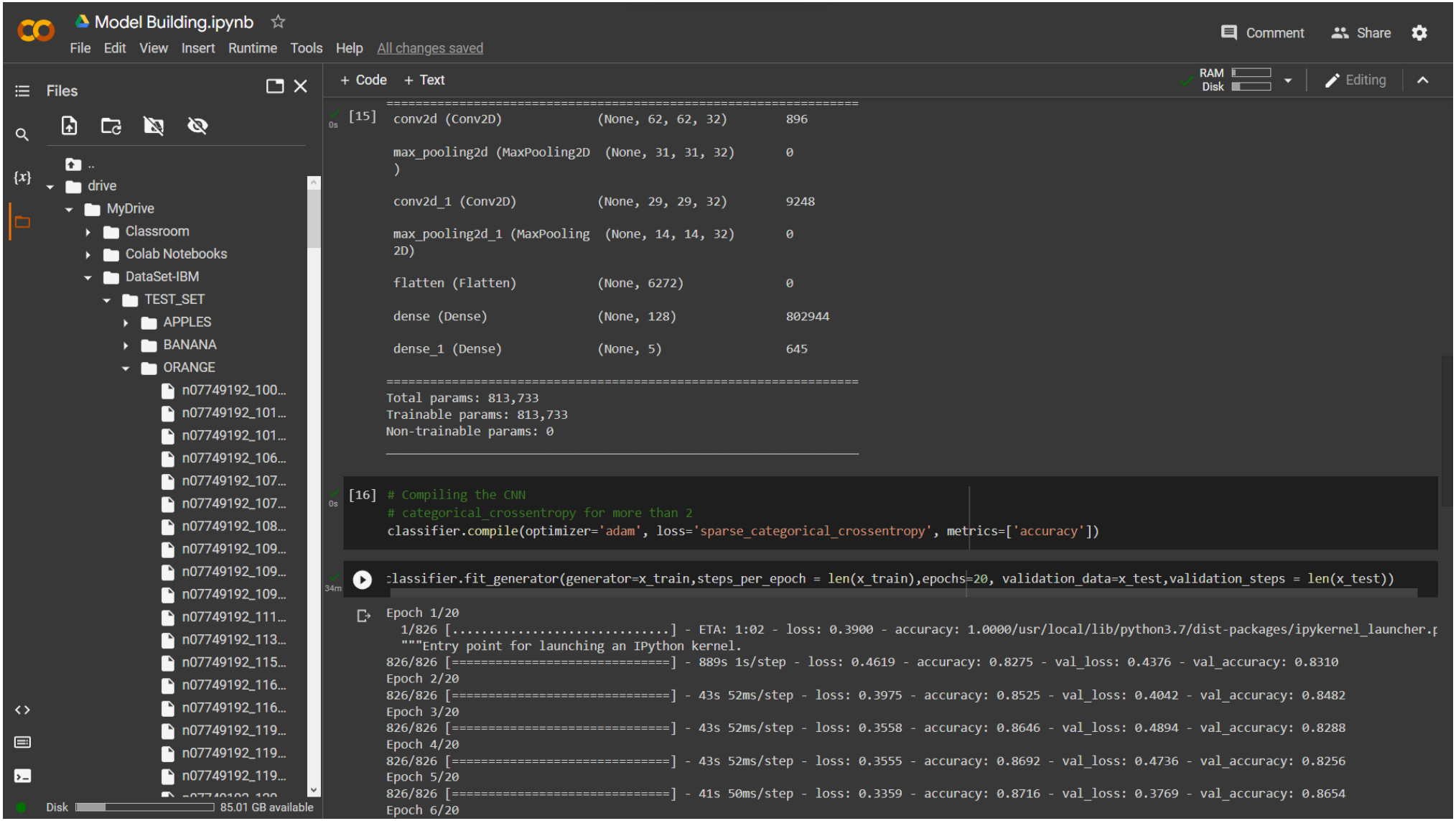
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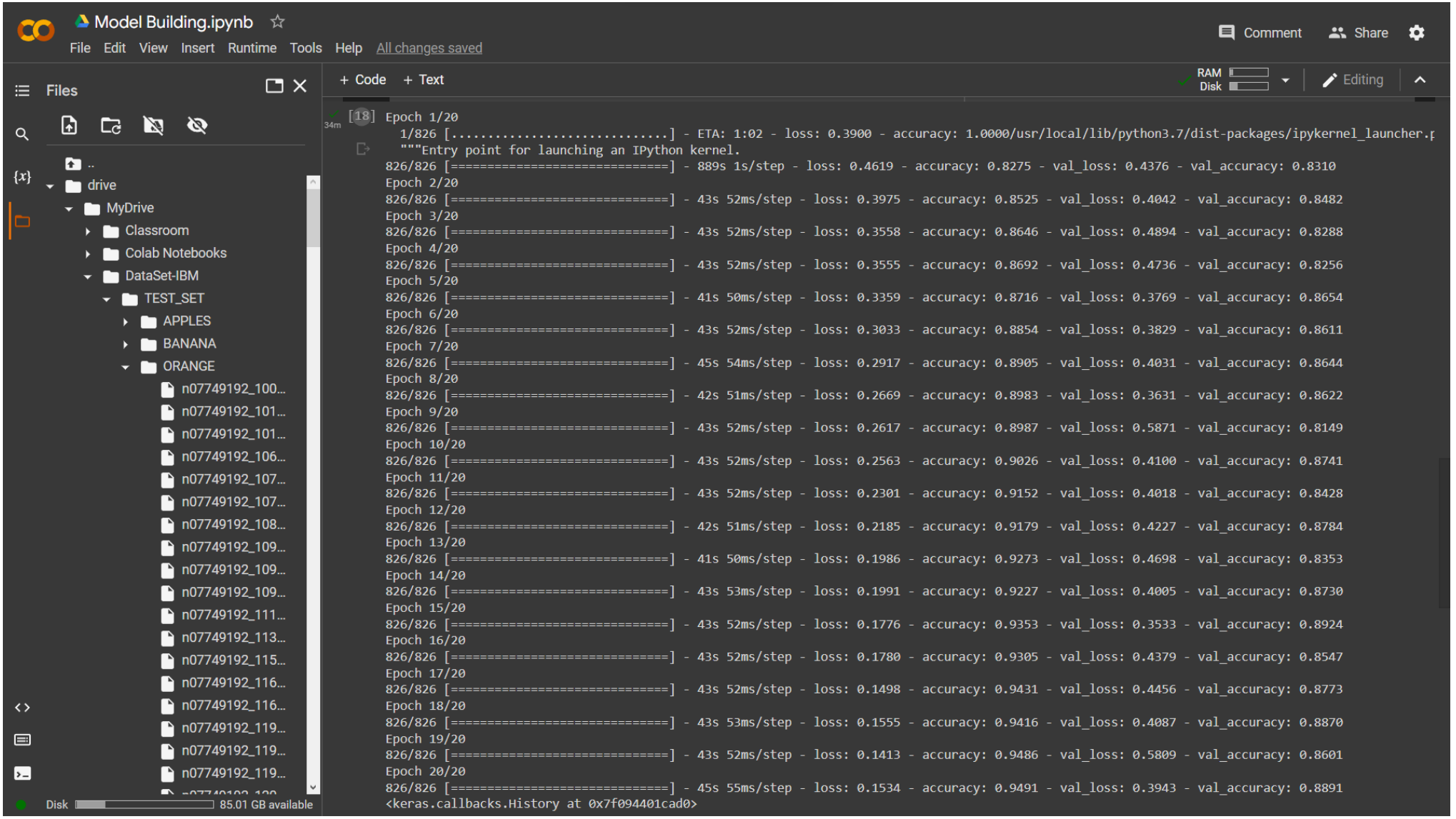
[15]
conv2d (Conv2D) (None, 62, 62, 32) 896
max_pooling2d (MaxPooling2D) (None, 31, 31, 32) 0
conv2d_1 (Conv2D) (None, 29, 29, 32) 9248
max_pooling2d_1 (MaxPooling2D) (None, 14, 14, 32) 0
flatten (Flatten) (None, 6272) 0
dense (Dense) (None, 128) 802944
dense_1 (Dense) (None, 5) 645
Total params: 813,733
Trainable params: 813,733
Non-trainable params: 0
[16]
# Compiling the CNN
# categorical_crossentropy for more than 2
classifier.compile(optimizer='adam', loss='sparse_categorical_crossentropy', metrics=['accuracy'])
classifier.fit_generator(generator=x_train,steps_per_epoch = len(x_train),epochs=20, validation_data=x_test,validation_steps = len(x_test))
Epoch 1/20
1/826 [..] - ETA: 1:02 - loss: 0.3900 - accuracy: 1.0000/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.p
"""Entry point for launching an IPython kernel.
826/826 [==========] - 889s 1s/step - loss: 0.4619 - accuracy: 0.8275 - val_loss: 0.4376 - val_accuracy: 0.8310
Epoch 2/20
826/826 [==========] - 43s 52ms/step - loss: 0.3975 - accuracy: 0.8525 - val_loss: 0.4042 - val_accuracy: 0.8482
Epoch 3/20
826/826 [==========] - 43s 52ms/step - loss: 0.3558 - accuracy: 0.8646 - val_loss: 0.4894 - val_accuracy: 0.8288
Epoch 4/20
826/826 [==========] - 43s 52ms/step - loss: 0.3555 - accuracy: 0.8692 - val_loss: 0.4736 - val_accuracy: 0.8256
Epoch 5/20
826/826 [==========] - 41s 50ms/step - loss: 0.3359 - accuracy: 0.8716 - val_loss: 0.3769 - val_accuracy: 0.8654
Epoch 6/20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34m
Epoch 1/20
1/826 [..............................] - ETA: 1:02 - loss: 0.3900 - accuracy: 1.0000/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.p
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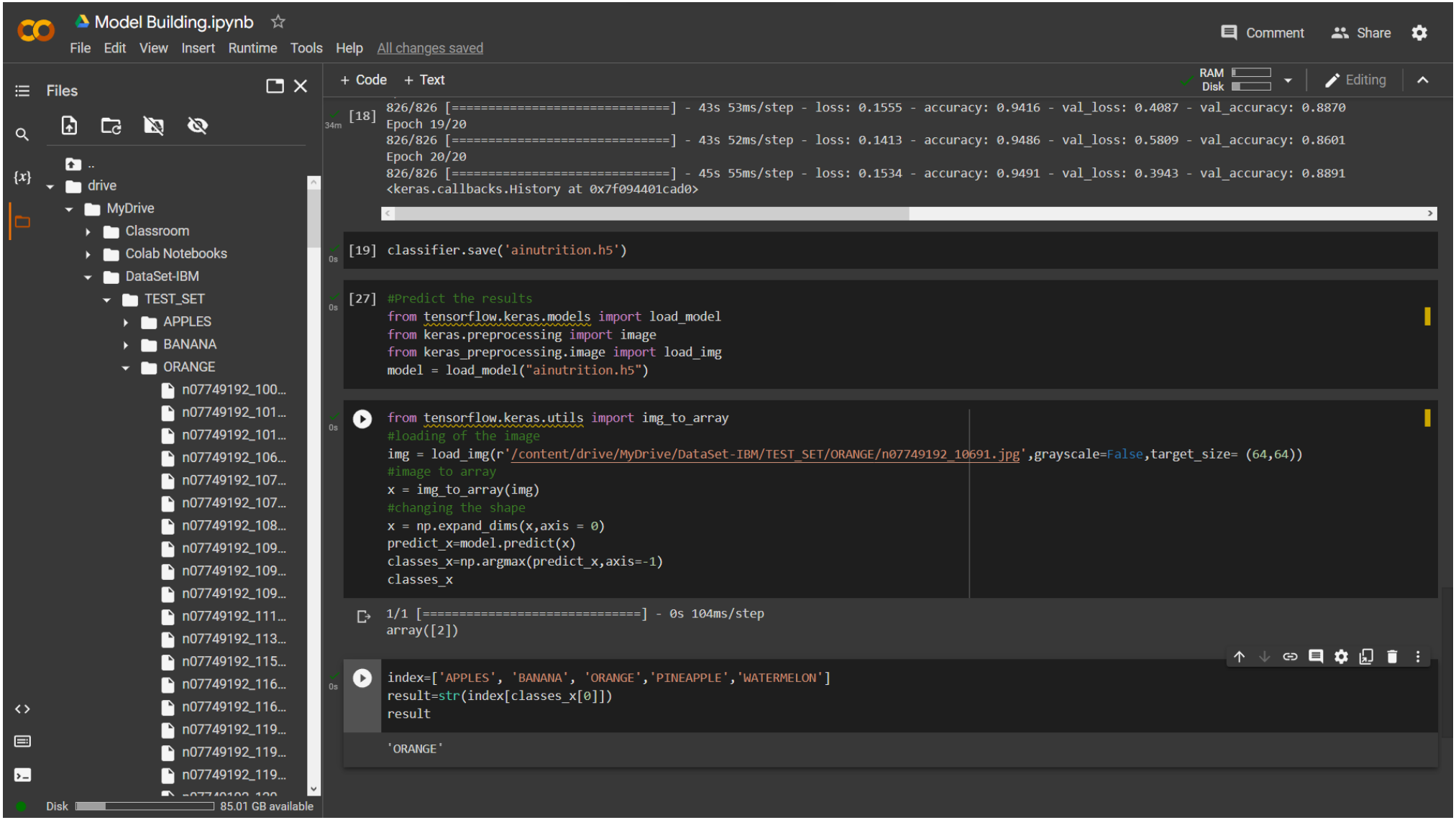
Epoch 6/20
826/826 [==============================] - 43s 52ms/step - loss: 0.3033 - accuracy: 0.8854 - val_loss: 0.3829 - val_accuracy: 0.8611
Epoch 7/20
826/826 [==============================] - 45s 54ms/step - loss: 0.2917 - accuracy: 0.8905 - val_loss: 0.4031 - val_accuracy: 0.8644
Epoch 8/20
826/826 [==============================] - 42s 51ms/step - loss: 0.2669 - accuracy: 0.8983 - val_loss: 0.3631 - val_accuracy: 0.8622
Epoch 9/20
826/826 [==============================] - 43s 52ms/step - loss: 0.2617 - accuracy: 0.8987 - val_loss: 0.5871 - val_accuracy: 0.8149
Epoch 10/20
826/826 [==============================] - 43s 52ms/step - loss: 0.2563 - accuracy: 0.9026 - val_loss: 0.4100 - val_accuracy: 0.8741
Epoch 11/20
826/826 [==============================] - 43s 52ms/step - loss: 0.2301 - accuracy: 0.9152 - val_loss: 0.4018 - val_accuracy: 0.8428
Epoch 12/20
826/826 [==============================] - 42s 51ms/step - loss: 0.2185 - accuracy: 0.9179 - val_loss: 0.4227 - val_accuracy: 0.8784
Epoch 13/20
826/826 [==============================] - 41s 50ms/step - loss: 0.1986 - accuracy: 0.9273 - val_loss: 0.4698 - val_accuracy: 0.8353
Epoch 14/20
826/826 [==============================] - 43s 53ms/step - loss: 0.1991 - accuracy: 0.9227 - val_loss: 0.4005 - val_accuracy: 0.8730
Epoch 15/20
826/826 [==============================] - 43s 52ms/step - loss: 0.1776 - accuracy: 0.9353 - val_loss: 0.3533 - val_accuracy: 0.8924
Epoch 16/20
826/826 [==============================] - 43s 52ms/step - loss: 0.1780 - accuracy: 0.9305 - val_loss: 0.4379 - val_accuracy: 0.8547
Epoch 17/20
826/826 [==============================] - 43s 52ms/step - loss: 0.1498 - accuracy: 0.9431 - val_loss: 0.4456 - val_accuracy: 0.8773
Epoch 18/20
826/826 [==============================] - 43s 53ms/step - loss: 0.1555 - accuracy: 0.9416 - val_loss: 0.4087 - val_accuracy: 0.8870
Epoch 19/20
826/826 [==============================] - 43s 52ms/step - loss: 0.1413 - accuracy: 0.9486 - val_loss: 0.5809 - val_accuracy: 0.8601
Epoch 20/20
826/826 [==============================] - 45s 55ms/step - loss: 0.1534 - accuracy: 0.9491 - val_loss: 0.3943 - val_accuracy: 0.8891
<keras.callbacks.History at 0x7f094401cad0>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<keras.callbacks.History at 0x7f094401cad0>
[19] classifier.save('ainutrition.h5')
[27] #Predict the results
from tensorflow.keras.models import load_model
from keras.preprocessing import image
from keras_preprocessing.image import load_img
model = load_model("ainutrition.h5")
from tensorflow.keras.utils import img_to_array
#loading of the image
img = load_img(r'/content/drive/MyDrive/DataSet-IBM/TEST_SET/ORANGE/n07749192_10691.jpg',grayscale=False,target_size= (64,64))
#image to array
x = img_to_array(img)
#changing the shape
x = np.expand_dims(x,axis = 0)
predict_x=model.predict(x)
classes_x=np.argmax(predict_x,axis=-1)
classes_x
1/1 [==========] - 0s 104ms/step
array([2])
index=['APPLES', 'BANANA', 'ORANGE','PINEAPPLE','WATERMELON']
result=str(index[classes_x[0]])
result
'ORANGE'