Project Development Phase
Model Performance Test

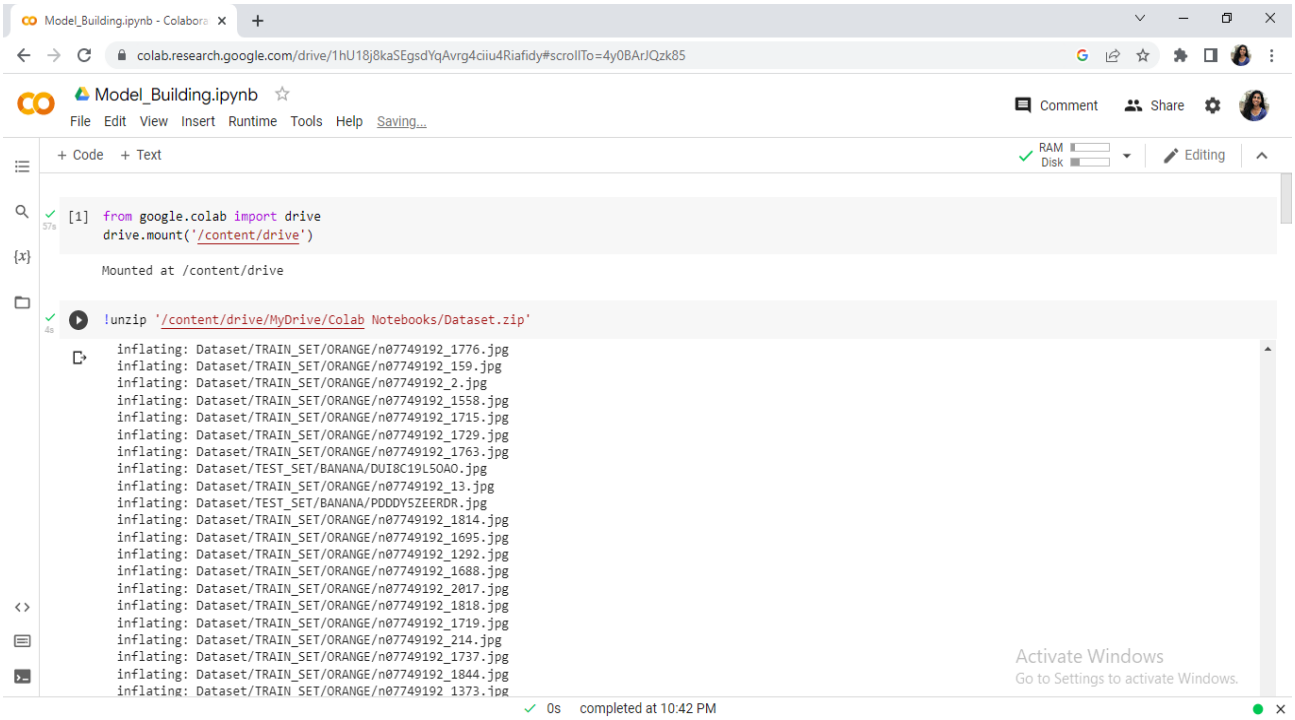
Date	18 November 2022
Team ID	PNT2022TMID29438
Project Name	AI-Powered Nutrition Analyzer for Fitness Enthusiasts
Maximum Marks	10 Marks

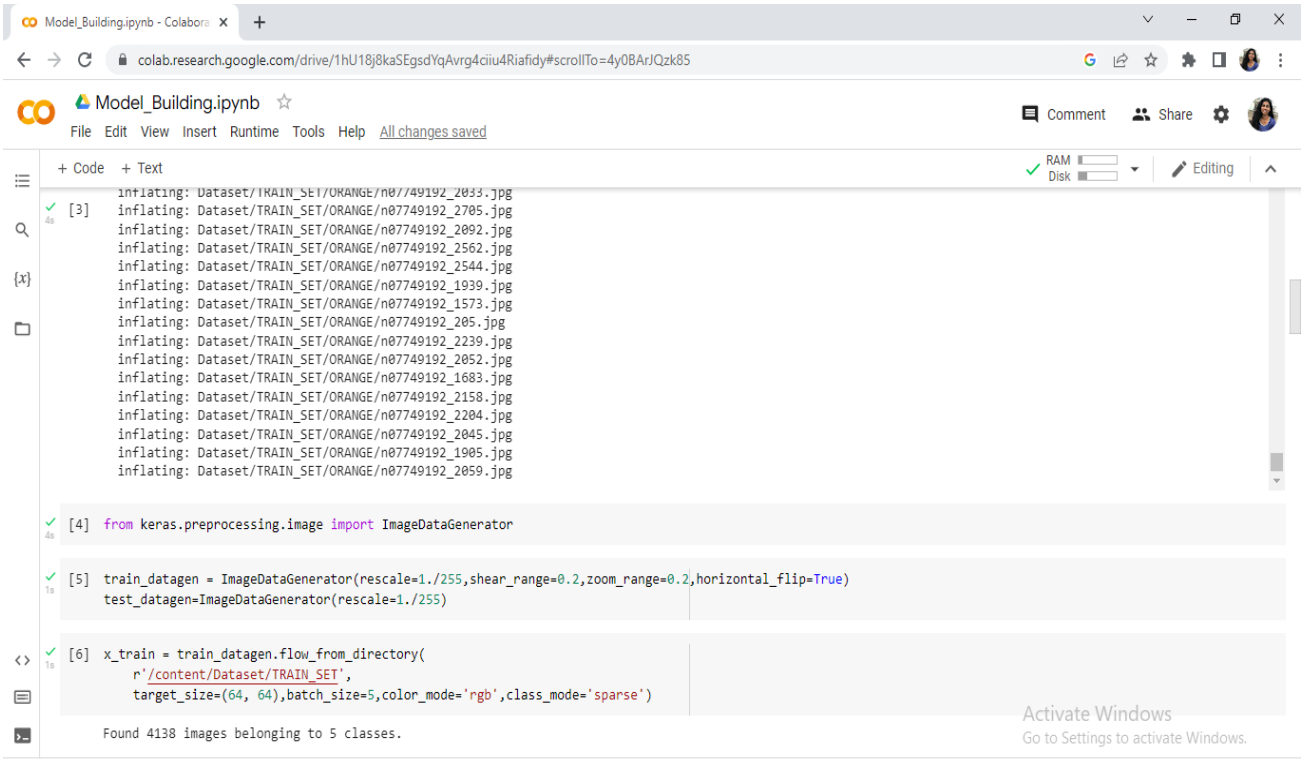
Model Performance Testing:

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

S.No.	Parameter	Values	Screenshot
1.	Model Summary	Total params-813,733 Trainable params-813,733 Non-trainable params-0	Attached Below
2.	Accuracy	Training Accuracy - 0.8975 Validation Accuracy - 0.8698	Attached Below

Screenshots:




Model_Building.ipynb - Colabora
colab.research.google.com/drive/1hU18j8kaSEgsdYqAvrg4ciiu4Riafidy#scrollTo=4y0BArJQzk85
Model_Building.ipynb
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inflating: Dataset/TRAIN_SET/ORANGE/n07749192_2033.jpg
[3] inflating: Dataset/TRAIN_SET/ORANGE/n07749192_2705.jpg
inflating: Dataset/TRAIN_SET/ORANGE/n07749192_2092.jpg
inflating: Dataset/TRAIN_SET/ORANGE/n07749192_2562.jpg
inflating: Dataset/TRAIN_SET/ORANGE/n07749192_2544.jpg
inflating: Dataset/TRAIN_SET/ORANGE/n07749192_1939.jpg
inflating: Dataset/TRAIN_SET/ORANGE/n07749192_1573.jpg
inflating: Dataset/TRAIN_SET/ORANGE/n07749192_205.jpg
inflating: Dataset/TRAIN_SET/ORANGE/n07749192_2239.jpg
inflating: Dataset/TRAIN_SET/ORANGE/n07749192_2052.jpg
inflating: Dataset/TRAIN_SET/ORANGE/n07749192_1683.jpg
inflating: Dataset/TRAIN_SET/ORANGE/n07749192_2158.jpg
inflating: Dataset/TRAIN_SET/ORANGE/n07749192_2204.jpg
inflating: Dataset/TRAIN_SET/ORANGE/n07749192_2045.jpg
inflating: Dataset/TRAIN_SET/ORANGE/n07749192_1905.jpg
inflating: Dataset/TRAIN_SET/ORANGE/n07749192_2059.jpg
[4] from keras.preprocessing.image import ImageDataGenerator
[5] train_datagen = ImageDataGenerator(rescale=1./255,shear_range=0.2,zoom_range=0.2,horizontal_flip=True)
test_datagen=ImageDataGenerator(rescale=1./255)
[6] x_train = train_datagen.flow_from_directory(
r'/content/Dataset/TRAIN_SET',
target_size=(64, 64),batch_size=5,color_mode='rgb',class_mode='sparse')
Found 4138 images belonging to 5 classes.
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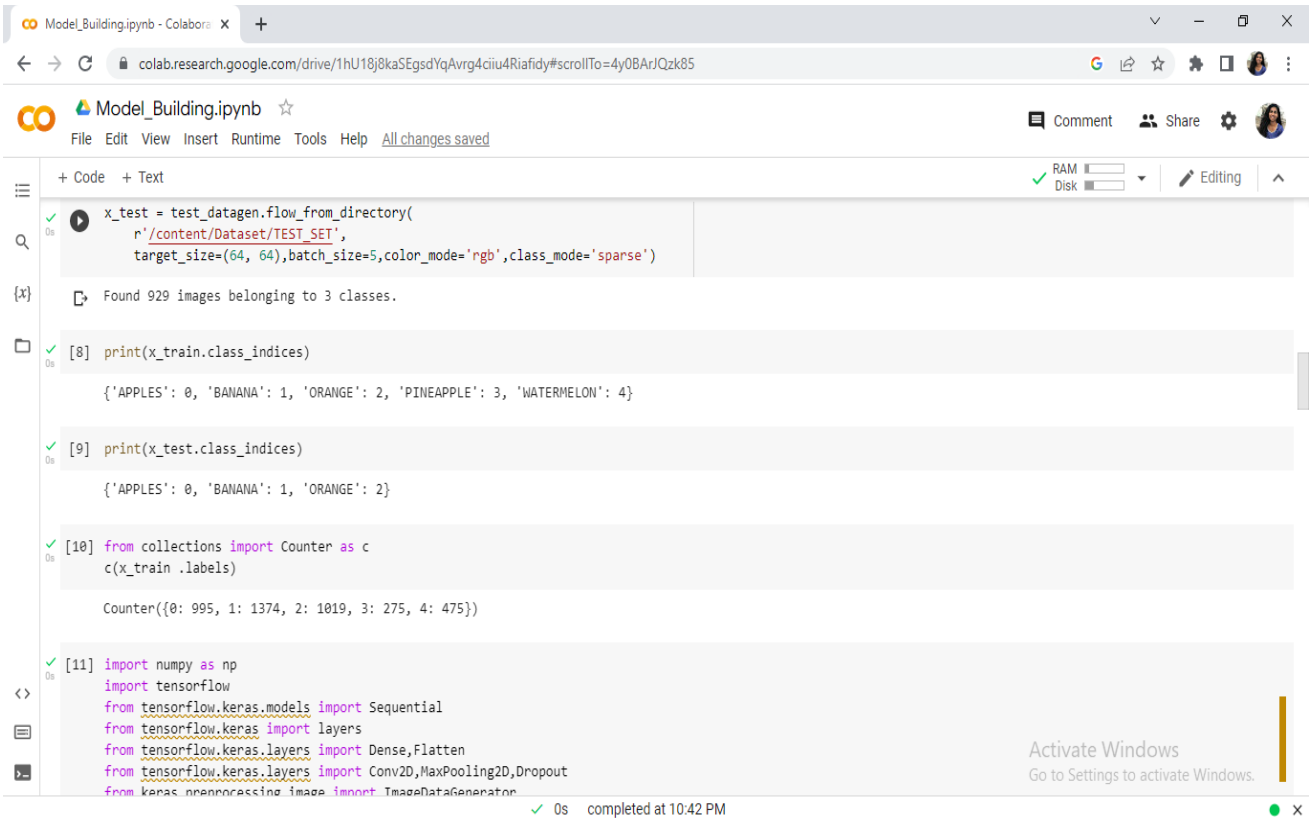
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x_test = test_datagen.flow_from_directory(
r'/content/Dataset/TEST_SET',
target_size=(64, 64),batch_size=5,color_mode='rgb',class_mode='sparse')
Found 929 images belonging to 3 classes.
[8] print(x_train.class_indices)
{'APPLES': 0, 'BANANA': 1, 'ORANGE': 2, 'PINEAPPLE': 3, 'WATERMELON': 4}
[9] print(x_test.class_indices)
{'APPLES': 0, 'BANANA': 1, 'ORANGE': 2}
[10] from collections import Counter as c
c(x_train .labels)
Counter({0: 995, 1: 1374, 2: 1019, 3: 275, 4: 475})
[11] import numpy as np
import tensorflow
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
from keras.preprocessing.image import ImageDataGenerator
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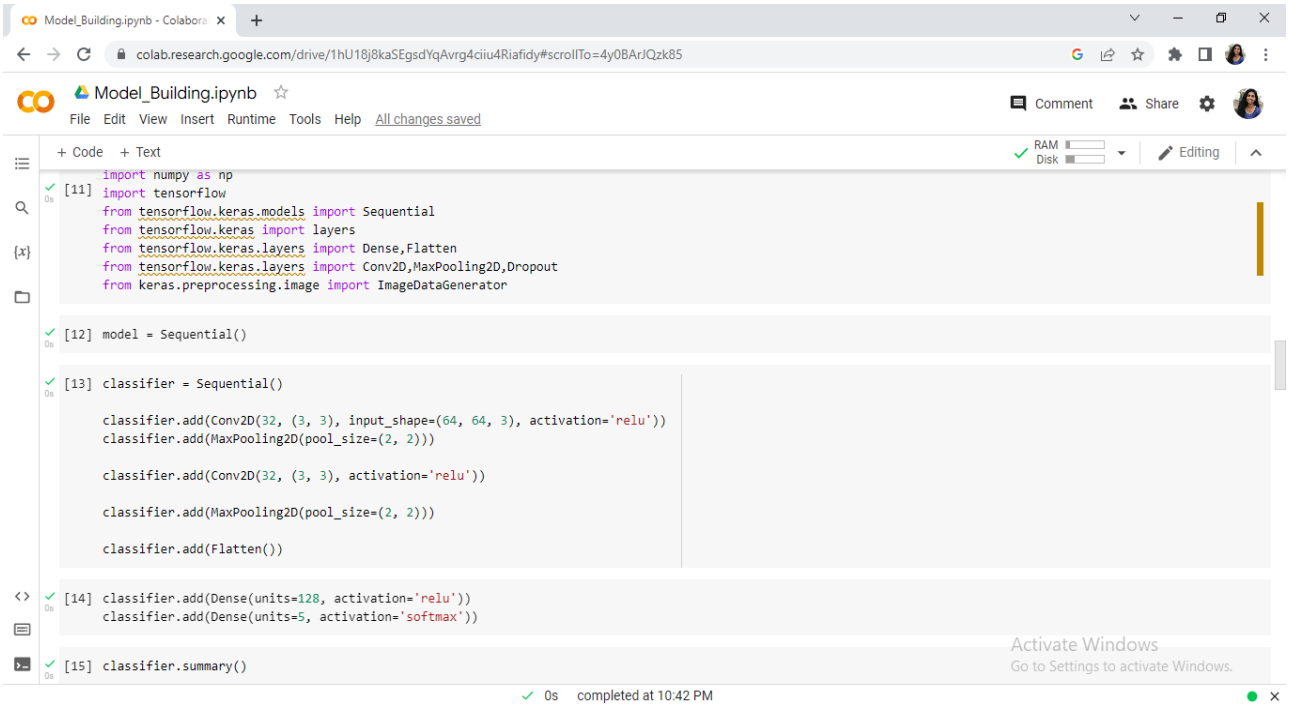
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import numpy as np
[11] import tensorflow
from tensorflow.keras.models import Sequential
from tensorflow.keras import layers
from tensorflow.keras.layers import Dense,Flatten
from tensorflow.keras.layers import Conv2D,MaxPooling2D,Dropout
from keras.preprocessing.image import ImageDataGenerator
[12] model = Sequential()
[13] classifier = Sequential()
classifier.add(Conv2D(32, (3, 3), input_shape=(64, 64, 3), activation='relu'))
classifier.add(MaxPooling2D(pool_size=(2, 2)))
classifier.add(Conv2D(32, (3, 3), activation='relu'))
classifier.add(MaxPooling2D(pool_size=(2, 2)))
classifier.add(Flatten())
[14] classifier.add(Dense(units=128, activation='relu'))
classifier.add(Dense(units=5, activation='softmax'))
[15] classifier.summary()
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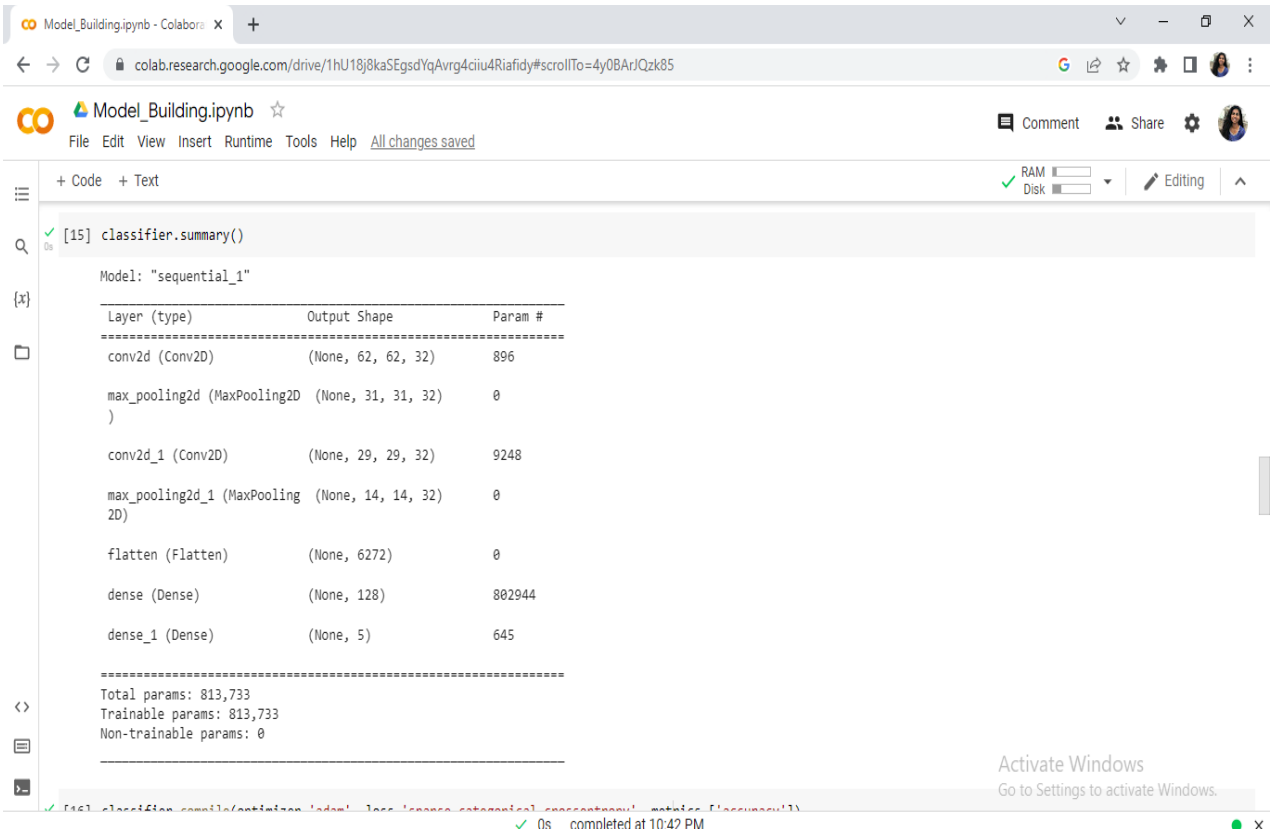
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[15] classifier.summary()
Model: "sequential_1"
Layer (type) Output Shape Param #
conv2d (Conv2D) (None, 62, 62, 32) 896
max_pooling2d (MaxPooling2D (None, 31, 31, 32) 0
)
conv2d_1 (Conv2D) (None, 29, 29, 32) 9248
max_pooling2d_1 (MaxPooling (None, 14, 14, 32) 0
2D)
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
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```
[16] classifier.compile(optimizer='adam', loss='sparse_categorical_crossentropy', metrics=['accuracy'])
```

```
[17] classifier.fit_generator(
            generator=x_train,steps_per_epoch = len(x_train),
            epochs=10, validation_data=x_test,validation_steps = len(x_test))
```

```
Epoch 1/10
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:3: UserWarning: `Model.fit_generator` is deprecated and will be removed in a future version. Please u
  This is separate from the ipykernel package so we can avoid doing imports until
828/828 [==============================] - 38s 44ms/step - loss: 0.6383 - accuracy: 0.7535 - val_loss: 0.5450 - val_accuracy: 0.7879
Epoch 2/10
828/828 [==============================] - 34s 41ms/step - loss: 0.4398 - accuracy: 0.8330 - val_loss: 0.5090 - val_accuracy: 0.8149
Epoch 3/10
828/828 [==============================] - 36s 44ms/step - loss: 0.3830 - accuracy: 0.8557 - val_loss: 0.4756 - val_accuracy: 0.8030
Epoch 4/10
828/828 [==============================] - 36s 44ms/step - loss: 0.3510 - accuracy: 0.8649 - val_loss: 0.4983 - val_accuracy: 0.8019
Epoch 5/10
828/828 [==============================] - 34s 41ms/step - loss: 0.3289 - accuracy: 0.8724 - val_loss: 0.4204 - val_accuracy: 0.8471
Epoch 6/10
828/828 [==============================] - 37s 44ms/step - loss: 0.3250 - accuracy: 0.8758 - val_loss: 0.4223 - val_accuracy: 0.8396
Epoch 7/10
828/828 [==============================] - 36s 43ms/step - loss: 0.3028 - accuracy: 0.8816 - val_loss: 0.4622 - val_accuracy: 0.8105
Epoch 8/10
828/828 [==============================] - 34s 42ms/step - loss: 0.2904 - accuracy: 0.8864 - val_loss: 0.3801 - val_accuracy: 0.8687
Epoch 9/10
828/828 [==============================] - 36s 44ms/step - loss: 0.2655 - accuracy: 0.8949 - val_loss: 0.4252 - val_accuracy: 0.8536
Epoch 10/10
828/828 [==============================] - 34s 41ms/step - loss: 0.2693 - accuracy: 0.8975 - val_loss: 0.3616 - val_accuracy: 0.8698
<keras.callbacks.History at 0x7fadd89c30d0>
```


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```
<keras.callbacks.History at 0x7fadd89c30d0>
```

```
[18] classifier.save('nutrition.h5')
```

```
[19] from tensorflow.keras.models import load_model
     from tensorflow.keras.preprocessing import image
     import numpy as np
```

```
[20] img = image.load_img("/content/Dataset/TRAIN_SET/ORANGE/n07749192_5963.jpg",target_size= (64,64))
     img
```

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

```
array([[[251., 239., 225.],
        [254., 240., 227.],
        [254., 242., 228.],
        ...,
        [255., 255., 253.],
        [255., 255., 253.],
        [255., 255., 251.]],
```


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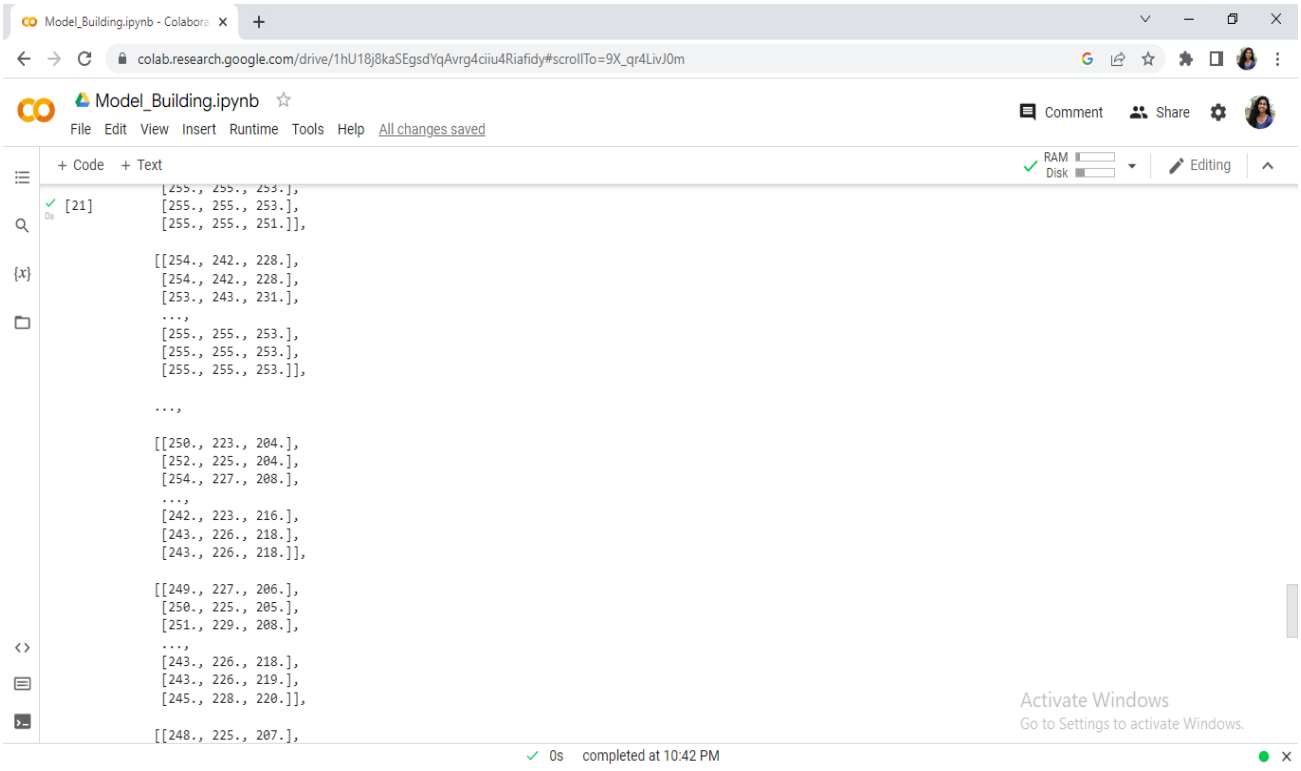
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[21]
[[[255., 255., 253.],
[255., 255., 253.],
[255., 255., 251.]],
[[254., 242., 228.],
[254., 242., 228.],
[253., 243., 231.],
...,
[255., 255., 253.],
[255., 255., 253.],
[255., 255., 253.]],
...,
[[250., 223., 204.],
[252., 225., 204.],
[254., 227., 208.],
...,
[242., 223., 216.],
[243., 226., 218.],
[243., 226., 218.]],
[[249., 227., 206.],
[250., 225., 205.],
[251., 229., 208.],
...,
[243., 226., 218.],
[243., 226., 219.],
[245., 228., 220.]],
[[248., 225., 207.],
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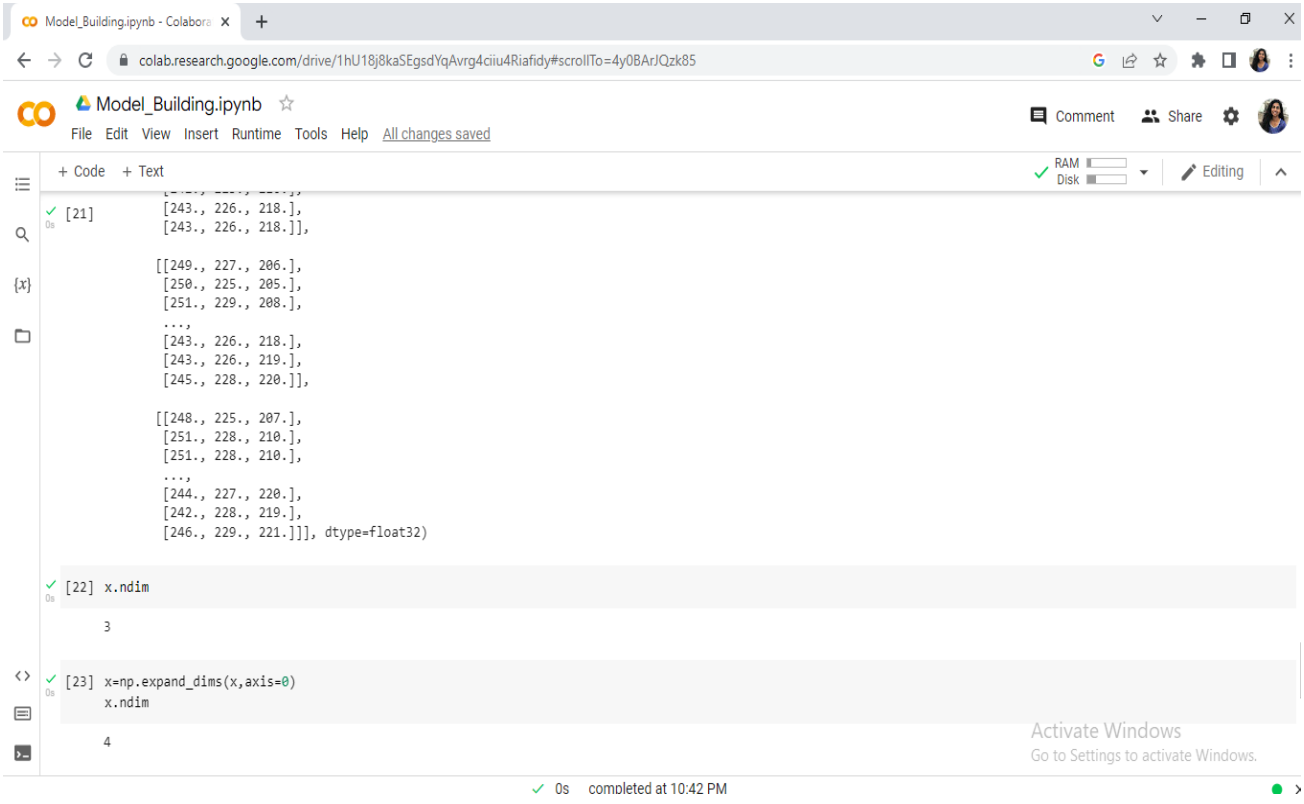
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Model_Building.ipynb
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[21]
[243., 226., 218.],
[243., 226., 218.]],
[[249., 227., 206.],
[250., 225., 205.],
[251., 229., 208.],
...,
[243., 226., 218.],
[243., 226., 219.],
[245., 228., 220.]],
[[248., 225., 207.],
[251., 228., 210.],
[251., 228., 210.],
...,
[244., 227., 220.],
[242., 228., 219.],
[246., 229., 221.]]], dtype=float32)
[22] x.ndim
3
[23] x=np.expand_dims(x,axis=0)
x.ndim
4
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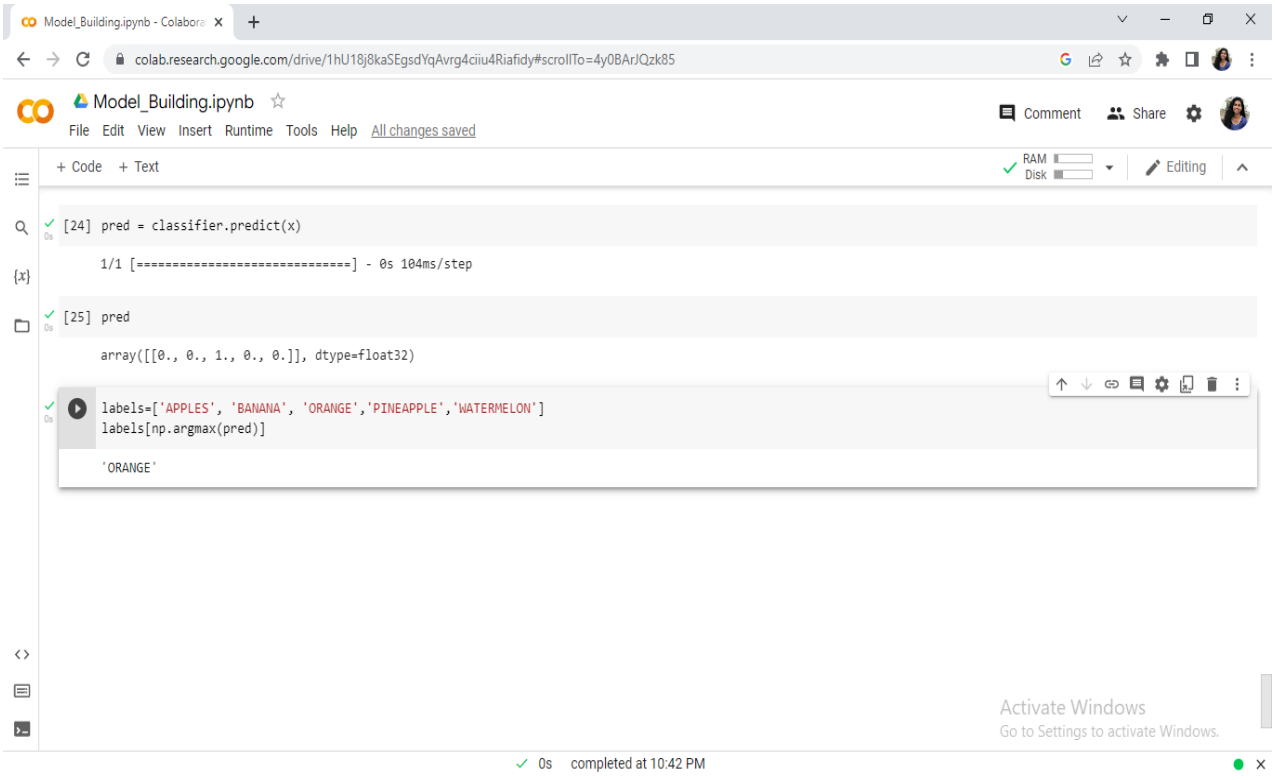
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[24] pred = classifier.predict(x)
1/1 [==============================] - 0s 104ms/step
[25] pred
array([[0., 0., 1., 0., 0.]], dtype=float32)
labels=['APPLES', 'BANANA', 'ORANGE','PINEAPPLE','WATERMELON']
labels[np.argmax(pred)]
'ORANGE'
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