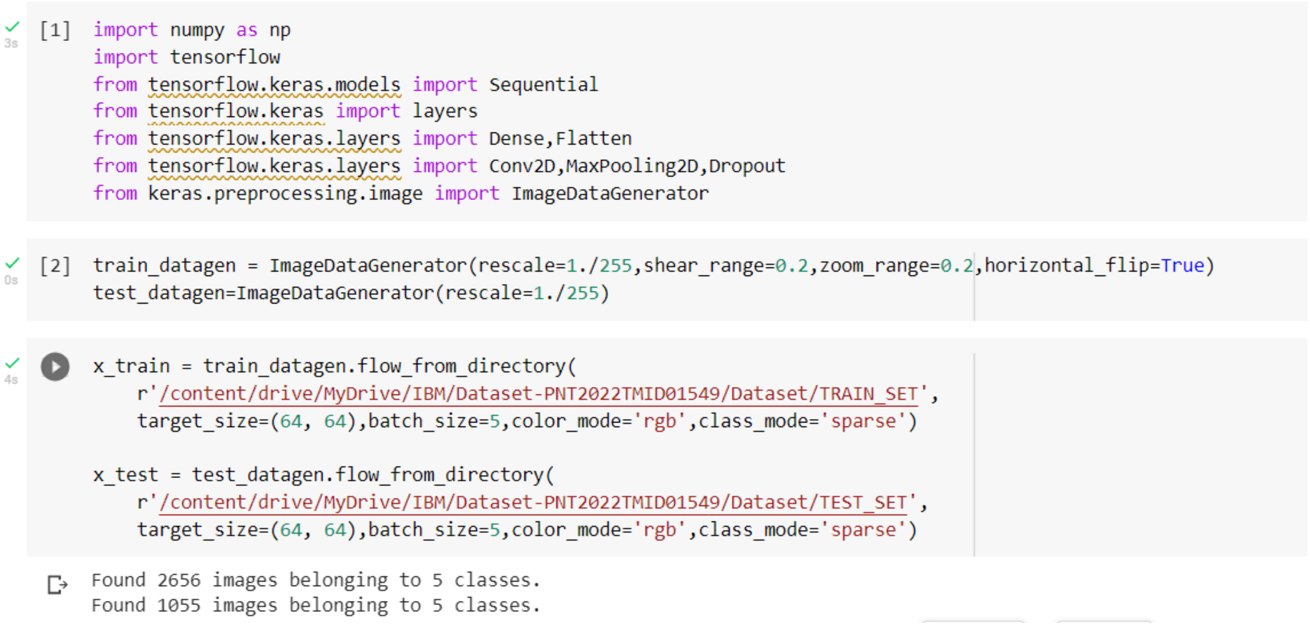
MODEL BUILDING

Date	31 October 2022
Team ID	PNT2022TMID01549
Project Name	AI-Powered Nutrition Analyzer for Fitness Enthusiasts

Importing the Model Building Libraries



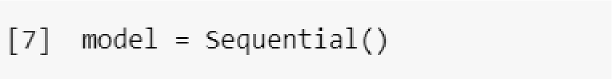
```
[1] import numpy as np
    import tensorflow
    from tensorflow.keras.models import Sequential
    from tensorflow.keras import layers
    from tensorflow.keras.layers import Dense,Flatten
    from tensorflow.keras.layers import Conv2D,MaxPooling2D,Dropout
    from keras.preprocessing.image import ImageDataGenerator
```

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

```
x_train = train_datagen.flow_from_directory(
    r'/content/drive/MyDrive/IBM/Dataset-PNT2022TMID01549/Dataset/TRAIN_SET',
    target_size=(64, 64),batch_size=5,color_mode='rgb',class_mode='sparse')

x_test = test_datagen.flow_from_directory(
    r'/content/drive/MyDrive/IBM/Dataset-PNT2022TMID01549/Dataset/TEST_SET',
    target_size=(64, 64),batch_size=5,color_mode='rgb',class_mode='sparse')
```

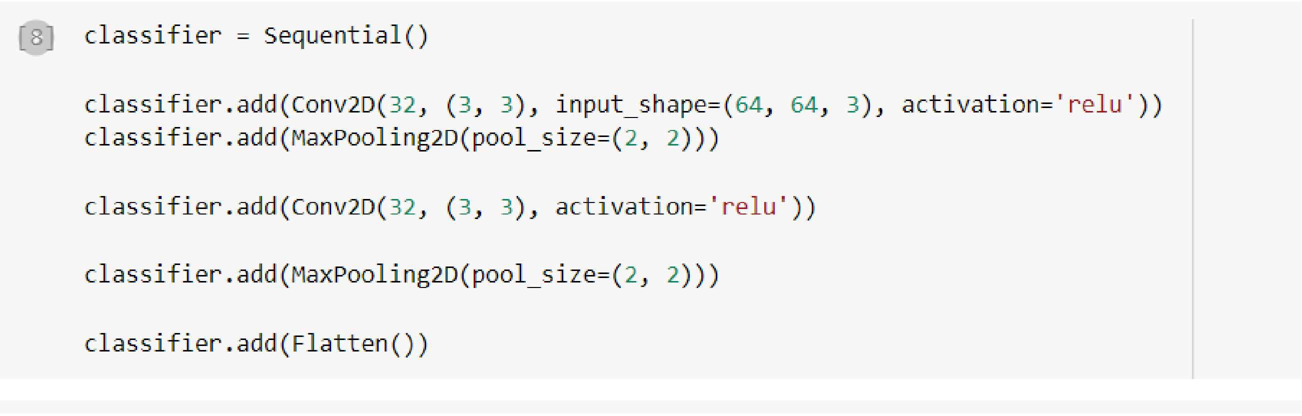
```
Found 2656 images belonging to 5 classes.
Found 1055 images belonging to 5 classes.
```

Initializing the Model



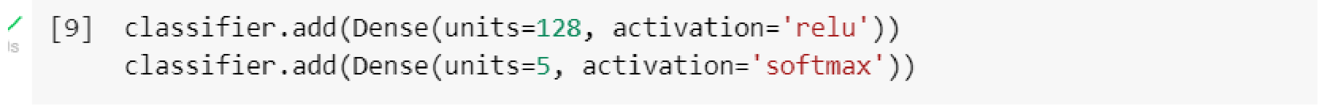
```
[7] model = Sequential()
```

Adding CNN Layers

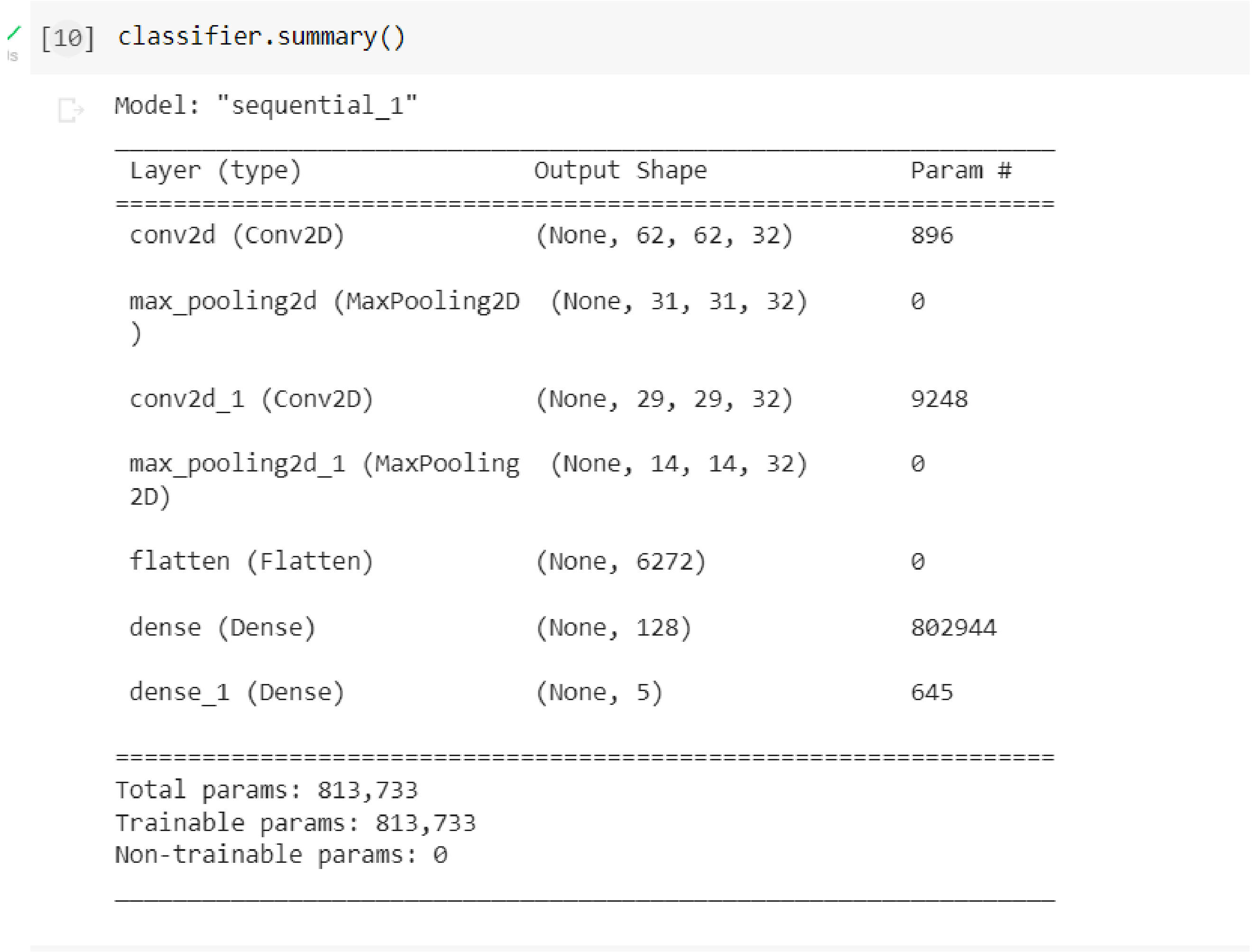


```
[8] classifier = Sequential()

    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())
```

Adding Dense Layers



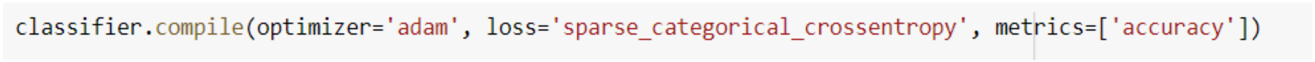
```
[9]  classifier.add(Dense(units=128, activation='relu'))
     classifier.add(Dense(units=5, activation='softmax'))
```



```
[10] classifier.summary()
```

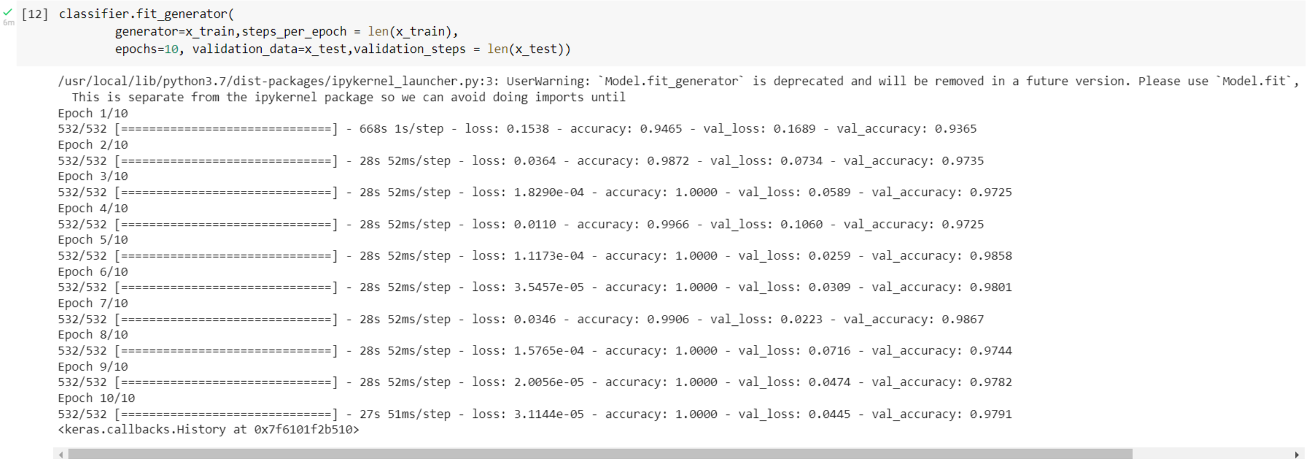
```
Model: "sequential_1"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 conv2d (Conv2D)             (None, 62, 62, 32)        896

 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
_________________________________________________________________
```

Configure The Learning Process



```
classifier.compile(optimizer='adam', loss='sparse_categorical_crossentropy', metrics=['accuracy'])
```

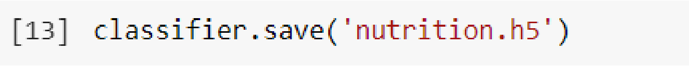
Train The Model



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

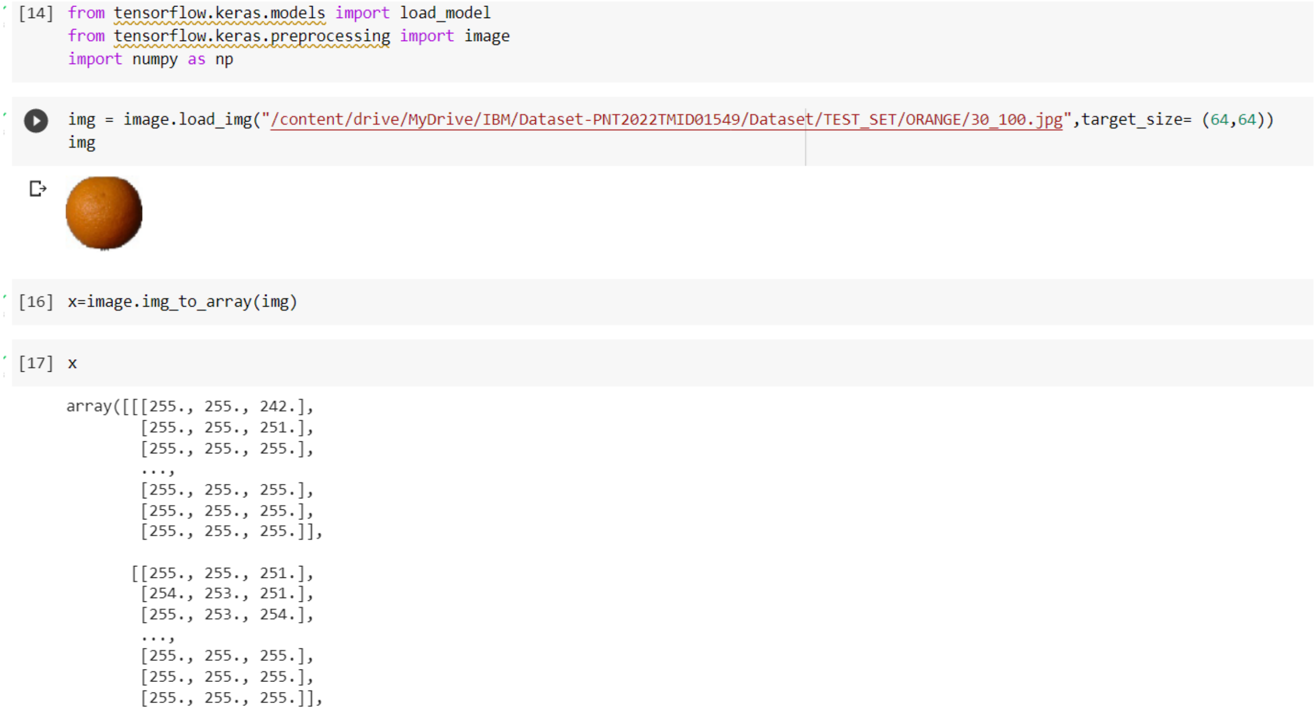
```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:3: UserWarning: `Model.fit_generator` is deprecated and will be removed in a future version. Please use `Model.fit`,
  This is separate from the ipykernel package so we can avoid doing imports until
Epoch 1/10
532/532 [==============================] - 668s 1s/step - loss: 0.1538 - accuracy: 0.9465 - val_loss: 0.1689 - val_accuracy: 0.9365
Epoch 2/10
532/532 [==============================] - 28s 52ms/step - loss: 0.0364 - accuracy: 0.9872 - val_loss: 0.0734 - val_accuracy: 0.9735
Epoch 3/10
532/532 [==============================] - 28s 52ms/step - loss: 1.8290e-04 - accuracy: 1.0000 - val_loss: 0.0589 - val_accuracy: 0.9725
Epoch 4/10
532/532 [==============================] - 28s 52ms/step - loss: 0.0110 - accuracy: 0.9966 - val_loss: 0.1060 - val_accuracy: 0.9725
Epoch 5/10
532/532 [==============================] - 28s 52ms/step - loss: 1.1173e-04 - accuracy: 1.0000 - val_loss: 0.0259 - val_accuracy: 0.9858
Epoch 6/10
532/532 [==============================] - 28s 52ms/step - loss: 3.5457e-05 - accuracy: 1.0000 - val_loss: 0.0309 - val_accuracy: 0.9801
Epoch 7/10
532/532 [==============================] - 28s 52ms/step - loss: 0.0346 - accuracy: 0.9906 - val_loss: 0.0223 - val_accuracy: 0.9867
Epoch 8/10
532/532 [==============================] - 28s 52ms/step - loss: 1.5765e-04 - accuracy: 1.0000 - val_loss: 0.0716 - val_accuracy: 0.9744
Epoch 9/10
532/532 [==============================] - 28s 52ms/step - loss: 2.0056e-05 - accuracy: 1.0000 - val_loss: 0.0474 - val_accuracy: 0.9782
Epoch 10/10
532/532 [==============================] - 27s 51ms/step - loss: 3.1144e-05 - accuracy: 1.0000 - val_loss: 0.0445 - val_accuracy: 0.9791
<keras.callbacks.History at 0x7f6101f2b510>
```

Save the Model



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

Test the Model



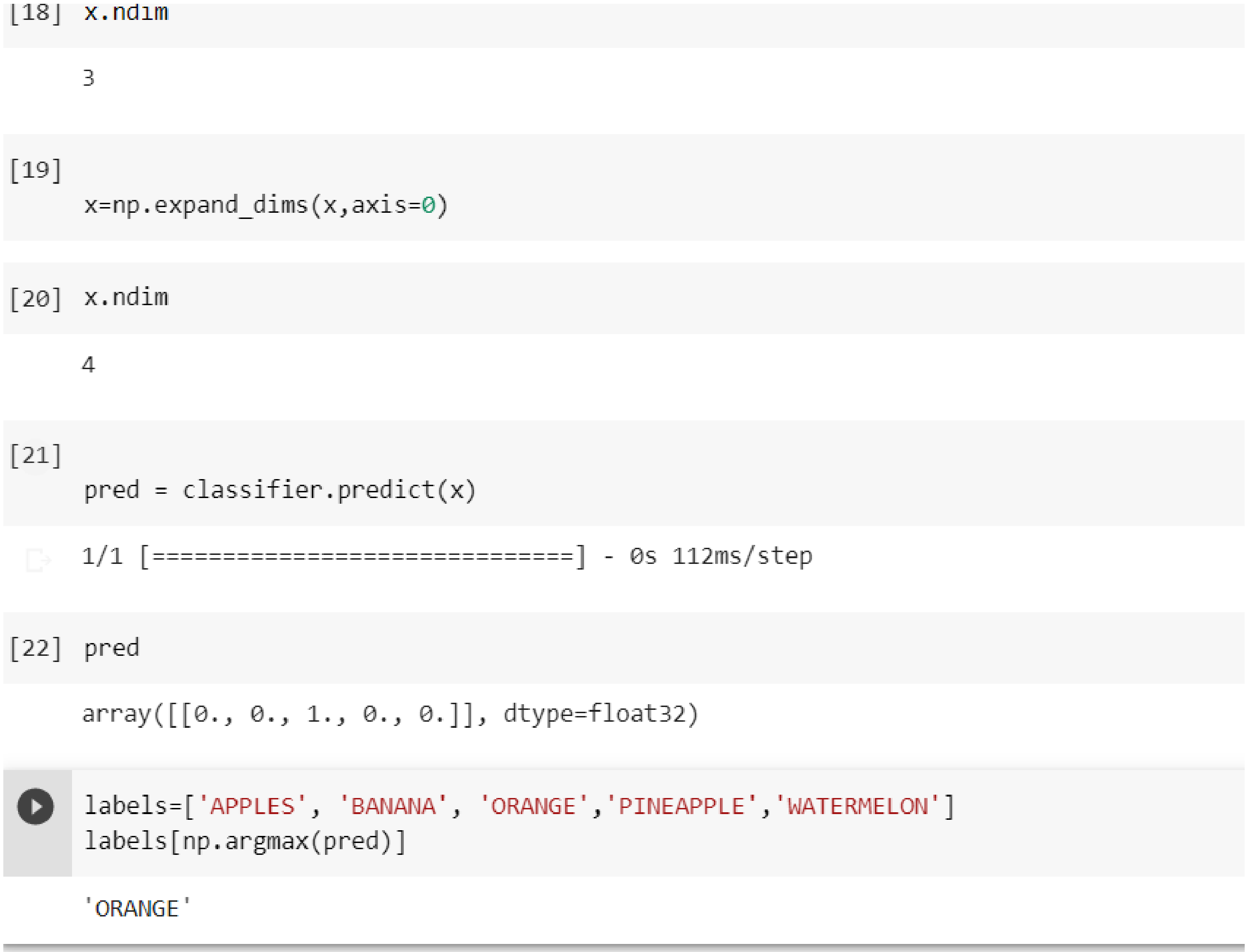
```
[14] from tensorflow.keras.models import load_model
     from tensorflow.keras.preprocessing import image
     import numpy as np
```

```
img = image.load_img("/content/drive/MyDrive/IBM/Dataset-PNT2022TMID01549/Dataset/TEST_SET/ORANGE/30_100.jpg",target_size= (64,64))
img
```

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

```
[17] x
```

```
array([[[[255., 255., 242.],
         [255., 255., 251.],
         [255., 255., 255.],
         ...,
         [255., 255., 255.],
         [255., 255., 255.],
         [255., 255., 255.]],

        [[255., 255., 251.],
         [254., 253., 251.],
         [255., 253., 254.],
         ...,
         [255., 255., 255.],
         [255., 255., 255.],
         [255., 255., 255.]],
```



```
[18] x.ndim

     3
```

```
[19]
     x=np.expand_dims(x,axis=0)
```

```
[20] x.ndim

     4
```

```
[21]
     pred = classifier.predict(x)

     1/1 [==============================] - 0s 112ms/step
```

```
[22] pred

     array([[0., 0., 1., 0., 0.]], dtype=float32)
```

```
labels=['APPLES', 'BANANA', 'ORANGE','PINEAPPLE','WATERMELON']
labels[np.argmax(pred)]

'ORANGE'
```