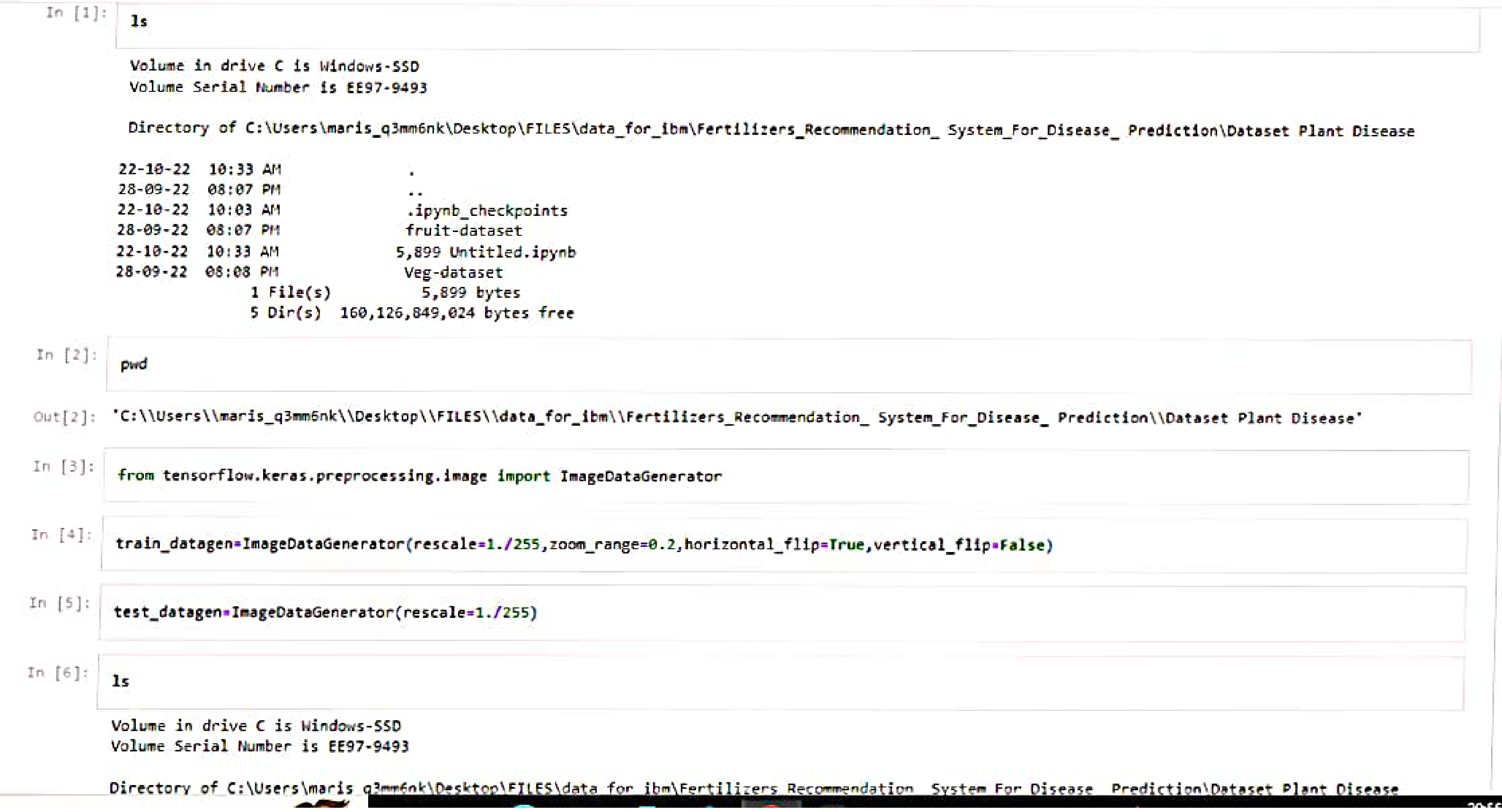


```
In [1]: ls

 Volume in drive C is Windows-SSD
 Volume Serial Number is EE97-9493

 Directory of C:\Users\maris_q3mm6nk\Desktop\FILES\data_for_ibm\Fertilizers_Recommendation_ System_For_Disease_ Prediction\Dataset Plant Disease

22-10-22  10:33 AM    <DIR>          .
28-09-22  08:07 PM    <DIR>          ..
22-10-22  10:03 AM    <DIR>          .ipynb_checkpoints
28-09-22  08:07 PM    <DIR>          fruit-dataset
22-10-22  10:33 AM             5,899 Untitled.ipynb
28-09-22  08:08 PM    <DIR>          Veg-dataset
               1 File(s)          5,899 bytes
               5 Dir(s)  160,126,849,024 bytes free
```

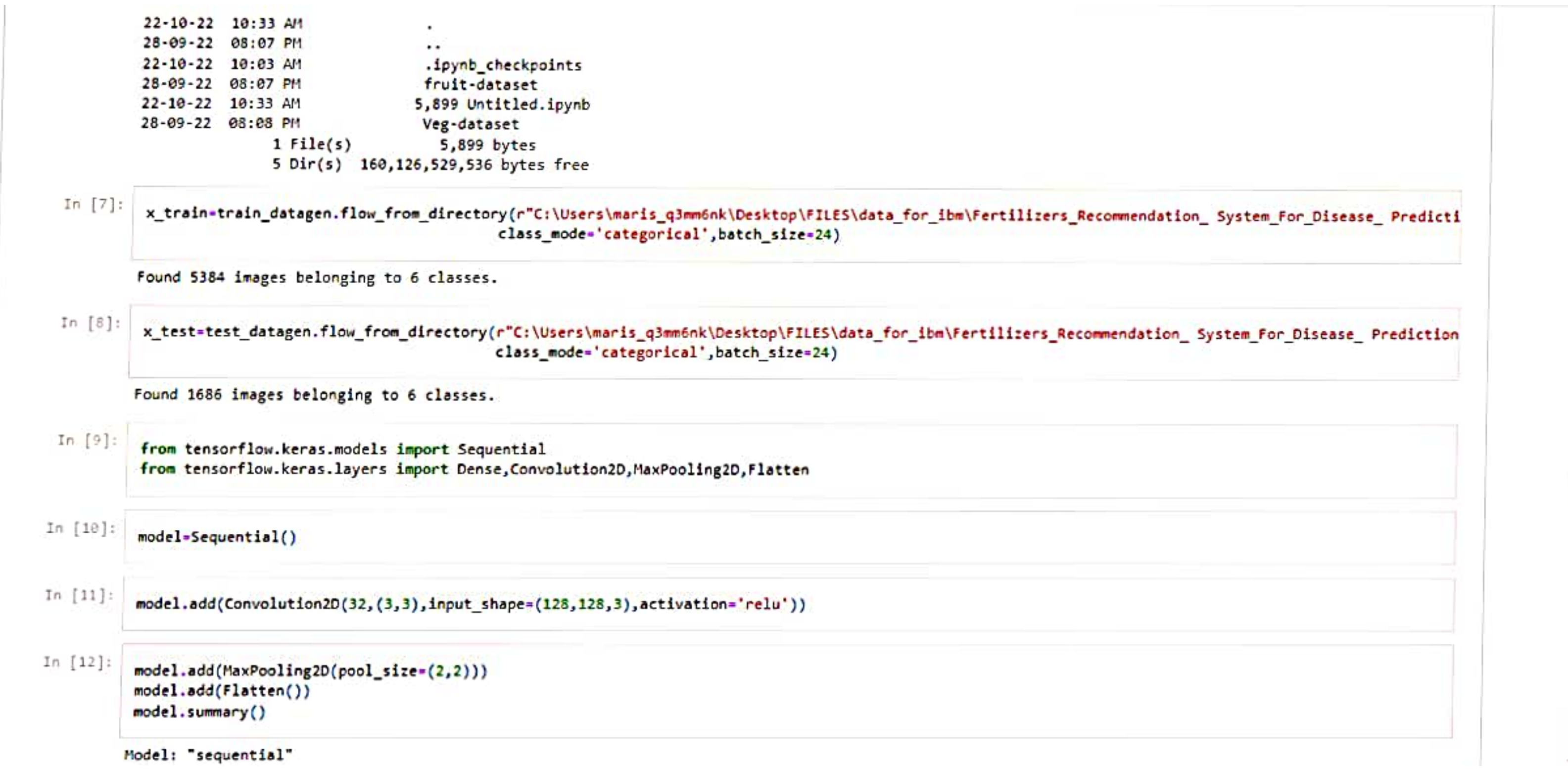
```
In [2]: pwd

Out[2]: 'C:\\Users\\maris_q3mm6nk\\Desktop\\FILES\\data_for_ibm\\Fertilizers_Recommendation_ System_For_Disease_ Prediction\\Dataset Plant Disease'
```

```
In [3]: from tensorflow.keras.preprocessing.image import ImageDataGenerator
```

```
In [4]: train_datagen=ImageDataGenerator(rescale=1./255,zoom_range=0.2,horizontal_flip=True,vertical_flip=False)
```

```
In [5]: test_datagen=ImageDataGenerator(rescale=1./255)
```

```
In [6]: ls

 Volume in drive C is Windows-SSD
 Volume Serial Number is EE97-9493

 Directory of C:\Users\maris_q3mm6nk\Desktop\FILES\data_for_ibm\Fertilizers_Recommendation_ System_For_Disease_ Prediction\Dataset Plant Disease
```



```
22-10-22  10:33 AM              .
28-09-22  08:07 PM              ..
22-10-22  10:03 AM              .ipynb_checkpoints
28-09-22  08:07 PM              fruit-dataset
22-10-22  10:33 AM       5,899 Untitled.ipynb
28-09-22  08:08 PM              Veg-dataset
               1 File(s)          5,899 bytes
               5 Dir(s)  160,126,529,536 bytes free
```

In [7]:

```
x_train=train_datagen.flow_from_directory(r"C:\Users\maris_q3mm6nk\Desktop\FILES\data_for_ibm\Fertilizers_Recommendation_ System_For_Disease_ Predicti
                                          class_mode='categorical',batch_size=24)
```

```
Found 5384 images belonging to 6 classes.
```

In [8]:

```
x_test=test_datagen.flow_from_directory(r"C:\Users\maris_q3mm6nk\Desktop\FILES\data_for_ibm\Fertilizers_Recommendation_ System_For_Disease_ Prediction
                                          class_mode='categorical',batch_size=24)
```

```
Found 1686 images belonging to 6 classes.
```

In [9]:

```
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense,Convolution2D,MaxPooling2D,Flatten
```

In [10]:

```
model=Sequential()
```

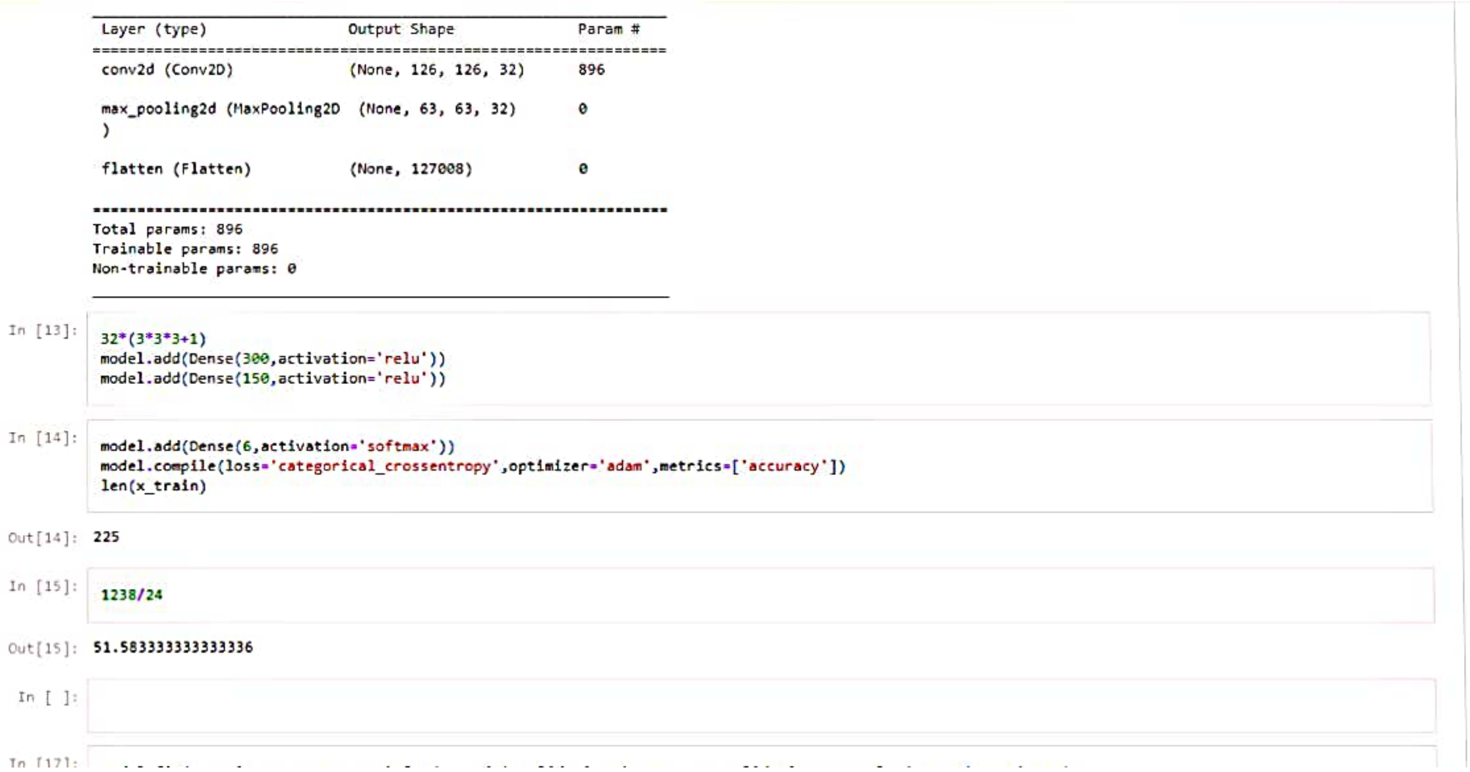
In [11]:

```
model.add(Convolution2D(32,(3,3),input_shape=(128,128,3),activation='relu'))
```

In [12]:

```
model.add(MaxPooling2D(pool_size=(2,2)))
model.add(Flatten())
model.summary()
```

```
Model: "sequential"
```



```
 Layer (type)                Output Shape              Param #
=================================================================
 conv2d (Conv2D)             (None, 126, 126, 32)      896

 max_pooling2d (MaxPooling2D  (None, 63, 63, 32)       0
 )

 flatten (Flatten)           (None, 127008)            0

=================================================================
Total params: 896
Trainable params: 896
Non-trainable params: 0
_________________________________________________________________
```

In [13]:

```
32*(3*3*3+1)
model.add(Dense(300,activation='relu'))
model.add(Dense(150,activation='relu'))
```

In [14]:

```
model.add(Dense(6,activation='softmax'))
model.compile(loss='categorical_crossentropy',optimizer='adam',metrics=['accuracy'])
len(x_train)
```

Out[14]:

```
225
```

In [15]:

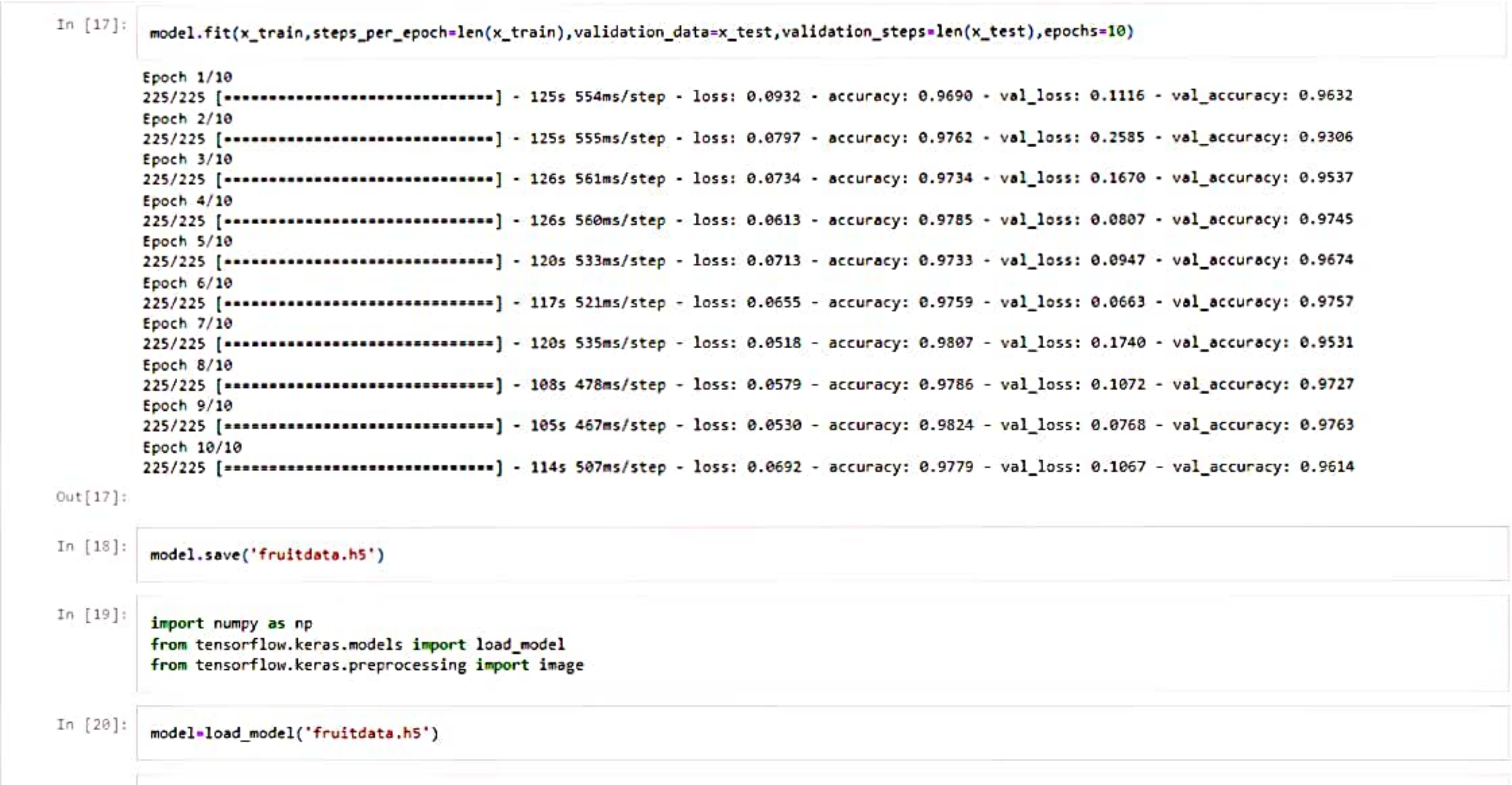
```
1238/24
```

Out[15]:

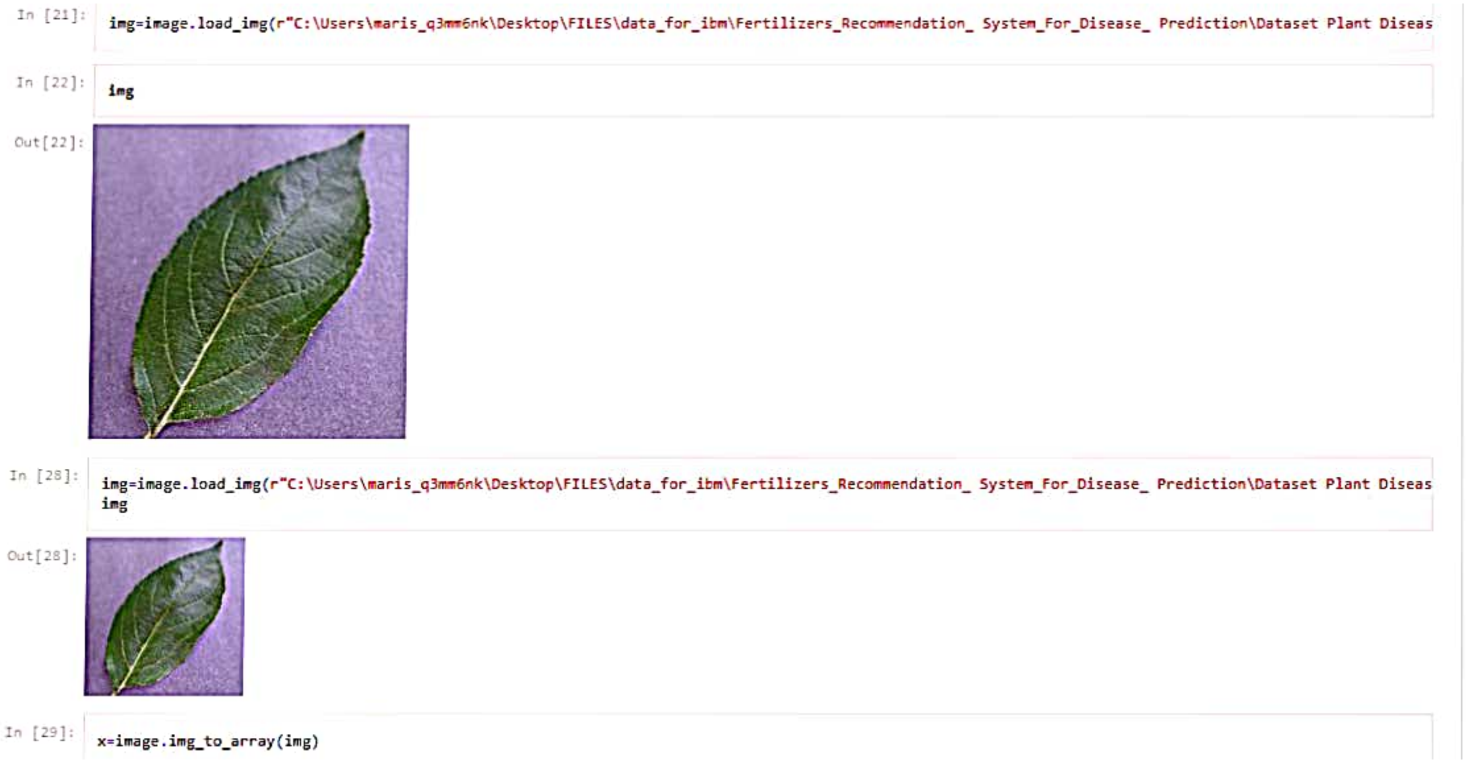
```
51.583333333333336
```

In [ ]:

In [17]:



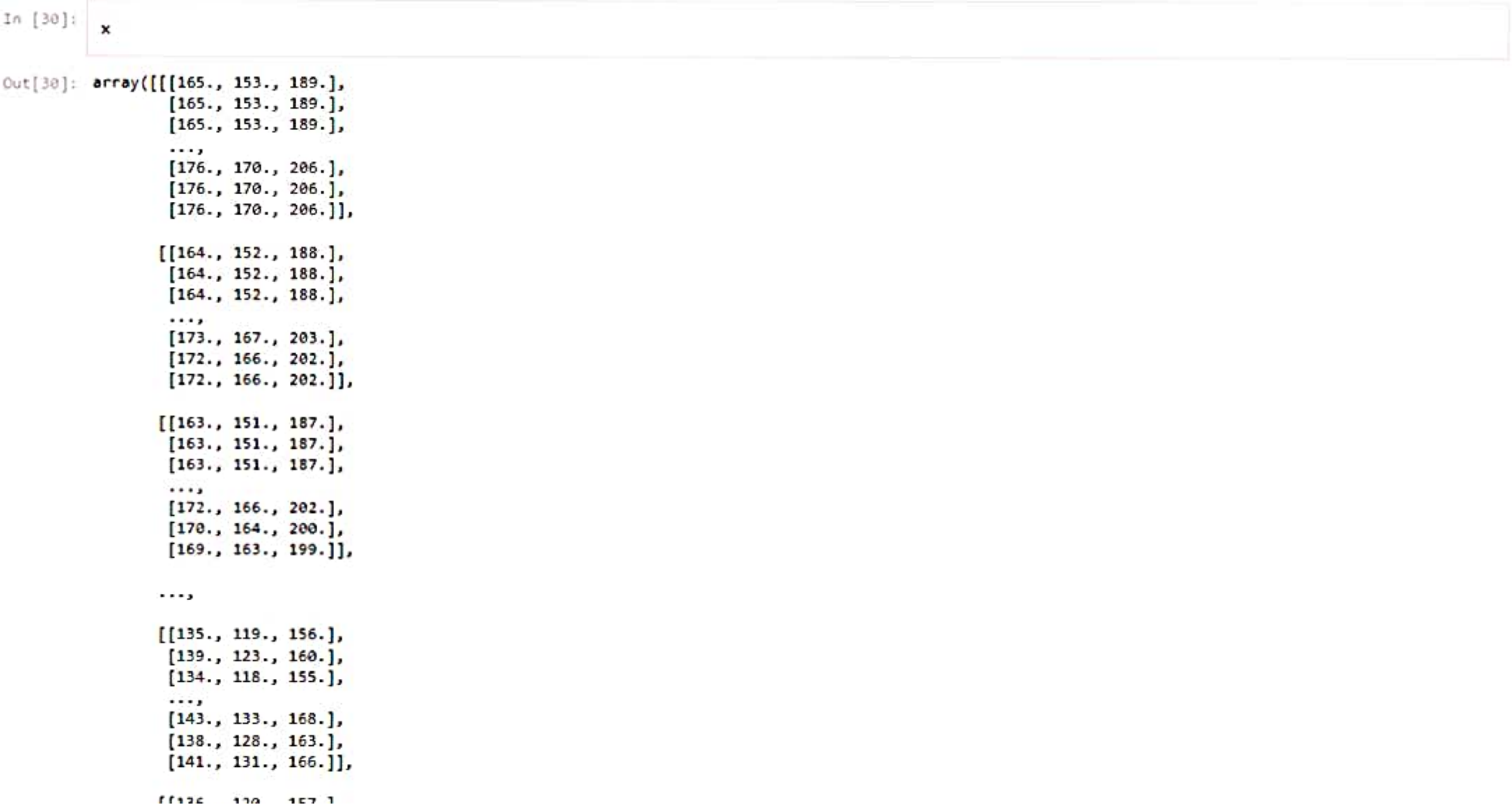
```
In [17]: model.fit(x_train,steps_per_epoch=len(x_train),validation_data=x_test,validation_steps=len(x_test),epochs=10)

Epoch 1/10
225/225 [==============================] - 125s 554ms/step - loss: 0.0932 - accuracy: 0.9690 - val_loss: 0.1116 - val_accuracy: 0.9632
Epoch 2/10
225/225 [==============================] - 125s 555ms/step - loss: 0.0797 - accuracy: 0.9762 - val_loss: 0.2585 - val_accuracy: 0.9306
Epoch 3/10
225/225 [==============================] - 126s 561ms/step - loss: 0.0734 - accuracy: 0.9734 - val_loss: 0.1670 - val_accuracy: 0.9537
Epoch 4/10
225/225 [==============================] - 126s 560ms/step - loss: 0.0613 - accuracy: 0.9785 - val_loss: 0.0807 - val_accuracy: 0.9745
Epoch 5/10
225/225 [==============================] - 120s 533ms/step - loss: 0.0713 - accuracy: 0.9733 - val_loss: 0.0947 - val_accuracy: 0.9674
Epoch 6/10
225/225 [==============================] - 117s 521ms/step - loss: 0.0655 - accuracy: 0.9759 - val_loss: 0.0663 - val_accuracy: 0.9757
Epoch 7/10
225/225 [==============================] - 120s 535ms/step - loss: 0.0518 - accuracy: 0.9807 - val_loss: 0.1740 - val_accuracy: 0.9531
Epoch 8/10
225/225 [==============================] - 108s 478ms/step - loss: 0.0579 - accuracy: 0.9786 - val_loss: 0.1072 - val_accuracy: 0.9727
Epoch 9/10
225/225 [==============================] - 105s 467ms/step - loss: 0.0530 - accuracy: 0.9824 - val_loss: 0.0768 - val_accuracy: 0.9763
Epoch 10/10
225/225 [==============================] - 114s 507ms/step - loss: 0.0692 - accuracy: 0.9779 - val_loss: 0.1067 - val_accuracy: 0.9614

Out[17]:

In [18]: model.save('fruitdata.h5')

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

In [20]: model=load_model('fruitdata.h5')
```



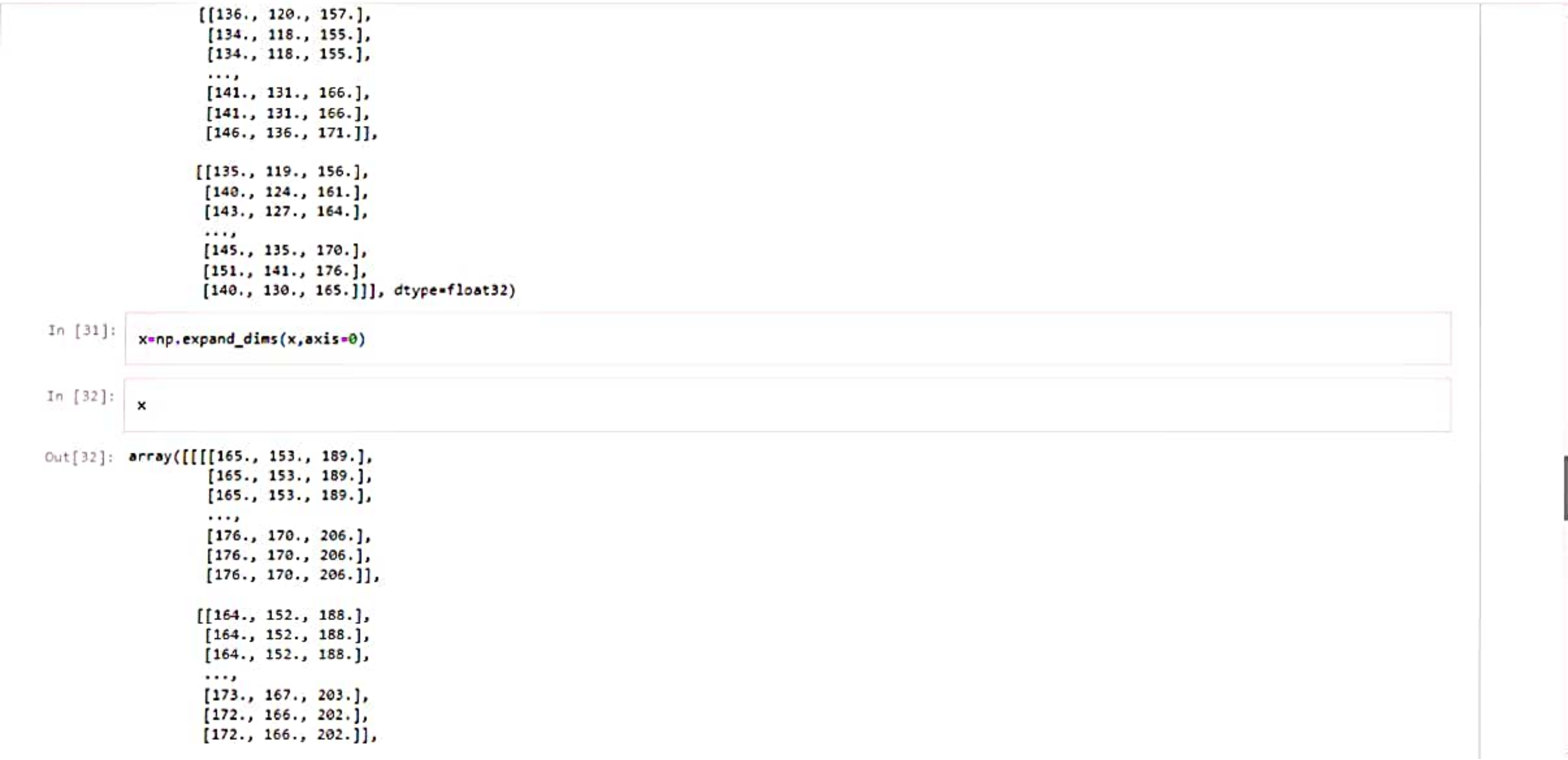
```
In [21]: img=image.load_img(r"C:\Users\maris_q3mm6nk\Desktop\FILES\data_for_ibm\Fertilizers_Recommendation_ System_For_Disease_ Prediction\Dataset Plant Diseas

In [22]: img

Out[22]:
```

```
In [28]: img=image.load_img(r"C:\Users\maris_q3mm6nk\Desktop\FILES\data_for_ibm\Fertilizers_Recommendation_ System_For_Disease_ Prediction\Dataset Plant Diseas
         img

Out[28]:
```

```
In [29]: x=image.img_to_array(img)
```



```
In [30]:  x

Out[30]: array([[[165., 153., 189.],
                 [165., 153., 189.],
                 [165., 153., 189.],
                 ...,
                 [176., 170., 206.],
                 [176., 170., 206.],
                 [176., 170., 206.]],

                [[164., 152., 188.],
                 [164., 152., 188.],
                 [164., 152., 188.],
                 ...,
                 [173., 167., 203.],
                 [172., 166., 202.],
                 [172., 166., 202.]],

                [[163., 151., 187.],
                 [163., 151., 187.],
                 [163., 151., 187.],
                 ...,
                 [172., 166., 202.],
                 [170., 164., 200.],
                 [169., 163., 199.]],

                ...,

                [[135., 119., 156.],
                 [139., 123., 160.],
                 [134., 118., 155.],
                 ...,
                 [143., 133., 168.],
                 [138., 128., 163.],
                 [141., 131., 166.]],

                [[136., 120., 157.]
```



```
        [[136., 120., 157.],
         [134., 118., 155.],
         [134., 118., 155.],
         ...,
         [141., 131., 166.],
         [141., 131., 166.],
         [146., 136., 171.]],

        [[135., 119., 156.],
         [140., 124., 161.],
         [143., 127., 164.],
         ...,
         [145., 135., 170.],
         [151., 141., 176.],
         [140., 130., 165.]]], dtype=float32)
```

In [31]:

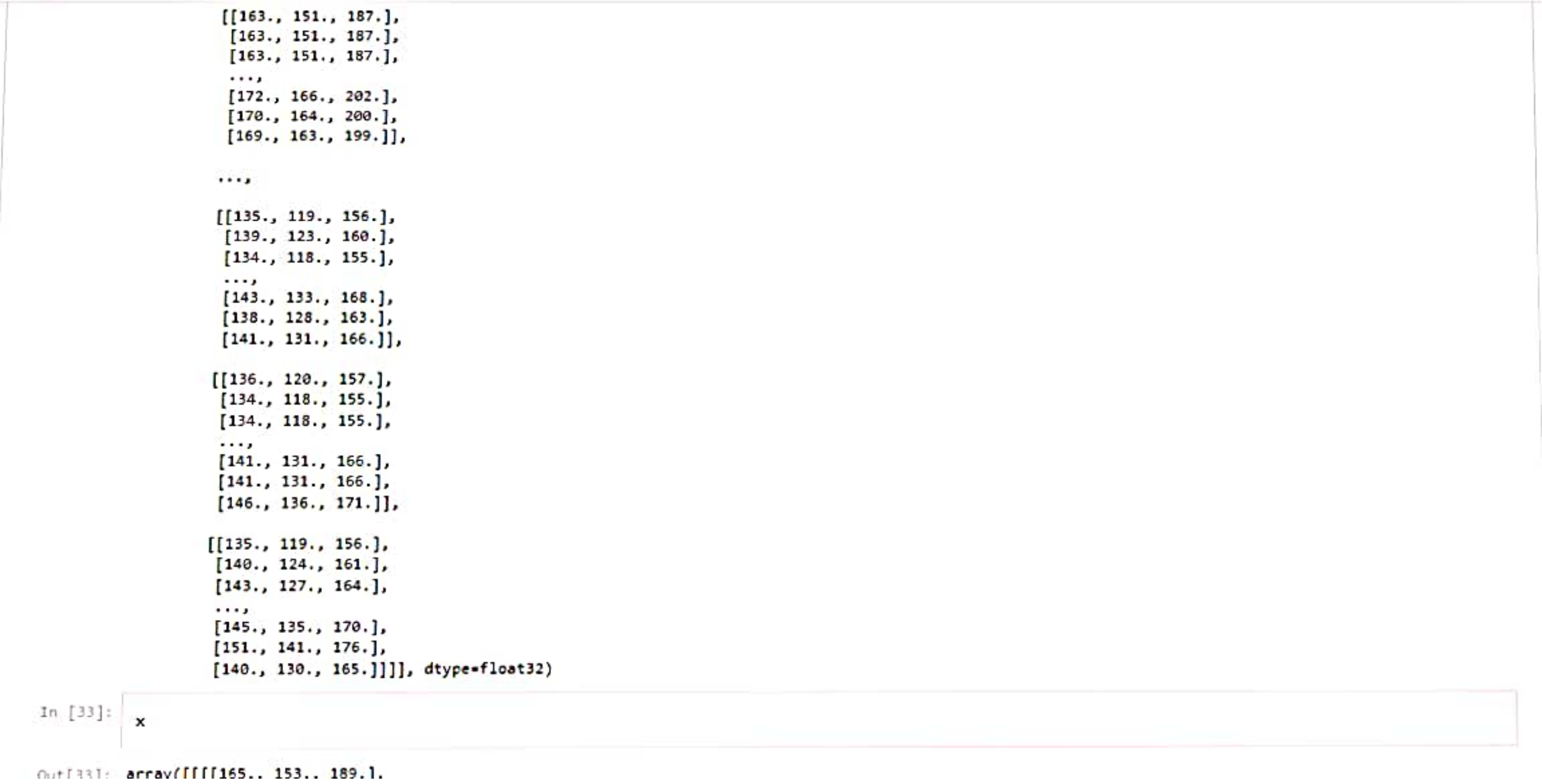
```
x=np.expand_dims(x,axis=0)
```

In [32]:

```
x
```

Out[32]:

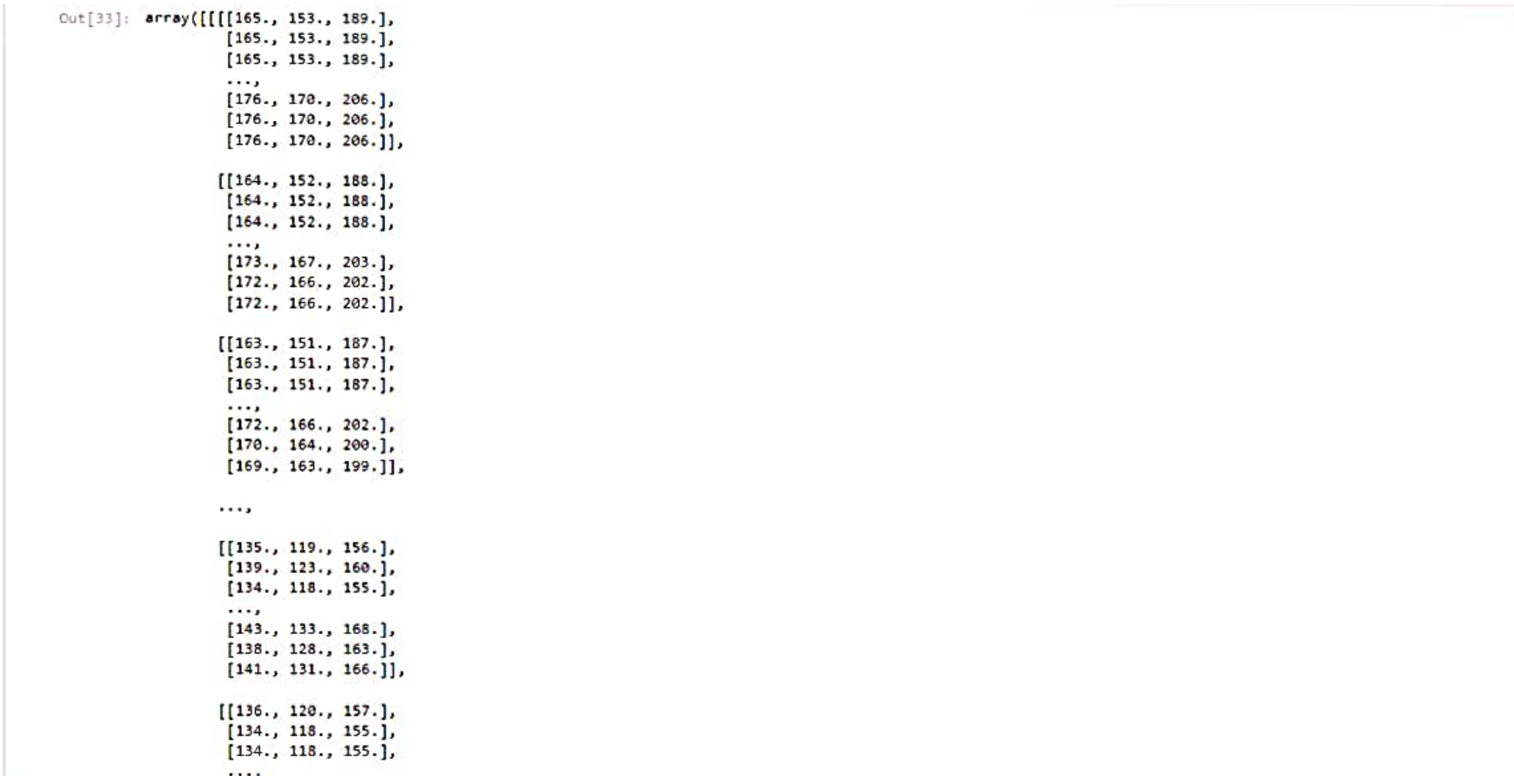
```
array([[[[165., 153., 189.],
         [165., 153., 189.],
         [165., 153., 189.],
         ...,
         [176., 170., 206.],
         [176., 170., 206.],
         [176., 170., 206.]],

        [[164., 152., 188.],
         [164., 152., 188.],
         [164., 152., 188.],
         ...,
         [173., 167., 203.],
         [172., 166., 202.],
         [172., 166., 202.]],
```



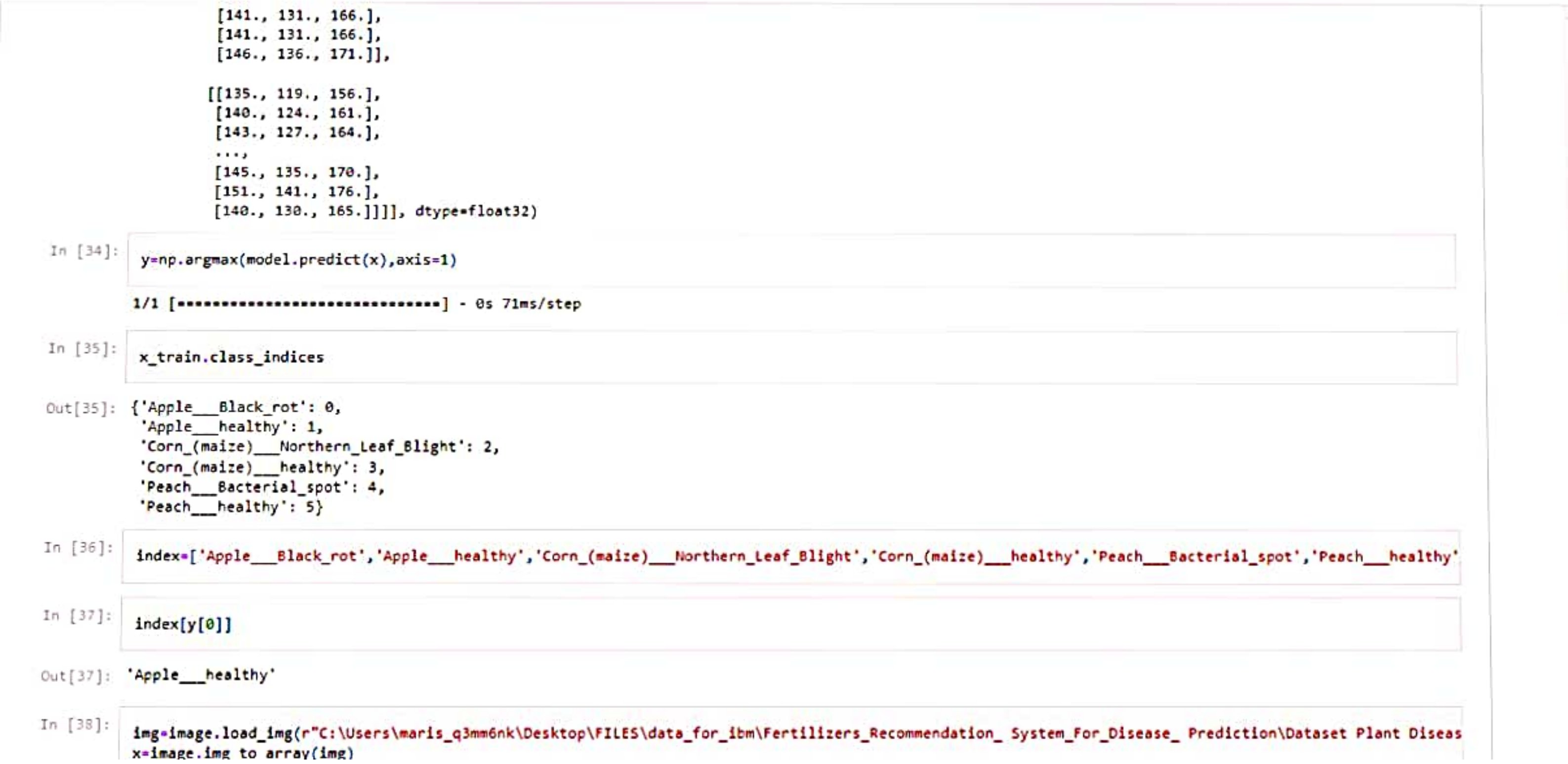
```
         [[163., 151., 187.],
          [163., 151., 187.],
          [163., 151., 187.],
          ...,
          [172., 166., 202.],
          [170., 164., 200.],
          [169., 163., 199.]],

         ...,

         [[135., 119., 156.],
          [139., 123., 160.],
          [134., 118., 155.],
          ...,
          [143., 133., 168.],
          [138., 128., 163.],
          [141., 131., 166.]],

         [[136., 120., 157.],
          [134., 118., 155.],
          [134., 118., 155.],
          ...,
          [141., 131., 166.],
          [141., 131., 166.],
          [146., 136., 171.]],

         [[135., 119., 156.],
          [140., 124., 161.],
          [143., 127., 164.],
          ...,
          [145., 135., 170.],
          [151., 141., 176.],
          [140., 130., 165.]]]], dtype=float32)
```

```
In [33]: x
```

```
Out[33]: array([[[[165., 153., 189.],
```

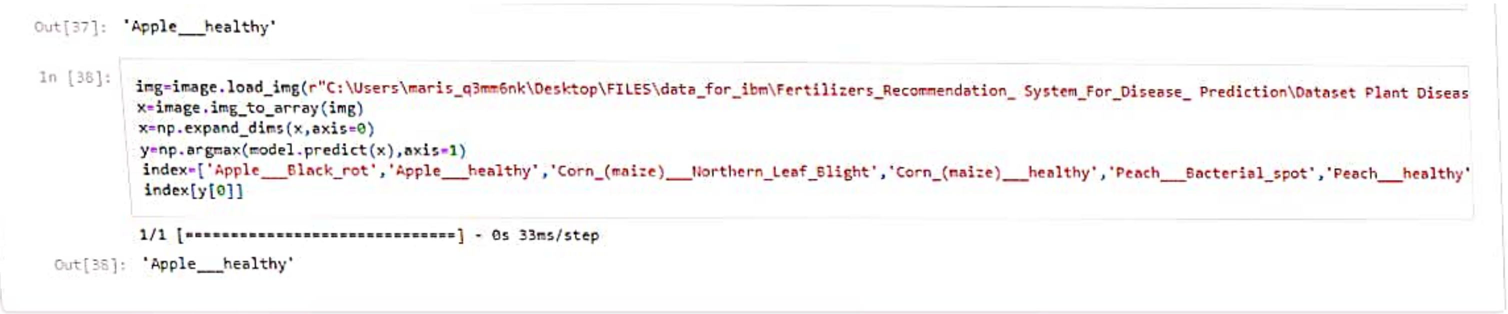


```
Out[33]: array([[[[165., 153., 189.],
                  [165., 153., 189.],
                  [165., 153., 189.],
                  ...,
                  [176., 170., 206.],
                  [176., 170., 206.],
                  [176., 170., 206.]],

                 [[164., 152., 188.],
                  [164., 152., 188.],
                  [164., 152., 188.],
                  ...,
                  [173., 167., 203.],
                  [172., 166., 202.],
                  [172., 166., 202.]],

                 [[163., 151., 187.],
                  [163., 151., 187.],
                  [163., 151., 187.],
                  ...,
                  [172., 166., 202.],
                  [170., 164., 200.],
                  [169., 163., 199.]],

                 ...,

                 [[135., 119., 156.],
                  [139., 123., 160.],
                  [134., 118., 155.],
                  ...,
                  [143., 133., 168.],
                  [138., 128., 163.],
                  [141., 131., 166.]],

                 [[136., 120., 157.],
                  [134., 118., 155.],
                  [134., 118., 155.],
                  ....
```



```
          [141., 131., 166.],
          [141., 131., 166.],
          [146., 136., 171.]],

         [[135., 119., 156.],
          [140., 124., 161.],
          [143., 127., 164.],
          ...,
          [145., 135., 170.],
          [151., 141., 176.],
          [140., 130., 165.]]]], dtype=float32)
```

```
In [34]: y=np.argmax(model.predict(x),axis=1)

         1/1 [==============================] - 0s 71ms/step

In [35]: x_train.class_indices

Out[35]: {'Apple___Black_rot': 0,
          'Apple___healthy': 1,
          'Corn_(maize)___Northern_Leaf_Blight': 2,
          'Corn_(maize)___healthy': 3,
          'Peach___Bacterial_spot': 4,
          'Peach___healthy': 5}

In [36]: index=['Apple___Black_rot','Apple___healthy','Corn_(maize)___Northern_Leaf_Blight','Corn_(maize)___healthy','Peach___Bacterial_spot','Peach___healthy'

In [37]: index[y[0]]

Out[37]: 'Apple___healthy'

In [38]: img=image.load_img(r"C:\Users\maris_q3mm6nk\Desktop\FILES\data_for_ibm\Fertilizers_Recommendation_ System_For_Disease_ Prediction\Dataset Plant Diseas
         x=image.img_to_array(img)
```



```
Out[37]: 'Apple___healthy'

In [38]:
img=image.load_img(r"C:\Users\maris_q3mm6nk\Desktop\FILES\data_for_ibm\Fertilizers_Recommendation_ System_For_Disease_ Prediction\Dataset Plant Diseas
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['Apple___Black_rot','Apple___healthy','Corn_(maize)___Northern_Leaf_Blight','Corn_(maize)___healthy','Peach___Bacterial_spot','Peach___healthy'
index[y[0]]

1/1 [==============================] - 0s 33ms/step
Out[38]: 'Apple___healthy'
```