```
from tensorflow.keras.preprocessing.image import ImageDataGenerator
```

In [2]:

```
train_datagen=ImageDataGenerator(rescale=1./255,zoom_range=0.2,horizontal_f
lip=True,vertical_flip=False)
```

In [3]:

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

In [4]:

```
x_test=test_datagen.flow_from_directory(r"C:\Users\VENGAT\Desktop\Data\Data
set Plant Disease\fruit-dataset\fruit-dataset\test",target_size=(128,128),

class_mode='categorical',batch_size=24)
```

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

In [5]:

```
x_train=train_datagen.flow_from_directory(r"C:\Users\VENGAT\Desktop\Data\Da
taset Plant Disease\fruit-dataset\fruit-
dataset\train",target_size=(128,128),

class_mode='categorical',batch_size=24)
```

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

In [6]:

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

In [7]:

```
model=Sequential()
```

In [8]:

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

In [9]:

```
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 [10]:

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

In [11]:

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

```
len(x_train)
```

Out[11]:

```
225
```

In [12]:

```
1238/24
```

Out[12]:

```
51.583333333333336
```

In [13]:

```
model.fit(x_train,steps_per_epoch=len(x_train),validation_data=x_test,valid
ation_steps=len(x_test),epochs=10)
```

```
Epoch 1/10
225/225 [==============================] - 1030s 5s/step - loss: 1.1202 -
accuracy: 0.7676 - val_loss: 0.2617 - val_accuracy: 0.9152
Epoch 2/10
225/225 [==============================] - 549s 2s/step - loss: 0.2752 -
accuracy: 0.9006 - val_loss: 0.1839 - val_accuracy: 0.9401
Epoch 3/10
225/225 [==============================] - 294s 1s/step - loss: 0.2114 -
accuracy: 0.9281 - val_loss: 0.1272 - val_accuracy: 0.9537
Epoch 4/10
225/225 [==============================] - 241s 1s/step - loss: 0.1607 -
accuracy: 0.9443 - val_loss: 0.1056 - val_accuracy: 0.9656
Epoch 5/10
225/225 [==============================] - 249s 1s/step - loss: 0.1491 -
accuracy: 0.9491 - val_loss: 0.1406 - val_accuracy: 0.9531
Epoch 6/10
225/225 [==============================] - 253s 1s/step - loss: 0.1057 -
accuracy: 0.9625 - val_loss: 0.0968 - val_accuracy: 0.9698
Epoch 7/10
225/225 [==============================] - 273s 1s/step - loss: 0.1086 -
accuracy: 0.9614 - val_loss: 0.1886 - val_accuracy: 0.9472
Epoch 8/10
225/225 [==============================] - 242s 1s/step - loss: 0.1273 -
accuracy: 0.9528 - val_loss: 0.1523 - val_accuracy: 0.9508
Epoch 9/10
225/225 [==============================] - 230s 1s/step - loss: 0.1127 -
accuracy: 0.9593 - val_loss: 0.0915 - val_accuracy: 0.9680
Epoch 10/10
225/225 [==============================] - 240s 1s/step - loss: 0.1045 -
accuracy: 0.9632 - val_loss: 0.1136 - val_accuracy: 0.9549
```

Out[13]:

In [14]:

```
model.save('fruitdata.h5')
```

In [15]:

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

In [16]:

```
model=load_model('fruitdata.h5')
```

In [17]:

```
img=image.load_img(r"C:\Users\VENGAT\Desktop\Data\Dataset Plant
Disease\fruit-dataset\fruit-dataset\test\Apple___healthy\00fca0da-2db3-
481b-b98a-9b67bb7b105c___RS_HL 7708.jpg")
```

In [18]:

```
img
```

Out[18]:

In [19]:

```
img=image.load_img(r"C:\Users\VENGAT\Desktop\Data\Dataset Plant
Disease\fruit-dataset\fruit-dataset\test\Apple___healthy\00fca0da-2db3-
481b-b98a-9b67bb7b105c___RS_HL 7708.jpg",target_size=(128,128))
img
```

Out[19]:

In [20]:

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

In [21]:

```
x
```

Out[21]:

```
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 [22]:

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

In [23]:

```
x
```

Out[23]:

```
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 [24]:

```
y=np.argmax(model.predict(x),axis=1)
```

```
1/1 [==============================] - 10s 10s/step
```

In [25]:

```
x_train.class_indices
```

Out[25]:

```
{'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 [26]:

```
index=['Apple___Black_rot','Apple___healthy','Corn_(maize)___Northern_Leaf_
Blight','Corn_(maize)___healthy','Peach___Bacterial_spot','Peach___healthy'
]
```

In [27]:

```
index[y[0]]
```

Out[27]:

```
'Apple___healthy'
```

In [28]:

```
img=image.load_img(r"C:\Users\VENGAT\Desktop\Data\Dataset Plant
Disease\fruit-dataset\fruit-dataset\test\Apple___healthy\00fca0da-2db3-
481b-b98a-9b67bb7b105c___RS_HL 7708.jpg",target_size=(128,128))
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 250ms/step
```

Out[28]:

```
'Apple___healthy'
```

In [ ]: