```
from keras.preprocessing.image import ImageDataGenerator
train_datagen=ImageDataGenerator(rescale=1./255,shear_range=0.2,zoom_r
ange=0.2,horizontal_flip=True)
test_datagen=ImageDataGenerator(rescale=1)
```

```
x_train=train_datagen.flow_from_directory(r'/content/drive/MyDrive/
DataSet/Dataset Plant
Disease/fruit-dataset/fruit-dataset/test',target_size=(128,128),batch_
size=2,class_mode='categorical')
x_test=test_datagen.flow_from_directory(r'/content/drive/MyDrive/DataS
et/Dataset Plant
Disease/fruit-dataset/fruit-dataset/train',target_size=(128,128),batch
_size=2,class_mode='categorical')
```

```
Found 1686 images belonging to 6 classes.
Found 5384 images belonging to 6 classes.
```

1. import the libraries

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

1. initializing the model

```
model=Sequential()
```

1. Add CNN layers

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

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

```
model.add(Flatten())
```

1. Add dense layer

```
model.add(Dense(units=40,kernel_initializer='uniform',activation='relu
'))
```

```
model.add(Dense(units=20,kernel_initializer='random_uniform',activatio
n='relu'))
```

```
model.add(Dense(units=6,kernel_initializer='random_uniform',activation
='softmax'))
```

1. Train and save the model

```
model.compile(loss='categorical_crossentropy',optimizer="adam",metrics
=["accuracy"])
```

```
model.fit(x_train,steps_per_epoch=89,epochs=20,validation_data=x_test,
validation_steps=27)
```

```
Epoch 1/20
89/89 [==============================] - 146s 2s/step - loss: 1.6616 -
accuracy: 0.3764 - val_loss: 203.1930 - val_accuracy: 0.2963
Epoch 2/20
89/89 [==============================] - 129s 1s/step - loss: 1.7158 -
accuracy: 0.2697 - val_loss: 22.3784 - val_accuracy: 0.2778
Epoch 3/20
89/89 [==============================] - 125s 1s/step - loss: 1.6271 -
accuracy: 0.3258 - val_loss: 163.5451 - val_accuracy: 0.3333
Epoch 4/20
89/89 [==============================] - 112s 1s/step - loss: 1.3890 -
accuracy: 0.4888 - val_loss: 88.6855 - val_accuracy: 0.5926
Epoch 5/20
89/89 [==============================] - 112s 1s/step - loss: 0.9276 -
accuracy: 0.6236 - val_loss: 164.1111 - val_accuracy: 0.6667
Epoch 6/20
89/89 [==============================] - 105s 1s/step - loss: 0.7846 -
accuracy: 0.6798 - val_loss: 71.4850 - val_accuracy: 0.6481
Epoch 7/20
89/89 [==============================] - 99s 1s/step - loss: 0.7925 -
accuracy: 0.7135 - val_loss: 102.9553 - val_accuracy: 0.5926
Epoch 8/20
89/89 [==============================] - 98s 1s/step - loss: 0.7527 -
accuracy: 0.7135 - val_loss: 560.5753 - val_accuracy: 0.5000
Epoch 9/20
89/89 [==============================] - 92s 1s/step - loss: 0.7694 -
accuracy: 0.6966 - val_loss: 69.2323 - val_accuracy: 0.7963
Epoch 10/20
89/89 [==============================] - 95s 1s/step - loss: 0.6303 -
accuracy: 0.8090 - val_loss: 126.6944 - val_accuracy: 0.6296
Epoch 11/20
89/89 [==============================] - 88s 978ms/step - loss: 0.6382
- accuracy: 0.7584 - val_loss: 65.5593 - val_accuracy: 0.7593
Epoch 12/20
89/89 [==============================] - 87s 980ms/step - loss: 0.6182
- accuracy: 0.7865 - val_loss: 86.7426 - val_accuracy: 0.6667
Epoch 13/20
89/89 [==============================] - 84s 938ms/step - loss: 0.5206
- accuracy: 0.8034 - val_loss: 43.7637 - val_accuracy: 0.8333
Epoch 14/20
89/89 [==============================] - 86s 976ms/step - loss: 0.5636
- accuracy: 0.8202 - val_loss: 112.9079 - val_accuracy: 0.7037
Epoch 15/20
89/89 [==============================] - 83s 937ms/step - loss: 0.5015
- accuracy: 0.8315 - val_loss: 81.1166 - val_accuracy: 0.7407
Epoch 16/20
89/89 [==============================] - 84s 943ms/step - loss: 0.4755
- accuracy: 0.8315 - val_loss: 97.4727 - val_accuracy: 0.7593
Epoch 17/20
89/89 [==============================] - 85s 965ms/step - loss: 0.4559
```

```
- accuracy: 0.8427 - val_loss: 88.8596 - val_accuracy: 0.7407
Epoch 18/20
89/89 [==============================] - 82s 923ms/step - loss: 0.3686
- accuracy: 0.8596 - val_loss: 107.9981 - val_accuracy: 0.7222
Epoch 19/20
89/89 [==============================] - 80s 901ms/step - loss: 0.4244
- accuracy: 0.8764 - val_loss: 34.6990 - val_accuracy: 0.8704
Epoch 20/20
89/89 [==============================] - 80s 897ms/step - loss: 0.5965
- accuracy: 0.7809 - val_loss: 64.9681 - val_accuracy: 0.7222
```

```
<keras.callbacks.History at 0x7f2f0fc41d90>
```

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

```
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         
                                                                 
 dense (Dense)               (None, 300)               38102700  
                                                                 
 dense_1 (Dense)             (None, 40)                12040     
                                                                 
 dense_2 (Dense)             (None, 20)                820       
                                                                 
 dense_3 (Dense)             (None, 6)                 126       
                                                                 
=================================================================
Total params: 38,116,582
Trainable params: 38,116,582
Non-trainable params: 0
_________________________________________________________________
```