FERTILIZER RECOMMENDATION SYSTEM FOR DISEASE PREDECTION

Model_building_for_fruit_disease

In [ ]:
```
from keras.preprocessing.image import ImageDataGenerator
train_datagen=ImageDataGenerator(rescale=1./255,shear_range=0.2,zoom_range=0.2,horizontal_flip=True)
test_datagen=ImageDataGenerator(rescale=1)
```

In [ ]:
```
x_train=train_datagen.flow_from_directory(r'/content/drive/MyDrive/DataSet/Dataset Plant Disease/fruit-dataset/fruit-dataset/test',target_size=(128,12
x_test=test_datagen.flow_from_directory(r'/content/drive/MyDrive/DataSet/Dataset Plant Disease/fruit-dataset/fruit-dataset/train',target_size=(128,128
```

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

In [ ]:
```
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
```

In [ ]:
```
model=Sequential()
```

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

In [ ]:
```
model.add(MaxPooling2D(pool_size=(2,2)))
```

In [ ]:
```
model.add(Flatten())
```

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

In [ ]:
```
model.add(Dense(units=20,kernel_initializer='random_uniform',activation='relu'))
```

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

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

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

```
Epoch 1/20
89/89 [==============================] - 18s 201ms/step - loss: 0.4114 - accuracy: 0.8764 - val_loss: 25.6859 - val_accuracy: 0.9259
Epoch 2/20
```

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```
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```

```
Epoch 1/20
89/89 [==============================] - 18s 201ms/step - loss: 0.4114 - accuracy: 0.8764 - val_loss: 25.6859 - val_accuracy: 0.9259
Epoch 2/20
89/89 [==============================] - 17s 191ms/step - loss: 0.3548 - accuracy: 0.8876 - val_loss: 121.5058 - val_accuracy: 0.7593
Epoch 3/20
89/89 [==============================] - 16s 178ms/step - loss: 0.3149 - accuracy: 0.8596 - val_loss: 92.9890 - val_accuracy: 0.8333
Epoch 4/20
89/89 [==============================] - 16s 179ms/step - loss: 0.2673 - accuracy: 0.9157 - val_loss: 44.4134 - val_accuracy: 0.9259
Epoch 5/20
89/89 [==============================] - 16s 179ms/step - loss: 0.4496 - accuracy: 0.8315 - val_loss: 114.5069 - val_accuracy: 0.7963
Epoch 6/20
89/89 [==============================] - 16s 181ms/step - loss: 0.4912 - accuracy: 0.8258 - val_loss: 74.3852 - val_accuracy: 0.7963
Epoch 7/20
89/89 [==============================] - 17s 191ms/step - loss: 0.4440 - accuracy: 0.8315 - val_loss: 38.0450 - val_accuracy: 0.9074
Epoch 8/20
89/89 [==============================] - 17s 189ms/step - loss: 0.3460 - accuracy: 0.9045 - val_loss: 101.0049 - val_accuracy: 0.7963
Epoch 9/20
89/89 [==============================] - 14s 161ms/step - loss: 0.4628 - accuracy: 0.8427 - val_loss: 67.1219 - val_accuracy: 0.8519
Epoch 10/20
89/89 [==============================] - 16s 184ms/step - loss: 0.4445 - accuracy: 0.8146 - val_loss: 72.1230 - val_accuracy: 0.8333
Epoch 11/20
89/89 [==============================] - 15s 173ms/step - loss: 0.3353 - accuracy: 0.8708 - val_loss: 84.4692 - val_accuracy: 0.7593
Epoch 12/20
89/89 [==============================] - 12s 141ms/step - loss: 0.3237 - accuracy: 0.8764 - val_loss: 46.2378 - val_accuracy: 0.9259
Epoch 13/20
89/89 [==============================] - 14s 161ms/step - loss: 0.2462 - accuracy: 0.9045 - val_loss: 23.9153 - val_accuracy: 0.9259
Epoch 14/20
89/89 [==============================] - 14s 155ms/step - loss: 0.2982 - accuracy: 0.9101 - val_loss: 208.1245 - val_accuracy: 0.7778
Epoch 15/20
89/89 [==============================] - 14s 162ms/step - loss: 0.2816 - accuracy: 0.8989 - val_loss: 65.4288 - val_accuracy: 0.8519
Epoch 16/20
89/89 [==============================] - 15s 166ms/step - loss: 0.2422 - accuracy: 0.9157 - val_loss: 181.1028 - val_accuracy: 0.7963
Epoch 17/20
89/89 [==============================] - 14s 160ms/step - loss: 0.2712 - accuracy: 0.9101 - val_loss: 229.0342 - val_accuracy: 0.7222
Epoch 18/20
89/89 [==============================] - 13s 151ms/step - loss: 0.2775 - accuracy: 0.9157 - val_loss: 117.6737 - val_accuracy: 0.8148
Epoch 19/20
89/89 [==============================] - 13s 152ms/step - loss: 0.1857 - accuracy: 0.9438 - val_loss: 156.3340 - val_accuracy: 0.8148
Epoch 20/20
89/89 [==============================] - 14s 156ms/step - loss: 0.2138 - accuracy: 0.9213 - val_loss: 143.7909 - val_accuracy: 0.7593
```

Out[ ]:

Save the Model

In [ ]:
```
model.save('fruit.h5')
```

In [ ]:
```
model.summary()
```

```
Model: "sequential_2"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 conv2d_2 (Conv2D)           (None, 126, 126, 32)      896

 max_pooling2d_1 (MaxPooling  (None, 63, 63, 32)       0
 2D)

 flatten_1 (Flatten)         (None, 127008)            0

 dense_3 (Dense)             (None, 40)                5080360

 dense_4 (Dense)             (None, 20)                820

 dense_5 (Dense)             (None, 6)                 126

=================================================================
Total params: 5,082,202
Trainable params: 5,082,202
Non-trainable params: 0
_________________________________________________________________
```


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