

import the libraries

```
from tensorflow.keras.preprocessing.image import ImageDataGenerator
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense, Convolution2D, MaxPooling2D, Flatten
import numpy as np
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
```

image augmentation

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

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

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

```
x_train=train_datagen.flow_from_directory(r"/content/drive/MyDrive/Dataset Plant Disease/Veg-dataset/Veg-dataset/train_set", target_size=(128,128),
                                          class_mode='categorical', batch_size=24)
```

Found 11386 images belonging to 9 classes.

```
x_test=test_datagen.flow_from_directory(r"/content/drive/MyDrive/Dataset Plant Disease/Veg-dataset/Veg-dataset/test_set", target_size=(128,128), class_mode='categorical', batch_size=24)
```

Found 3416 images belonging to 9 classes.

add layers

```
from tensorflow.keras.models import Sequential
```

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

```
model=Sequential()
```

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

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

```
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

```
model.add(Dense(300,activation='relu'))
```

```
model.add(Dense(150,activation='relu'))
```

```
model.add(Dense(9,activation='softmax'))
```

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

```
len(x_train)
```

475

1238/24

51.583333333333336

fit the model

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

Epoch 1/10

475/475 [=====] - 3275s 7s/step - loss: 1.4156 - accuracy: 0.6092
- val_loss: 0.8031 - val_accuracy: 0.7178

Epoch 2/10

475/475 [=====] - 375s 789ms/step - loss: 0.5598 - accuracy: 0.80
04 - val_loss: 0.5123 - val_accuracy: 0.8150

Epoch 3/10

475/475 [=====] - 362s 762ms/step - loss: 0.4634 - accuracy: 0.84
02 - val_loss: 0.3696 - val_accuracy: 0.8718

Epoch 4/10

475/475 [=====] - 364s 765ms/step - loss: 0.3832 - accuracy: 0.86
69 - val_loss: 0.2470 - val_accuracy: 0.9183

Epoch 5/10

475/475 [=====] - 364s 765ms/step - loss: 0.3210 - accuracy: 0.88
73 - val_loss: 0.3565 - val_accuracy: 0.8741

Epoch 6/10

475/475 [=====] - 360s 758ms/step - loss: 0.2831 - accuracy: 0.90
40 - val_loss: 0.4657 - val_accuracy: 0.8352

Epoch 7/10

475/475 [=====] - 371s 781ms/step - loss: 0.2453 - accuracy: 0.91
35 - val_loss: 0.1700 - val_accuracy: 0.9458

Epoch 8/10

475/475 [=====] - 361s 760ms/step - loss: 0.2693 - accuracy: 0.90
62 - val_loss: 0.3006 - val_accuracy: 0.8967

Epoch 9/10

475/475 [=====] - 373s 786ms/step - loss: 0.2177 - accuracy: 0.92
57 - val_loss: 0.1678 - val_accuracy: 0.9429

Epoch 10/10

475/475 [=====] - 373s 786ms/step - loss: 0.2082 - accuracy: 0.92
88 - val_loss: 0.1483 - val_accuracy: 0.9494

save the model

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

test the model

```
import numpy as np
```

```
from tensorflow.keras.models import load_model
```

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

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

```
img=image.load_img(r"/content/drive/MyDrive/Dataset Plant Disease/Veg-dataset/Veg-  
dataset/test_set/Potato___Early_blight/b7883606-5157-4dc1-b965-fc10f8fe1796___RS_Early.B  
7598.JPG")
```

```
img
```



```
x=image.img_to_array(img)
img=image.load_img(r"/content/drive/MyDrive/Dataset Plant Disease/Veg-dataset/Veg-
dataset/test_set/Potato___Early_blight/b7883606-5157-4dc1-b965-fc10f8fe1796___RS_Early.B
7598.JPG",target_size=(128,128))
img
```



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

```
array([[[[156., 163., 191.],
         [158., 165., 193.],
         [155., 162., 190.],
         ...,
         [109., 113., 140.],
         [109., 113., 140.],
         [113., 117., 144.]],

        [[166., 173., 201.],
         [166., 173., 201.],
         [159., 166., 194.],
         ...,
         [110., 114., 141.],
         [104., 108., 135.],
         [109., 113., 140.]],

        [[168., 175., 203.],
         [160., 167., 195.],
         [152., 159., 187.],
         ...,
         [110., 114., 141.],
         [101., 105., 132.],
         [110., 114., 141.]]],

       dtype=float32)
```

```

...,

[[160., 161., 181.],
 [162., 163., 183.],
 [155., 156., 176.],
 ...,
 [103., 101., 122.],
 [ 99.,  97., 118.],
 [105., 103., 124.]],

[[155., 156., 176.],
 [150., 151., 171.],
 [152., 153., 173.],
 ...,
 [109., 107., 128.],
 [102., 100., 121.],
 [107., 105., 126.]],

[[157., 158., 178.],
 [156., 157., 177.],
 [149., 150., 170.],
 ...,
 [ 92.,  90., 111.],
 [119., 117., 138.],
 [ 96.,  94., 115.]]], dtype=float32)
x=np.expand_dims(x,axis=0)
x
array([[[[156., 163., 191.],
 [158., 165., 193.],
 [155., 162., 190.],
 ...,
 [109., 113., 140.],
 [109., 113., 140.],
 [113., 117., 144.]],

[[166., 173., 201.],
 [166., 173., 201.],
 [159., 166., 194.],
 ...,
 [110., 114., 141.],
 [104., 108., 135.],
 [109., 113., 140.]],

[[168., 175., 203.],
 [160., 167., 195.],
 [152., 159., 187.],
 ...,
 [110., 114., 141.],
 [101., 105., 132.],
 [110., 114., 141.]],

...,

[[160., 161., 181.],

```

```

[162., 163., 183.],
[155., 156., 176.],
...,
[103., 101., 122.],
[ 99., 97., 118.],
[105., 103., 124.]],

[[155., 156., 176.],
[150., 151., 171.],
[152., 153., 173.],
...,
[109., 107., 128.],
[102., 100., 121.],
[107., 105., 126.]],

[[157., 158., 178.],
[156., 157., 177.],
[149., 150., 170.],
...,
[ 92., 90., 111.],
[119., 117., 138.],
[ 96., 94., 115.]]], dtype=float32)
y=np.argmax(model.predict(x),axis=1)
1/1 [=====] - 0s 208ms/step
x_train.class_indices
{'Pepper__bell__Bacterial_spot': 0,
'Pepper__bell__healthy': 1,
'Potato__Early_blight': 2,
'Potato__Late_blight': 3,
'Potato__healthy': 4,
'Tomato__Bacterial_spot': 5,
'Tomato__Late_blight': 6,
'Tomato__Leaf_Mold': 7,
'Tomato__Septoria_leaf_spot': 8}
index=['Pepper__bell__Bacterial_spot','Pepper__bell__healthy','Potato__Early_blight','Potato__Late_blight','Potato__healthy','Tomato__Bacterial_spot','Tomato__Late_blight','Tomato__Leaf_Mold','Tomato__Septoria_leaf_spot']
index[y[0]]
'Potato__Early_blight'
img=image.load_img(r"/content/drive/MyDrive/Dataset Plant Disease/Veg-dataset/Veg-dataset/test_set/Potato__Early_blight/b7883606-5157-4dc1-b965-fc10f8fe1796__RS_Early.B7598.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=['Pepper__bell__Bacterial_spot','Pepper__bell__healthy','Potato__Early_blight','Potato__Late_blight','Potato__healthy','Tomato__Bacterial_spot','Tomato__Leaf_Mold','Tomato__Septoria__leaf_spot']
index[y[0]]
1/1 [=====] - 0s 60ms/step
'Potato__Early_blight'

```