**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

In [ ]:

train\_datagen**=**ImageDataGenerator(rescale**=**1.**/**255,zoom\_range**=**0.2,horizontal\_flip**=True**,vertical\_flip**=False**)

In [ ]:

test\_datagen**=**ImageDataGenerator(rescale**=**1.**/**255)

In [ ]:

x\_train**=**train\_datagen**.**flow\_from\_directory(r"/content/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.

In [ ]:

x\_test**=**test\_datagen**.**flow\_from\_directory(r"/content/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.

**Adding Layers**

In [2]:

model**=**Sequential()

model**.**add(Convolution2D(32,(3,3),input\_shape**=**(128,128,3),activation**=**'relu'))

model**.**add(MaxPooling2D(pool\_size**=**(2,2)))

model**.**add(Flatten())

model**.**summary()

Model: "sequential"

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Layer (type) Output Shape Param #

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conv2d (Conv2D) (None, 126, 126, 32) 896

max\_pooling2d (MaxPooling2D (None, 63, 63, 32) 0

)

flatten (Flatten) (None, 127008) 0

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Total params: 896

Trainable params: 896

Non-trainable params: 0

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In [4]:

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'])

In [ ]:

len(x\_train)

Out[ ]:

143

In [ ]:

1238**/**24

Out[ ]:

51.583333333333336

In [ ]:

model**.**fit(x\_train,steps\_per\_epoch**=**len(x\_train),validation\_data**=**x\_test,validation\_steps**=**len(x\_test),epochs**=**10)

Epoch 1/10

143/143 [==============================] - 131s 908ms/step - loss: 2.1251 - accuracy: 0.4432 - val\_loss: 0.9709 - val\_accuracy: 0.6809

Epoch 2/10

143/143 [==============================] - 130s 907ms/step - loss: 0.8973 - accuracy: 0.6985 - val\_loss: 0.8680 - val\_accuracy: 0.7125

Epoch 3/10

143/143 [==============================] - 126s 883ms/step - loss: 0.6304 - accuracy: 0.7851 - val\_loss: 0.4569 - val\_accuracy: 0.8428

Epoch 4/10

143/143 [==============================] - 123s 861ms/step - loss: 0.5369 - accuracy: 0.8147 - val\_loss: 0.3411 - val\_accuracy: 0.8823

Epoch 5/10

143/143 [==============================] - 123s 860ms/step - loss: 0.4815 - accuracy: 0.8305 - val\_loss: 0.4353 - val\_accuracy: 0.8419

Epoch 6/10

143/143 [==============================] - 126s 885ms/step - loss: 0.4056 - accuracy: 0.8580 - val\_loss: 0.5034 - val\_accuracy: 0.8229

Epoch 7/10

143/143 [==============================] - 124s 867ms/step - loss: 0.4036 - accuracy: 0.8604 - val\_loss: 0.2579 - val\_accuracy: 0.9139

Epoch 8/10

143/143 [==============================] - 120s 837ms/step - loss: 0.3145 - accuracy: 0.8923 - val\_loss: 0.2749 - val\_accuracy: 0.8964

Epoch 9/10

143/143 [==============================] - 127s 890ms/step - loss: 0.2659 - accuracy: 0.9019 - val\_loss: 0.2573 - val\_accuracy: 0.9104

Epoch 10/10

143/143 [==============================] - 124s 871ms/step - loss: 0.3355 - accuracy: 0.8823 - val\_loss: 0.2301 - val\_accuracy: 0.9207

Out[ ]:

**Test and save the model**

In [5]:

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

model**=**load\_model('vegetabledata.h5')

In [ ]:

img**=**image**.**load\_img(r"/content/Dataset Plant Disease/Veg-dataset/Veg-dataset/test\_set/Potato\_\_\_Early\_blight/b475147c-92bc-419a-b2c3-7d5aabbb79ec\_\_\_RS\_Early.B 7379.JPG")

In [8]:

img**=**image**.**load\_img(r"/content/Dataset Plant Disease/Veg-dataset/Veg-dataset/test\_set/Potato\_\_\_Early\_blight/b475147c-92bc-419a-b2c3-7d5aabbb79ec\_\_\_RS\_Early.B 7379.JPG")

img

Out[8]:

In [ ]:

x**=**image**.**img\_to\_array(img)

img**=**image**.**load\_img(r"/content/Dataset Plant Disease/Veg-dataset/Veg-dataset/test\_set/Potato\_\_\_Early\_blight/b475147c-92bc-419a-b2c3-7d5aabbb79ec\_\_\_RS\_Early.B 7379.JPG",target\_size**=**(128,128))

img

Out[ ]:

In [ ]:

x**=**image**.**img\_to\_array(img)

x

Out[ ]:

array([[[191., 189., 200.],

[189., 187., 198.],

[189., 187., 198.],

...,

[178., 176., 190.],

[183., 181., 195.],

[174., 172., 186.]],

[[184., 182., 193.],

[192., 190., 201.],

[195., 193., 204.],

...,

[181., 179., 193.],

[191., 189., 203.],

[173., 171., 185.]],

[[184., 182., 193.],

[192., 190., 201.],

[197., 195., 206.],

...,

[174., 172., 186.],

[183., 181., 195.],

[171., 169., 183.]],

...,

[[163., 161., 172.],

[176., 174., 185.],

[159., 157., 168.],

...,

[158., 156., 167.],

[131., 130., 138.],

[145., 144., 152.]],

[[171., 169., 180.],

[167., 165., 176.],

[174., 172., 183.],

...,

[137., 135., 146.],

[134., 133., 141.],

[185., 184., 192.]],

[[157., 155., 166.],

[224., 222., 233.],

[204., 202., 213.],

...,

[155., 153., 164.],

[126., 125., 133.],

[165., 164., 172.]]], dtype=float32)

In [ ]:

x**=**np**.**expand\_dims(x,axis**=**0)

x

Out[ ]:

array([[[[191., 189., 200.],

[189., 187., 198.],

[189., 187., 198.],

...,

[178., 176., 190.],

[183., 181., 195.],

[174., 172., 186.]],

[[184., 182., 193.],

[192., 190., 201.],

[195., 193., 204.],

...,

[181., 179., 193.],

[191., 189., 203.],

[173., 171., 185.]],

[[184., 182., 193.],

[192., 190., 201.],

[197., 195., 206.],

...,

[174., 172., 186.],

[183., 181., 195.],

[171., 169., 183.]],

...,

[[163., 161., 172.],

[176., 174., 185.],

[159., 157., 168.],

...,

[158., 156., 167.],

[131., 130., 138.],

[145., 144., 152.]],

[[171., 169., 180.],

[167., 165., 176.],

[174., 172., 183.],

...,

[137., 135., 146.],

[134., 133., 141.],

[185., 184., 192.]],

[[157., 155., 166.],

[224., 222., 233.],

[204., 202., 213.],

...,

[155., 153., 164.],

[126., 125., 133.],

[165., 164., 172.]]]], dtype=float32)

In [ ]:

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

1/1 [==============================] - 0s 168ms/step

In [ ]:

x\_train**.**class\_indices

Out[ ]:

{'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}

In [ ]:

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]]

Out[ ]:

'Potato\_\_\_Early\_blight'

In [ ]:

img**=**image**.**load\_img(r"/content/Dataset Plant Disease/Veg-dataset/Veg-dataset/test\_set/Potato\_\_\_Early\_blight/b475147c-92bc-419a-b2c3-7d5aabbb79ec\_\_\_RS\_Early.B 7379.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 52ms/step

Out[ ]:

'Potato\_\_\_Early\_blight'