In [1]:
```
cd G:/
```

```
G:\
```

In [2]:
```
cd smart_bridge
```

```
G:\smart_bridge
```

In [3]:
```
cd plant-seedlings-classification
```

```
G:\smart_bridge\plant-seedlings-classification
```

Importing ImageDataGenerator Library

In [7]:
```
from keras.preprocessing.image import ImageDataGenerator
```

Configure ImageDataGenerator Class

In [8]:
```
train_datagen = ImageDataGenerator(rescale = 1./255,shear_range = 0.2,zoom_range
test_datagen = ImageDataGenerator(rescale =1 )
```

Apply ImageDataGenerator Functionaity to Trainset and Testset

In [9]:
```
x_train = train_datagen.flow_from_directory(r'train',target_size = (64,64),batch_
x_test = test_datagen.flow_from_directory(r'test',target_size = (64,64),batch_si
```

```
Found 3811 images belonging to 12 classes.
Found 939 images belonging to 12 classes.
```

In [10]:
```
x_train.class_indices
```

Out[10]:
```
{'Black-grass': 0,
 'Charlock': 1,
 'Cleavers': 2,
 'Common Chickweed': 3,
 'Common wheat': 4,
 'Fat Hen': 5,
 'Loose Silky-bent': 6,
 'Maize': 7,
 'Scentless Mayweed': 8,
 'Shepherds Purse': 9,
 'Small-flowered Cranesbill': 10,
 'Sugar beet': 11}
```

In [11]:
```
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 [12]:
```
model = Sequential()
```

```
WARNING:tensorflow:From C:\Users\Admin\Anaconda3\lib\site-packages\keras\backen
d\tensorflow_backend.py:74: The name tf.get_default_graph is deprecated. Please
use tf.compat.v1.get_default_graph instead.
```

In [13]:
```
model.add(Convolution2D(32,(3,3),input_shape = (64,64,3),activation = 'relu'))
```

```
WARNING:tensorflow:From C:\Users\Admin\Anaconda3\lib\site-packages\keras\backen
d\tensorflow_backend.py:517: The name tf.placeholder is deprecated. Please use
tf.compat.v1.placeholder instead.

WARNING:tensorflow:From C:\Users\Admin\Anaconda3\lib\site-packages\keras\backen
d\tensorflow_backend.py:4138: The name tf.random_uniform is deprecated. Please
use tf.random.uniform instead.
```

In [14]:
```
model.add(MaxPooling2D(pool_size=(2,2)))
```

```
WARNING:tensorflow:From C:\Users\Admin\Anaconda3\lib\site-packages\keras\backen
d\tensorflow_backend.py:3976: The name tf.nn.max_pool is deprecated. Please use
tf.nn.max_pool2d instead.
```

In [15]:
```
model.add(Flatten())
```

In [16]:
```
model.add(Dense(output_dim=150,init = 'uniform',activation = 'relu'))
```

```
C:\Users\Admin\Anaconda3\lib\site-packages\ipykernel_launcher.py:1: UserWarnin
g: Update your `Dense` call to the Keras 2 API: `Dense(activation="relu", units
=150, kernel_initializer="uniform")`
  """Entry point for launching an IPython kernel.
```

In [17]:
```
model.add(Dense(output_dim=12,init = 'uniform',activation = 'sigmoid'))
```

```
C:\Users\Admin\Anaconda3\lib\site-packages\ipykernel_launcher.py:1: UserWarnin
g: Update your `Dense` call to the Keras 2 API: `Dense(activation="sigmoid", un
its=12, kernel_initializer="uniform")`
  """Entry point for launching an IPython kernel.
```

In [18]:
```
from keras.preprocessing.image import ImageDataGenerator
train_datagen = ImageDataGenerator(rescale = 1./255,shear_range = 0.2,zoom_range
test_datagen = ImageDataGenerator(rescale =1 )
```

In [19]:
```
x_train = train_datagen.flow_from_directory(r'train',target_size = (64,64),batch_
x_test = test_datagen.flow_from_directory(r'test',target_size = (64,64),batch_si
```

```
Found 3811 images belonging to 12 classes.
Found 939 images belonging to 12 classes.
```

In [20]:
```
x_train.class_indices
```

Out[20]:
```
{'Black-grass': 0,
 'Charlock': 1,
 'Cleavers': 2,
 'Common Chickweed': 3,
 'Common wheat': 4,
 'Fat Hen': 5,
 'Loose Silky-bent': 6,
 'Maize': 7,
 'Scentless Mayweed': 8,
 'Shepherds Purse': 9,
 'Small-flowered Cranesbill': 10,
 'Sugar beet': 11}
```

In [21]:
```
model.compile(loss = 'categorical_crossentropy',optimizer = 'adam',metrics = ["a
```

```
WARNING:tensorflow:From C:\Users\Admin\Anaconda3\lib\site-packages\keras\optimi
zers.py:790: The name tf.train.Optimizer is deprecated. Please use tf.compat.v
1.train.Optimizer instead.

WARNING:tensorflow:From C:\Users\Admin\Anaconda3\lib\site-packages\keras\backen
d\tensorflow_backend.py:3295: The name tf.log is deprecated. Please use tf.mat
h.log instead.
```

In [24]:
```
model.fit_generator(x_train,steps_per_epoch =100,epochs=50,validation_data=x_tes
```

```
Epoch 1/50
100/100 [==============================] - 223s 2s/step - loss: 2.2380 - acc:
0.2066 - val_loss: nan - val_acc: 0.1966
Epoch 2/50
100/100 [==============================] - 176s 2s/step - loss: 1.8309 - acc:
0.3550 - val_loss: nan - val_acc: 0.1662
Epoch 3/50
100/100 [==============================] - 183s 2s/step - loss: 1.6225 - acc:
0.4215 - val_loss: nan - val_acc: 0.1555
Epoch 4/50
100/100 [==============================] - 198s 2s/step - loss: 1.4197 - acc:
0.4954 - val_loss: nan - val_acc: 0.1748
Epoch 5/50
100/100 [==============================] - 160s 2s/step - loss: 1.3464 - acc:
0.5257 - val_loss: nan - val_acc: 0.1567
Epoch 6/50
100/100 [==============================] - 163s 2s/step - loss: 1.2576 - acc:
0.5548 - val_loss: nan - val_acc: 0.1748
Epoch 7/50
100/100 [==============================] - 166s 2s/step - loss: 1.1939 - acc:
0.5784 - val_loss: nan - val_acc: 0.1292
Epoch 8/50
100/100 [==============================] - 184s 2s/step - loss: 1.1159 - acc:
0.6044 - val_loss: nan - val_acc: 0.1469
Epoch 9/50
100/100 [==============================] - 289s 3s/step - loss: 1.0559 - acc:
0.6407 - val_loss: nan - val_acc: 0.1266
Epoch 10/50
100/100 [==============================] - 216s 2s/step - loss: 1.0231 - acc:
0.6523 - val_loss: nan - val_acc: 0.1363
Epoch 11/50
100/100 [==============================] - 233s 2s/step - loss: 0.9756 - acc:
0.6709 - val_loss: nan - val_acc: 0.1165
Epoch 12/50
100/100 [==============================] - 194s 2s/step - loss: 0.9514 - acc:
0.6781 - val_loss: nan - val_acc: 0.1398
Epoch 13/50
100/100 [==============================] - 153s 2s/step - loss: 0.9367 - acc:
0.6864 - val_loss: nan - val_acc: 0.1211
Epoch 14/50
100/100 [==============================] - 249s 2s/step - loss: 0.8853 - acc:
0.7031 - val_loss: nan - val_acc: 0.1434
Epoch 15/50
100/100 [==============================] - 181s 2s/step - loss: 0.8567 - acc:
0.7171 - val_loss: nan - val_acc: 0.1254
Epoch 16/50
100/100 [==============================] - 209s 2s/step - loss: 0.8301 - acc:
0.7285 - val_loss: nan - val_acc: 0.1342
Epoch 17/50
100/100 [==============================] - 151s 2s/step - loss: 0.8437 - acc:
0.7242 - val_loss: nan - val_acc: 0.1272
Epoch 18/50
100/100 [==============================] - 175s 2s/step - loss: 0.8094 - acc:
0.7347 - val_loss: nan - val_acc: 0.1282
Epoch 19/50
```

```
100/100 [==============================] - 235s 2s/step - loss: 0.7610 - acc:
0.7447 - val_loss: nan - val_acc: 0.1201
Epoch 20/50
100/100 [==============================] - 196s 2s/step - loss: 0.7412 - acc:
0.7584 - val_loss: nan - val_acc: 0.1545
Epoch 21/50
100/100 [==============================] - 160s 2s/step - loss: 0.7555 - acc:
0.7512 - val_loss: nan - val_acc: 0.1206
Epoch 22/50
100/100 [==============================] - 147s 1s/step - loss: 0.7058 - acc:
0.7626 - val_loss: nan - val_acc: 0.1145
Epoch 23/50
100/100 [==============================] - 180s 2s/step - loss: 0.6870 - acc:
0.7865 - val_loss: nan - val_acc: 0.1327
Epoch 24/50
100/100 [==============================] - 163s 2s/step - loss: 0.7014 - acc:
0.7706 - val_loss: nan - val_acc: 0.1287
Epoch 25/50
100/100 [==============================] - 158s 2s/step - loss: 0.6396 - acc:
0.7839 - val_loss: nan - val_acc: 0.1377
Epoch 26/50
100/100 [==============================] - 154s 2s/step - loss: 0.6695 - acc:
0.7816 - val_loss: nan - val_acc: 0.1226
Epoch 27/50
100/100 [==============================] - 160s 2s/step - loss: 0.6115 - acc:
0.7890 - val_loss: nan - val_acc: 0.1327
Epoch 28/50
100/100 [==============================] - 167s 2s/step - loss: 0.6232 - acc:
0.7917 - val_loss: nan - val_acc: 0.1104
Epoch 29/50
100/100 [==============================] - 163s 2s/step - loss: 0.5997 - acc:
0.8044 - val_loss: nan - val_acc: 0.1059
Epoch 30/50
100/100 [==============================] - 169s 2s/step - loss: 0.5819 - acc:
0.8112 - val_loss: nan - val_acc: 0.1190
Epoch 31/50
100/100 [==============================] - 179s 2s/step - loss: 0.5771 - acc:
0.8044 - val_loss: nan - val_acc: 0.1277
Epoch 32/50
100/100 [==============================] - 165s 2s/step - loss: 0.5547 - acc:
0.8097 - val_loss: nan - val_acc: 0.1221
Epoch 33/50
100/100 [==============================] - 150s 2s/step - loss: 0.5665 - acc:
0.8117 - val_loss: nan - val_acc: 0.1084
Epoch 34/50
100/100 [==============================] - 172s 2s/step - loss: 0.5417 - acc:
0.8229 - val_loss: nan - val_acc: 0.1033
Epoch 35/50
100/100 [==============================] - 151s 2s/step - loss: 0.5277 - acc:
0.8272 - val_loss: nan - val_acc: 0.1111
Epoch 36/50
100/100 [==============================] - 148s 1s/step - loss: 0.4916 - acc:
0.8326 - val_loss: nan - val_acc: 0.0988
Epoch 37/50
100/100 [==============================] - 146s 1s/step - loss: 0.4999 - acc:
0.8384 - val_loss: nan - val_acc: 0.1109
Epoch 38/50
```

```
100/100 [==============================] - 183s 2s/step - loss: 0.4854 - acc:
0.8394 - val_loss: nan - val_acc: 0.1018
Epoch 39/50
100/100 [==============================] - 149s 1s/step - loss: 0.5280 - acc:
0.8234 - val_loss: nan - val_acc: 0.1084
Epoch 40/50
100/100 [==============================] - 150s 2s/step - loss: 0.4549 - acc:
0.8522 - val_loss: nan - val_acc: 0.0968
Epoch 41/50
100/100 [==============================] - 150s 1s/step - loss: 0.4446 - acc:
0.8515 - val_loss: nan - val_acc: 0.1074
Epoch 42/50
100/100 [==============================] - 154s 2s/step - loss: 0.4260 - acc:
0.8544 - val_loss: nan - val_acc: 0.1028
Epoch 43/50
100/100 [==============================] - 176s 2s/step - loss: 0.4161 - acc:
0.8619 - val_loss: nan - val_acc: 0.1013
Epoch 44/50
100/100 [==============================] - 155s 2s/step - loss: 0.4162 - acc:
0.8591 - val_loss: nan - val_acc: 0.1003
Epoch 45/50
100/100 [==============================] - 159s 2s/step - loss: 0.4220 - acc:
0.8592 - val_loss: nan - val_acc: 0.0983
Epoch 46/50
100/100 [==============================] - 177s 2s/step - loss: 0.3835 - acc:
0.8681 - val_loss: nan - val_acc: 0.1003
Epoch 47/50
100/100 [==============================] - 213s 2s/step - loss: 0.4047 - acc:
0.8644 - val_loss: nan - val_acc: 0.0998
Epoch 48/50
100/100 [==============================] - 254s 3s/step - loss: 0.4003 - acc:
0.8673 - val_loss: nan - val_acc: 0.1079
Epoch 49/50
100/100 [==============================] - 180s 2s/step - loss: 0.3596 - acc:
0.8779 - val_loss: nan - val_acc: 0.0932
Epoch 50/50
100/100 [==============================] - 198s 2s/step - loss: 0.3810 - acc:
0.8756 - val_loss: nan - val_acc: 0.0942
```

Out[24]: <keras.callbacks.History at 0x1fe81559ac8>

In [25]:
```
model.save("agriculture.h5")
```

In [ ]:
```

```