In [2]:
```
#step 1

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
```

```
Using TensorFlow backend.
C:\Users\anikp\anaconda3\lib\site-packages\tensorflow\python\framework\dtypes.py:516: FutureWarning: Passing (type, 1) or '1ty
pe' as a synonym of type is deprecated; in a future version of numpy, it will be understood as (type, (1,)) / '(1,)type'.
  _np_qint8 = np.dtype([("qint8", np.int8, 1)])
C:\Users\anikp\anaconda3\lib\site-packages\tensorflow\python\framework\dtypes.py:517: FutureWarning: Passing (type, 1) or '1ty
pe' as a synonym of type is deprecated; in a future version of numpy, it will be understood as (type, (1,)) / '(1,)type'.
  _np_quint8 = np.dtype([("quint8", np.uint8, 1)])
C:\Users\anikp\anaconda3\lib\site-packages\tensorflow\python\framework\dtypes.py:518: FutureWarning: Passing (type, 1) or '1ty
pe' as a synonym of type is deprecated; in a future version of numpy, it will be understood as (type, (1,)) / '(1,)type'.
  _np_qint16 = np.dtype([("qint16", np.int16, 1)])
C:\Users\anikp\anaconda3\lib\site-packages\tensorflow\python\framework\dtypes.py:519: FutureWarning: Passing (type, 1) or '1ty
pe' as a synonym of type is deprecated; in a future version of numpy, it will be understood as (type, (1,)) / '(1,)type'.
  _np_quint16 = np.dtype([("quint16", np.uint16, 1)])
C:\Users\anikp\anaconda3\lib\site-packages\tensorflow\python\framework\dtypes.py:520: FutureWarning: Passing (type, 1) or '1ty
pe' as a synonym of type is deprecated; in a future version of numpy, it will be understood as (type, (1,)) / '(1,)type'.
  _np_qint32 = np.dtype([("qint32", np.int32, 1)])
C:\Users\anikp\anaconda3\lib\site-packages\tensorflow\python\framework\dtypes.py:525: FutureWarning: Passing (type, 1) or '1ty
pe' as a synonym of type is deprecated; in a future version of numpy, it will be understood as (type, (1,)) / '(1,)type'.
  np_resource = np.dtype([("resource", np.ubyte, 1)])
C:\Users\anikp\anaconda3\lib\site-packages\tensorboard\compat\tensorflow_stub\dtypes.py:541: FutureWarning: Passing (type, 1)
or '1type' as a synonym of type is deprecated; in a future version of numpy, it will be understood as (type, (1,)) / '(1,)typ
e'.
  _np_qint8 = np.dtype([("qint8", np.int8, 1)])
C:\Users\anikp\anaconda3\lib\site-packages\tensorboard\compat\tensorflow_stub\dtypes.py:542: FutureWarning: Passing (type, 1)
or '1type' as a synonym of type is deprecated; in a future version of numpy, it will be understood as (type, (1,)) / '(1,)typ
e'.
  _np_quint8 = np.dtype([("quint8", np.uint8, 1)])
C:\Users\anikp\anaconda3\lib\site-packages\tensorboard\compat\tensorflow_stub\dtypes.py:543: FutureWarning: Passing (type, 1)
or '1type' as a synonym of type is deprecated; in a future version of numpy, it will be understood as (type, (1,)) / '(1,)typ
e'.
  _np_qint16 = np.dtype([("qint16", np.int16, 1)])
C:\Users\anikp\anaconda3\lib\site-packages\tensorboard\compat\tensorflow_stub\dtypes.py:544: FutureWarning: Passing (type, 1)
or '1type' as a synonym of type is deprecated; in a future version of numpy, it will be understood as (type, (1,)) / '(1,)typ
e'.
  _np_quint16 = np.dtype([("quint16", np.uint16, 1)])
```

```
C:\Users\anikp\anaconda3\lib\site-packages\tensorboard\compat\tensorflow_stub\dtypes.py:545: FutureWarning: Passing (type, 1)
or '1type' as a synonym of type is deprecated; in a future version of numpy, it will be understood as (type, (1,)) / '(1,)typ
e'.
  _np_qint32 = np.dtype([("qint32", np.int32, 1)])
C:\Users\anikp\anaconda3\lib\site-packages\tensorboard\compat\tensorflow_stub\dtypes.py:550: FutureWarning: Passing (type, 1)
or '1type' as a synonym of type is deprecated; in a future version of numpy, it will be understood as (type, (1,)) / '(1,)typ
e'.
  np_resource = np.dtype([("resource", np.ubyte, 1)])
```

In [3]:
```
# step 2

from keras.preprocessing.image import ImageDataGenerator
# rescale is scalling the pixels to range of 0-1,shear_range like zoom in
train_datagen=ImageDataGenerator(rescale=1./255,shear_range=0.2,zoom_range=0.2,horizontal_flip=True)
test_datagen=ImageDataGenerator(rescale=1./255)
```

In [6]:
```
#step 3

x_train = train_datagen.flow_from_directory(r'D:\ML_Course\Works_on_python\CNN Algo\Crop-animal data\Crop-animal data\trainset'
x_test = test_datagen.flow_from_directory(r'D:\ML_Course\Works_on_python\CNN Algo\Crop-animal data\Crop-animal data\testset',ta
```

```
Found 1495 images belonging to 5 classes.
Found 640 images belonging to 5 classes.
```

In [7]:
```
print(x_train.class_indices)
```

```
{'bears': 0, 'crows': 1, 'elephants': 2, 'racoons': 3, 'rats': 4}
```

In [11]:
```
#step 4

model=Sequential()
```

In [12]:
```
#step 5
#Convolution2D(32,(3,3) is
model.add(Convolution2D(32,(3,3),input_shape=(64,64,3),activation="relu"))#input_size can be 128,128 or 256,256 and 3 channel rg
```

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

WARNING:tensorflow:From C:\Users\anikp\Anaconda3\lib\site-packages\keras\backend\tensorflow_backend.py:4138: The name tf.rando
m_uniform is deprecated. Please use tf.random.uniform instead.
```

In [13]:
```
model.add(MaxPooling2D(pool_size=(2,2)))
```

```
WARNING:tensorflow:From C:\Users\anikp\Anaconda3\lib\site-packages\keras\backend\tensorflow_backend.py:3976: The name tf.nn.ma
x_pool is deprecated. Please use tf.nn.max_pool2d instead.
```

In [14]:
```
model.add(Flatten())#input layer of ANN
```

In [15]:
```
model.add(Dense(units=128,init="random_uniform",activation="relu"))#hidden layer
```

```
C:\Users\anikp\Anaconda3\lib\site-packages\ipykernel_launcher.py:1: UserWarning: Update your `Dense` call to the Keras 2 API:
`Dense(units=128, activation="relu", kernel_initializer="random_uniform")`
  """Entry point for launching an IPython kernel.
```

In [16]:
```
model.add(Dense(units=5,init="random_uniform",activation="softmax"))#output layer unit 5 coz 5 classes or 5 op
```

```
C:\Users\anikp\Anaconda3\lib\site-packages\ipykernel_launcher.py:1: UserWarning: Update your `Dense` call to the Keras 2 API:
`Dense(units=5, activation="softmax", kernel_initializer="random_uniform")`
  """Entry point for launching an IPython kernel.
```

In [20]:
```
model.compile(loss="categorical_crossentropy",optimizer="adam",metrics=["accuracy"])
```

In [22]:
```
#steps_per_epoch=47 is 1495/batch size 1495 is Found in images belonging to trainset
#validation steps 640/batch size 640 is Found in images belonging to testset
model.fit_generator(x_train , steps_per_epoch =  47 , epochs = 10, validation_data = x_test, validation_steps = 20)
#after x_train with 47 epocs takes 20 smaples and testing measn train and tet simultaneouly
```

```
WARNING:tensorflow:From C:\Users\anikp\Anaconda3\lib\site-packages\tensorflow\python\ops\math_grad.py:1250: add_dispatch_suppo
rt.<locals>.wrapper (from tensorflow.python.ops.array_ops) is deprecated and will be removed in a future version.
Instructions for updating:
Use tf.where in 2.0, which has the same broadcast rule as np.where
WARNING:tensorflow:From C:\Users\anikp\Anaconda3\lib\site-packages\keras\backend\tensorflow_backend.py:986: The name tf.assign
_add is deprecated. Please use tf.compat.v1.assign_add instead.

Epoch 1/10
47/47 [==============================] - 11s 234ms/step - loss: 1.5059 - acc: 0.3631 - val_loss: 1.2916 - val_acc: 0.4375
Epoch 2/10
47/47 [==============================] - 8s 177ms/step - loss: 1.2209 - acc: 0.5293 - val_loss: 1.1168 - val_acc: 0.5203
Epoch 3/10
47/47 [==============================] - 8s 176ms/step - loss: 1.0544 - acc: 0.5941 - val_loss: 0.8318 - val_acc: 0.6813
Epoch 4/10
47/47 [==============================] - 8s 179ms/step - loss: 0.9131 - acc: 0.6615 - val_loss: 0.9162 - val_acc: 0.6516
Epoch 5/10
47/47 [==============================] - 8s 180ms/step - loss: 0.8359 - acc: 0.6927 - val_loss: 0.7506 - val_acc: 0.7125
Epoch 6/10
47/47 [==============================] - 8s 175ms/step - loss: 0.7353 - acc: 0.7407 - val_loss: 0.5853 - val_acc: 0.7703
Epoch 7/10
47/47 [==============================] - 8s 179ms/step - loss: 0.6930 - acc: 0.7442 - val_loss: 0.6128 - val_acc: 0.7562
Epoch 8/10
47/47 [==============================] - 8s 181ms/step - loss: 0.6386 - acc: 0.7627 - val_loss: 0.4968 - val_acc: 0.8281
Epoch 9/10
47/47 [==============================] - 8s 178ms/step - loss: 0.5649 - acc: 0.7963 - val_loss: 0.4639 - val_acc: 0.8203
Epoch 10/10
47/47 [==============================] - 8s 178ms/step - loss: 0.4973 - acc: 0.8237 - val_loss: 0.5939 - val_acc: 0.7734
```

Out[22]:
```
<keras.callbacks.History at 0x18e703d0390>
```

In [23]:
```
model.save("animal.h5")
```

In [ ]:
```
```