SmartBridge Externship

Artificial Intelligence

Assignment-3

Build a CNN model for Bird species.

Bird species classification is the process of using machine learning and computer vision techniques to identify and categorize different species of birds based on their visual characteristics. By analyzing images of birds, models can extract features and patterns to accurately classify bird species. This classification is vital for ecological research, wildlife monitoring, and conservation efforts. Advancements in deep learning and the availability of large, annotated datasets have improved the accuracy of bird species classification models. Challenges include variations in lighting, pose, and background clutter. Ongoing research focuses on methods like transfer learning and data augmentation to enhance classification performance and contribute to avian biodiversity understanding and conservation.

Dataset Link: https://www.kaggle.com/datasets/prathamtripathi/drug-classification

Anuvrat Nehra

In [ ]:
```
#Data Augmentation
from tensorflow.keras.preprocessing.image import ImageDataGenerator
```

In [2]:
```
train_gen = ImageDataGenerator(rescale=(1./255),
                               horizontal_flip=True,
                               shear_range=0.2)
test_gen = ImageDataGenerator(rescale=(1./255))
```

In [14]:
```
train = train_gen.flow_from_directory('birdData/train_data/train_data/',
                                      target_size=(120,120),
                                      class_mode='categorical',
                                      batch_size=8)
test=test_gen.flow_from_directory('birdData/test_data/test_data/',
                                  target_size=(120,120),
                                  class_mode='categorical',
                                  batch_size=8)
```

```
Found 150 images belonging to 16 classes.
Found 157 images belonging to 16 classes.
```

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

```
{'blasti': 0,
 'bonegl': 1,
 'brhkyt': 2,
 'cbrtsh': 3,
 'cmnmyn': 4,
 'gretit': 5,
 'hilpig': 6,
 'himbul': 7,
 'himgri': 8,
 'hsparo': 9,
 'indvul': 10,
 'jglowl': 11,
 'lbicrw': 12,
 'mgprob': 13,
 'rebimg': 14,
 'wcrsrt': 15}
```

In [11]:
```
#CNN
from tensorflow.keras.layers import Convolution2D,MaxPooling2D,Flatten,Dense
from tensorflow.keras.models import Sequential
```

In [12]:
```
model =Sequential()
model.add(Convolution2D(20,(3,3),activation="relu",input_shape=(120,120,3)))
model.add(MaxPooling2D(pool_size=(2,2)))
model.add(Flatten())
model.add(Dense(45,activation="relu"))
model.add(Dense(16,activation='softmax'))
```

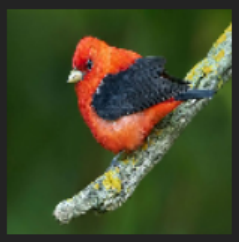
In [21]:
```
model.compile(optimizer='adam',loss='categorical_crossentropy',metrics=['accuracy'])
model.fit(train,batch_size=8,validation_data=test,epochs=10)
```

```
Epoch 1/10
19/19 [==============================] - 22s 1s/step - loss: 0.1801 - accuracy: 0.9733 - val_loss: 4.0152
- val_accuracy: 0.2675
Epoch 2/10
19/19 [==============================] - 21s 1s/step - loss: 0.0683 - accuracy: 1.0000 - val_loss: 4.2414
- val_accuracy: 0.2038
Epoch 3/10
19/19 [==============================] - 21s 1s/step - loss: 0.0370 - accuracy: 1.0000 - val_loss: 4.6163
- val_accuracy: 0.2484
Epoch 4/10
19/19 [==============================] - 21s 1s/step - loss: 0.0185 - accuracy: 1.0000 - val_loss: 4.7316
- val_accuracy: 0.2739
Epoch 5/10
19/19 [==============================] - 21s 1s/step - loss: 0.0164 - accuracy: 1.0000 - val_loss: 4.7581
- val_accuracy: 0.2675
Epoch 6/10
19/19 [==============================] - 21s 1s/step - loss: 0.0343 - accuracy: 0.9933 - val_loss: 5.0999
- val_accuracy: 0.2102
Epoch 7/10
19/19 [==============================] - 21s 1s/step - loss: 0.0486 - accuracy: 1.0000 - val_loss: 4.1103
- val_accuracy: 0.2548
Epoch 8/10
19/19 [==============================] - 21s 1s/step - loss: 0.0180 - accuracy: 1.0000 - val_loss: 4.5964
- val_accuracy: 0.2166
Epoch 9/10
19/19 [==============================] - 21s 1s/step - loss: 0.0122 - accuracy: 1.0000 - val_loss: 4.7346
- val_accuracy: 0.2548
Epoch 10/10
19/19 [==============================] - 21s 1s/step - loss: 0.0077 - accuracy: 1.0000 - val_loss: 4.7548
- val_accuracy: 0.2930


<keras.callbacks.History at 0x1f842933650>
```

In [38]:
```
# Testing
import numpy as np
from tensorflow.keras.preprocessing import image
```

In [39]:
```
img=image.load_img('sample_bird.jpg',target_size=(120,120))
img
```



In [40]:
```
img= image.img_to_array(img)
img=np.expand_dims(img,axis=0)
i=np.argmax(model.predict(img))
data=[*train.class_indices]
data[i]
```

```
1/1 [==============================] - 0s 12ms/step


'rebimg'
```