Extracting Dataset using Kaggle API

In [ ]:
```
# installing the Kaggle library
!pip install kaggle
```

```
Looking in indexes: https://pypi.org/simple, (https://pypi.org/simple,) https://us-python.pkg.dev/colab-whee
ls/public/simple/ (https://us-python.pkg.dev/colab-wheels/public/simple/)
Requirement already satisfied: kaggle in /usr/local/lib/python3.7/dist-packages (1.5.12)
Requirement already satisfied: tqdm in /usr/local/lib/python3.7/dist-packages (from kaggle) (4.64.0)
Requirement already satisfied: certifi in /usr/local/lib/python3.7/dist-packages (from kaggle) (2022.6.15)
Requirement already satisfied: requests in /usr/local/lib/python3.7/dist-packages (from kaggle) (2.23.0)
Requirement already satisfied: python-slugify in /usr/local/lib/python3.7/dist-packages (from kaggle) (6.1.
2)
Requirement already satisfied: urllib3 in /usr/local/lib/python3.7/dist-packages (from kaggle) (1.24.3)
Requirement already satisfied: python-dateutil in /usr/local/lib/python3.7/dist-packages (from kaggle) (2.8.
2)
Requirement already satisfied: six>=1.10 in /usr/local/lib/python3.7/dist-packages (from kaggle) (1.15.0)
Requirement already satisfied: text-unidecode>=1.3 in /usr/local/lib/python3.7/dist-packages (from python-sl
ugify->kaggle) (1.3)
Requirement already satisfied: chardet<4,>=3.0.2 in /usr/local/lib/python3.7/dist-packages (from requests->k
aggle) (3.0.4)
Requirement already satisfied: idna<3,>=2.5 in /usr/local/lib/python3.7/dist-packages (from requests->kaggl
e) (2.10)
```

In [ ]:
```
# configuring the path of Kaggle.json file
!mkdir -p ~/.kaggle
!cp kaggle.json ~/.kaggle/
!chmod 600 ~/.kaggle/kaggle.json
```

Importing the Dog vs Cat Dataset from Kaggle

In [ ]:
```
# Kaggle api
!kaggle competitions download -c dogs-vs-cats
```

```
Downloading dogs-vs-cats.zip to /content
 98% 793M/812M [00:22<00:00, 21.5MB/s]
100% 812M/812M [00:22<00:00, 38.2MB/s]
```

In [ ]:

```
!ls
```

```
dogs-vs-cats.zip  kaggle.json  sample_data
```

In [ ]:

```
# extracting the compressed dataset
from zipfile import ZipFile

dataset = '/content/dogs-vs-cats.zip'

with ZipFile(dataset, 'r') as zip:
  zip.extractall()
  print('The dataset is extracted')
```

```
The dataset is extracted
```

In [ ]:

```
# extracting the compressed dataset
from zipfile import ZipFile

dataset = '/content/train.zip'

with ZipFile(dataset, 'r') as zip:
  zip.extractall()
  print('The dataset is extracted')
```

```
The dataset is extracted
```

In [ ]:

```
import os
# counting the number of files in train folder
path, dirs, files = next(os.walk('/content/train'))
file_count = len(files)
print('Number of images: ', file_count)
```

```
Number of images:  25000
```

Printing the name of images

In [ ]:
```
file_names = os.listdir('/content/train/')
print(file_names)
```

```
['dog.12067.jpg', 'cat.11189.jpg', 'cat.7561.jpg', 'cat.7760.jpg', 'cat.7076.jpg', 'dog.8298.jpg', 'cat.4
352.jpg', 'cat.1873.jpg', 'cat.7969.jpg', 'dog.3687.jpg', 'cat.11144.jpg', 'cat.10530.jpg', 'cat.12043.jp
g', 'cat.11861.jpg', 'cat.676.jpg', 'cat.11571.jpg', 'cat.119.jpg', 'cat.2476.jpg', 'cat.11623.jpg', 'do
g.5745.jpg', 'cat.2185.jpg', 'dog.7937.jpg', 'dog.3629.jpg', 'dog.10635.jpg', 'cat.1837.jpg', 'cat.10941.
jpg', 'cat.291.jpg', 'cat.10625.jpg', 'dog.1993.jpg', 'dog.3845.jpg', 'dog.6381.jpg', 'cat.10032.jpg', 'c
at.643.jpg', 'dog.113.jpg', 'dog.36.jpg', 'dog.1370.jpg', 'cat.9164.jpg', 'dog.10551.jpg', 'cat.10084.jp
g', 'cat.7362.jpg', 'cat.7951.jpg', 'dog.12422.jpg', 'dog.8683.jpg', 'dog.6405.jpg', 'dog.4118.jpg', 'do
g.4177.jpg', 'dog.4702.jpg', 'cat.1640.jpg', 'dog.6242.jpg', 'cat.7756.jpg', 'dog.1265.jpg', 'dog.2119.jp
g', 'dog.2463.jpg', 'cat.3683.jpg', 'dog.6443.jpg', 'dog.4911.jpg', 'dog.6058.jpg', 'cat.12302.jpg', 'do
g.901.jpg', 'dog.11339.jpg', 'dog.9874.jpg', 'cat.3478.jpg', 'cat.12207.jpg', 'dog.7674.jpg', 'cat.1954.j
pg', 'dog.11309.jpg', 'dog.3776.jpg', 'cat.11256.jpg', 'cat.1037.jpg', 'dog.1653.jpg', 'dog.6532.jpg', 'd
og.5091.jpg', 'cat.4403.jpg', 'cat.2298.jpg', 'dog.10825.jpg', 'cat.1482.jpg', 'cat.9295.jpg', 'cat.2219.
jpg', 'cat.9104.jpg', 'cat.9078.jpg', 'cat.7957.jpg', 'cat.10100.jpg', 'cat.4095.jpg', 'cat.3435.jpg', 'd
og.5041.jpg', 'cat.11419.jpg', 'dog.11325.jpg', 'dog.8286.jpg', 'cat.10967.jpg', 'cat.12390.jpg', 'cat.11
335.jpg', 'cat.9313.jpg', 'dog.8854.jpg', 'dog.7147.jpg', 'cat.10590.jpg', 'dog.2811.jpg', 'cat.10730.jp
g', 'cat.3996.jpg', 'dog.4273.jpg', 'dog.182.jpg', 'cat.10913.jpg', 'dog.11071.jpg', 'cat.270.jpg', 'dog.
6158.jpg', 'dog.4147.jpg', 'dog.3811.jpg', 'cat.6677.jpg', 'cat.3073.jpg', 'cat.10658.jpg', 'dog.8980.jp
g', 'cat.7392.jpg', 'dog.1430.jpg', 'dog.5775.jpg', 'dog.3646.jpg', 'cat.8439.jpg', 'cat.7625.jpg', 'cat.
3510.jpg', 'dog.1186.jpg', 'cat.5336.jpg', 'cat.7044.jpg', 'dog.3434.jpg', 'dog.10898.jpg', 'cat.4256.jp
```

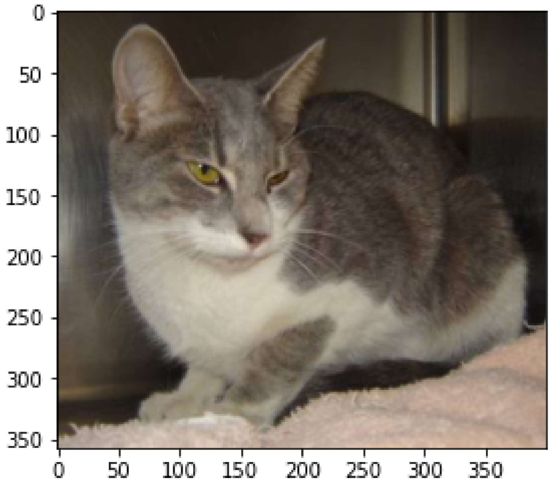
Importing the Dependencies

In [ ]:
```
import numpy as np
from PIL import Image
import matplotlib.pyplot as plt
import matplotlib.image as mpimg
from sklearn.model_selection import train_test_split
from google.colab.patches import cv2_imshow
```

Displaying the images of dogs and cats

In [ ]:
```
# display dog image
img = mpimg.imread('/content/train/dog.8298.jpg')
imgplt = plt.imshow(img)
plt.show()
```

In [ ]:
```
# display cat image
img = mpimg.imread('/content/train/cat.4352.jpg')
imgplt = plt.imshow(img)
plt.show()
```



In [ ]:

```
file_names = os.listdir('/content/train/')

for i in range(5):

  name = file_names[i]
  print(name[0:3])
```

```
dog
cat
cat
cat
cat
```

In [ ]:

```
file_names = os.listdir('/content/train/')

dog_count = 0
cat_count = 0

for img_file in file_names:

  name = img_file[0:3]

  if name == 'dog':
    dog_count += 1

  else:
    cat_count += 1

print('Number of dog images =', dog_count)
print('Number of cat images =', cat_count)
```

```
Number of dog images = 12500
Number of cat images = 12500
```

Resizing all the images

In [ ]:

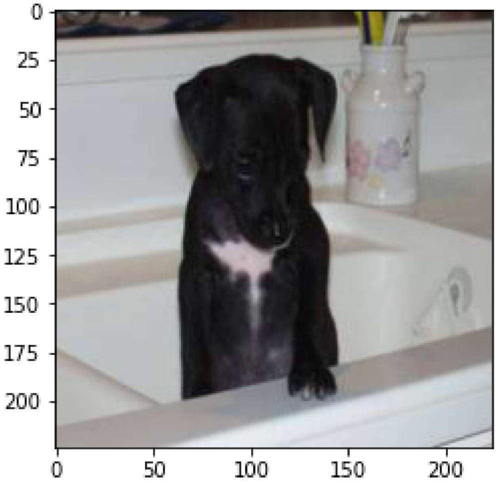
```
#creating a directory for resized images
os.mkdir('/content/image resized')
```

In [ ]:

```
original_folder = '/content/train/'
resized_folder = '/content/image resized/'

for i in range(2000):

  filename = os.listdir(original_folder)[i]
  img_path = original_folder+filename

  img = Image.open(img_path)
  img = img.resize((224, 224))
  img = img.convert('RGB')

  newImgPath = resized_folder+filename
  img.save(newImgPath)
```

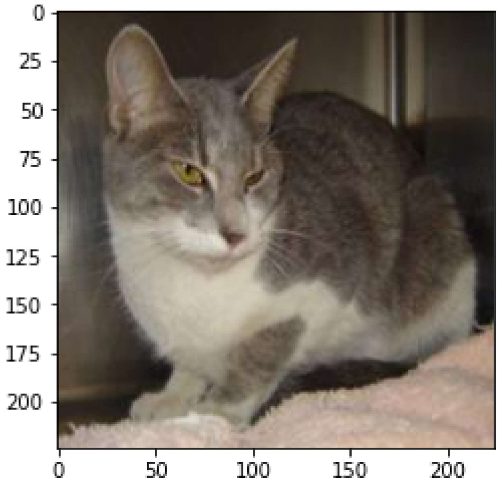
In [ ]:

```
# display resized dog image
img = mpimg.imread('/content/image resized/dog.8298.jpg')
imgplt = plt.imshow(img)
plt.show()
```



In [ ]:

```
# display resized cat image
img = mpimg.imread('/content/image resized/cat.4352.jpg')
imgplt = plt.imshow(img)
plt.show()
```



Creating labels for resized images of dogs and cats

Cat --> 0

Dog --> 1

In [ ]:

```
# creaing a for loop to assign labels
filenames = os.listdir('/content/image resized/')


labels = []

for i in range(2000):

  file_name = filenames[i]
  label = file_name[0:3]

  if label == 'dog':
    labels.append(1)

  else:
    labels.append(0)
```

In [ ]:

```
print(filenames[0:5])
print(len(filenames))
```

```
['dog.12067.jpg', 'cat.11189.jpg', 'cat.7561.jpg', 'cat.7760.jpg', 'cat.7076.jpg']
2000
```

In [ ]:

```
print(labels[0:5])
print(len(labels))
```

```
[1, 0, 0, 0, 0]
2000
```

In [ ]:

```
# counting the images of dogs and cats out of 2000 images
values, counts = np.unique(labels, return_counts=True)
print(values)
print(counts)
```

```
[0 1]
[ 992 1008]
```

Converting all the resized images to numpy arrays

In [ ]:

```
import cv2
import glob
```

In [ ]:

```
image_directory = '/content/image resized/'
image_extension = ['png', 'jpg']

files = []

[files.extend(glob.glob(image_directory + '*.' + e)) for e in image_extension]

dog_cat_images = np.asarray([cv2.imread(file) for file in files])
```

In [ ]:

```
print(dog_cat_images)
```

```
[[[[ 79  93 142]
   [ 67  79 127]
   [ 77  87 135]
   ...
   [121 113 113]
   [130 117 119]
   [129 116 118]]

  [[ 43  54 106]
   [ 45  56 106]
   [ 72  79 128]
   ...
   [121 113 113]
   [131 119 119]
   [131 119 119]]

  [[ 64  71 126]
   [ 77  85 138]
   [103 110 160]
```

In [ ]:

```
type(dog_cat_images)
```

Out[31]:

```
numpy.ndarray
```

In [ ]:

```
print(dog_cat_images.shape)
```

```
(2000, 224, 224, 3)
```

In [ ]:

```
X = dog_cat_images
Y = np.asarray(labels)
```

Train Test Split

In [ ]:

```
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size=0.2, random_state=2)
```

In [ ]:

```
print(X.shape, X_train.shape, X_test.shape)
```

```
(2000, 224, 224, 3) (1600, 224, 224, 3) (400, 224, 224, 3)
```

1600 --> training images

400 --> test images

In [ ]:

```
# scaling the data
X_train_scaled = X_train/255

X_test_scaled = X_test/255
```

In [ ]:

```
print(X_train_scaled)
```

```
[[[[0.75686275 0.9254902  0.88235294]
   [0.79215686 0.96078431 0.91764706]
   [0.77254902 0.95294118 0.90588235]
   ...
   [0.53333333 0.92156863 0.84313725]
   [0.50588235 0.90196078 0.81960784]
   [0.5372549  0.94117647 0.85882353]]

  [[0.75294118 0.94117647 0.89411765]
   [0.76862745 0.95686275 0.90980392]
   [0.76078431 0.94901961 0.90196078]
   ...
   [0.57647059 0.96470588 0.88627451]
   [0.49019608 0.88627451 0.80392157]
   [0.4627451  0.86666667 0.78431373]]

  [[0.6745098  0.88627451 0.83529412]
   [0.65882353 0.87843137 0.82745098]
   [0.6627451  0.88235294 0.83137255]
```

Building the Neural Network

In [ ]:

```
import tensorflow as tf
import tensorflow_hub as hub
```

In [ ]:

```
mobilenet_model = 'https://tfhub.dev/google/tf2-preview/mobilenet_v2/feature_vector/4'

pretrained_model = hub.KerasLayer(mobilenet_model, input_shape=(224,224,3), trainable=False)
```

In [ ]:

```
num_of_classes = 2

model = tf.keras.Sequential([

    pretrained_model,
    tf.keras.layers.Dense(num_of_classes)

])

model.summary()
```

```
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #   
=================================================================
 keras_layer (KerasLayer)    (None, 1280)              2257984   
                                                                 
 dense (Dense)               (None, 2)                 2562      
                                                                 
=================================================================
Total params: 2,260,546
Trainable params: 2,562
Non-trainable params: 2,257,984
_________________________________________________________________
```

In [ ]:

```
model.compile(
    optimizer = 'adam',
    loss = tf.keras.losses.SparseCategoricalCrossentropy(from_logits=True),
    metrics = ['acc']
)
```

In [ ]:

```
model.fit(X_train_scaled, Y_train, epochs=5)
```

```
Epoch 1/5
50/50 [==============================] - 47s 861ms/step - loss: 0.2163 - acc: 0.9162
Epoch 2/5
50/50 [==============================] - 42s 838ms/step - loss: 0.0746 - acc: 0.9756
Epoch 3/5
50/50 [==============================] - 44s 872ms/step - loss: 0.0552 - acc: 0.9825
Epoch 4/5
50/50 [==============================] - 41s 824ms/step - loss: 0.0417 - acc: 0.9894
Epoch 5/5
50/50 [==============================] - 41s 825ms/step - loss: 0.0345 - acc: 0.9937
```

Out[42]:

```
<keras.callbacks.History at 0x7faedc598090>
```

In [ ]:

```
score, acc = model.evaluate(X_test_scaled, Y_test)
print('Test Loss =', score)
print('Test Accuracy =', acc)
```

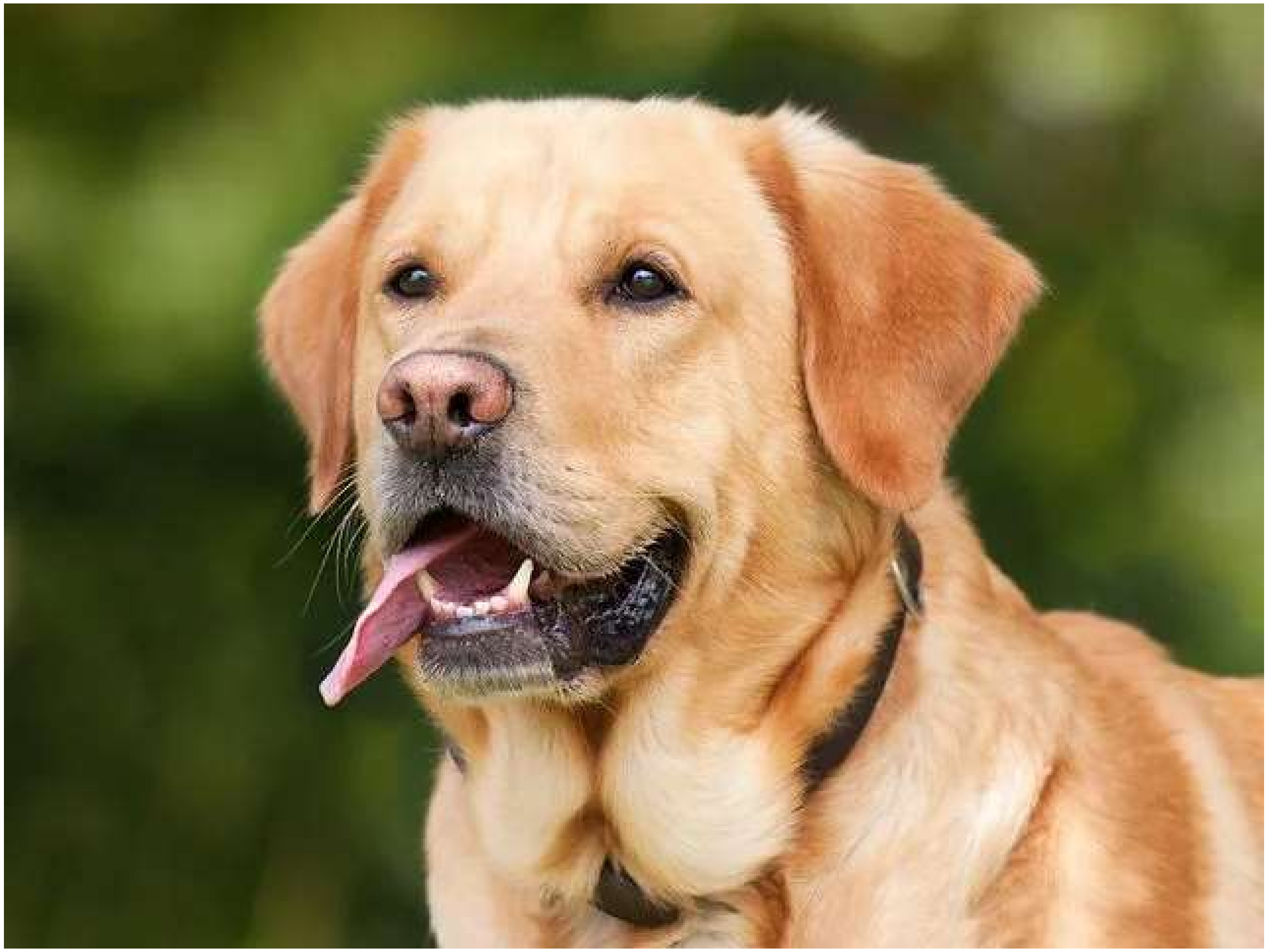
```
13/13 [==============================] - 12s 866ms/step - loss: 0.0812 - acc: 0.9775
Test Loss = 0.0812455490231514
Test Accuracy = 0.9775000214576721
```

Predictive System

In [ ]:

```
input_image_path = input('Path of the image to be predicted: ')

input_image = cv2.imread(input_image_path)

cv2_imshow(input_image)

input_image_resize = cv2.resize(input_image, (224,224))

input_image_scaled = input_image_resize/255

image_reshaped = np.reshape(input_image_scaled, [1,224,224,3])

input_prediction = model.predict(image_reshaped)

print(input_prediction)

input_pred_label = np.argmax(input_prediction)

print(input_pred_label)

if input_pred_label == 0:
  print('The image represents a Cat')

else:
  print('The image represents a Dog')
```

```
Path of the image to be predicted: /content/dog.jpg
```



```
[[-4.6012597  3.784018 ]]
1
The image represents a Dog
```

In [ ]:

```
input_image_path = input('Path of the image to be predicted: ')

input_image = cv2.imread(input_image_path)

cv2_imshow(input_image)

input_image_resize = cv2.resize(input_image, (224,224))

input_image_scaled = input_image_resize/255

image_reshaped = np.reshape(input_image_scaled, [1,224,224,3])

input_prediction = model.predict(image_reshaped)

print(input_prediction)

input_pred_label = np.argmax(input_prediction)

print(input_pred_label)

if input_pred_label == 0:
  print('The image represents a Cat')

else:
  print('The image represents a Dog')
```

```
Path of the image to be predicted: /content/cat.jpg
```

```
[[ 4.302739 -4.893738]]
0
The image represents a Cat
```

In [ ]:

```
```