BHARAT INTERNSHIP

** DOG VS CAT Classifier**

Problem statement :

To predict whether the uploaded image is represents a dog or cat using classification techniques

Link to the dataset : https://www.kaggle.com/competitions/dogs-vs-cats/data

Installing kaggle in ColabResearch

```
pip install kaggle
```

```
Requirement already satisfied: kaggle in /usr/local/lib/python3.10/dist-packages (1.5.16)
Requirement already satisfied: six>=1.10 in /usr/local/lib/python3.10/dist-packages (from kaggle) (1.16.0)
Requirement already satisfied: certifi in /usr/local/lib/python3.10/dist-packages (from kaggle) (2023.7.22)
Requirement already satisfied: python-dateutil in /usr/local/lib/python3.10/dist-packages (from kaggle) (2.8.2)
Requirement already satisfied: requests in /usr/local/lib/python3.10/dist-packages (from kaggle) (2.31.0)
Requirement already satisfied: tqdm in /usr/local/lib/python3.10/dist-packages (from kaggle) (4.66.1)
Requirement already satisfied: python-slugify in /usr/local/lib/python3.10/dist-packages (from kaggle) (8.0.1)
Requirement already satisfied: urllib3 in /usr/local/lib/python3.10/dist-packages (from kaggle) (2.0.7)
Requirement already satisfied: bleach in /usr/local/lib/python3.10/dist-packages (from kaggle) (6.1.0)
Requirement already satisfied: webencodings in /usr/local/lib/python3.10/dist-packages (from bleach->kaggle) (0.5.1)
Requirement already satisfied: text-unidecode>=1.3 in /usr/local/lib/python3.10/dist-packages (from python-slugify->kaggle) (1.3)
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.10/dist-packages (from requests->kaggle) (3.3.2)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-packages (from requests->kaggle) (3.4)
```

```
#Configuring the path of Kaggle.json filehttps://www.interviewbit.com/
!mkdir -p ~/.kaggle
!cp kaggle.json ~/.kaggle/
!chmod 600 ~/.kaggle/kaggle.json
```

Importing the Dog vs Cat dataset from kaggle

```
#Kaggle api
!kaggle competitions download -c dogs-vs-cats
```

```
Downloading dogs-vs-cats.zip to /content
 97% 790M/812M [00:08<00:00, 231MB/s]
100% 812M/812M [00:08<00:00, 103MB/s]
```

```
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
```

```
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
```

```
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

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

```
['cat.8868.jpg', 'dog.11655.jpg', 'dog.7181.jpg', 'dog.3609.jpg', 'cat.8018.jpg', 'cat.8015.jpg', 'dog.2969.jpg', 'cat.11524.jpg', 'dog.
```

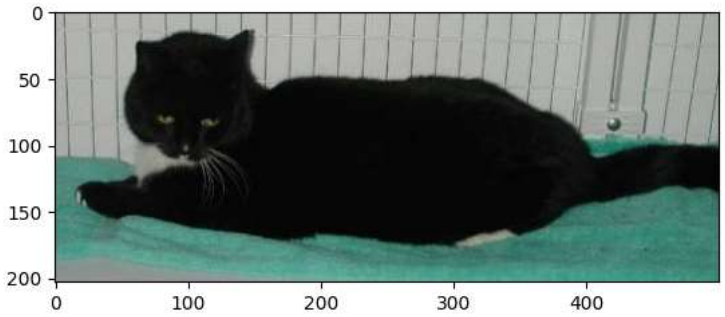
Importing the Dependencies

```
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

```
#display dog image
img = mpimg.imread('/content/train/dog.3609.jpg')
imgplt = plt.imshow(img)
plt.show()
```


```
#display cat image
img = mpimg.imread('/content/train/cat.8868.jpg')
imgplt = plt.imshow(img)
plt.show()
```




```
file_names = os.listdir('/content/train/')
for i in range(5):
  name = file_names[i]
  print(name[0:3])
```

```
cat
dog
dog
dog
cat
```

```
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)
```

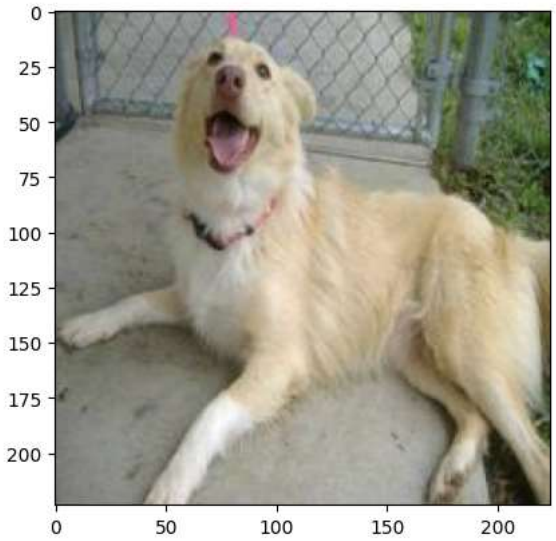
```
Number of dog images =  12500
Number of cat images =  12500
```

Resizing the images

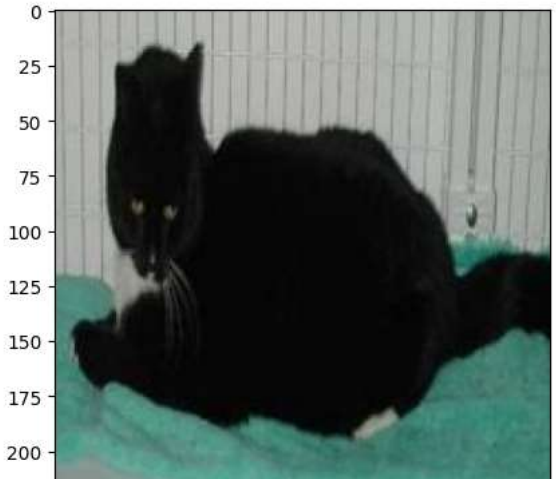
```
#creating a directory for resized images
os.mkdir('/content/image resized')
```

```
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)
```

```
#display resized dog image
img = mpimg.imread('/content/image resized/dog.3609.jpg')
imgplt = plt.imshow(img)
plt.show()
```




```
#display resized cat image
img = mpimg.imread('/content/image resized/cat.8868.jpg')
imgplt = plt.imshow(img)
plt.show()
```



Creating labels for resized images of dogs and cats

Cat -> 0

Dog -> 1

```
#creating 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)


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

```
['cat.8868.jpg', 'dog.11655.jpg', 'dog.7181.jpg', 'dog.3609.jpg', 'cat.8018.jpg']
2000
```

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

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

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

```
[0 1]
[ 995 1005]
```

Converting all the resized images to numpy arrays

```
import cv2
import glob


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])


print(dog_cat_images)
```

```
      [[[[181 183 183]
         [176 178 178]
         [165 167 167]
         ...
         [169 173 168]
         [161 165 160]
         [165 169 164]]

        [[181 183 183]
         [176 178 178]
         [166 168 168]
         ...
         [169 173 168]
         [161 165 160]
         [166 170 165]]

        [[180 182 182]
         [177 179 179]
         [166 168 168]
         ...
         [169 173 168]
         [161 165 160]
         [166 170 165]]

        ...

        [[145 146 142]
         [145 146 142]
         [145 146 142]
         ...
         [124 143  56]
         [122 141  56]
         [123 142  55]]

        [[146 147 145]
         [146 147 145]
         [146 147 145]
         ...
         [123 143  54]
         [122 141  54]
         [125 145  56]]

        [[146 147 145]
         [146 147 145]
         [146 147 145]
         ...
         [122 142  53]
         [123 143  54]
         [126 146  57]]]


       [[[191 195 213]
         [198 202 220]
         [197 204 221]
         ...
         [158 173 189]
         [195 210 226]
         [168 183 199]]
```

```
type(dog_cat_images)
```

```
numpy.ndarray
```

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

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

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

Train test split

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

```
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

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

X_test_scaled = X_test/255
```

```
print(X_train_scaled)
```

```
[[[[0.00392157 0.01568627 0.03529412]
   [0.         0.01176471 0.03137255]
   [0.         0.01176471 0.03137255]
   ...
   [0.03921569 0.02745098 0.03529412]
   [0.         0.         0.01176471]
   [0.01176471 0.00784314 0.02352941]]

  [[0.00784314 0.01960784 0.03921569]
   [0.00784314 0.01960784 0.03921569]
   [0.00392157 0.01568627 0.03529412]
   ...
   [0.04313725 0.03137255 0.03921569]
   [0.         0.         0.01176471]
   [0.01568627 0.01176471 0.02745098]]

  [[0.01568627 0.02745098 0.04705882]
   [0.01568627 0.02745098 0.04705882]
   [0.01960784 0.03137255 0.05098039]
   ...
   [0.03921569 0.02745098 0.03529412]
   [0.00392157 0.         0.01568627]
   [0.01568627 0.01176471 0.02745098]]

  ...

  [[0.25098039 0.20392157 0.13333333]
   [0.26666667 0.21960784 0.14901961]
   [0.28627451 0.23921569 0.16862745]
   ...
   [0.47058824 0.4745098  0.57647059]
   [0.4745098  0.47058824 0.57254902]
   [0.47058824 0.47058824 0.56470588]]

  [[0.34117647 0.29411765 0.22352941]
   [0.25882353 0.21176471 0.14117647]
   [0.23921569 0.19215686 0.12156863]
   ...
   [0.4627451  0.46666667 0.56862745]
   [0.4745098  0.47058824 0.57254902]
   [0.48235294 0.48235294 0.57647059]]

  [[0.34117647 0.29411765 0.22352941]
   [0.22352941 0.17647059 0.10588235]
   [0.22352941 0.17647059 0.10588235]
   ...
   [0.46666667 0.47058824 0.57254902]
   [0.48627451 0.48235294 0.58431373]
   [0.50196078 0.50196078 0.59607843]]]


 [[[0.59607843 0.59607843 0.59607843]
   [0.61568627 0.61568627 0.61568627]
   [0.62745098 0.62745098 0.62745098]
   ...
   [0.31764706 0.28235294 0.24705882]
   [0.31764706 0.28235294 0.24705882]
   [0.31764706 0.28235294 0.24705882]]
```

Building the Neural network

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

```
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)


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: 2260546 (8.62 MB)
Trainable params: 2562 (10.01 KB)
Non-trainable params: 2257984 (8.61 MB)
_________________________________________________________________
```

```
model.compile(

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


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

```
Epoch 1/5
50/50 [==============================] - 52s 967ms/step - loss: 0.1910 - acc: 0.9262
Epoch 2/5
50/50 [==============================] - 70s 1s/step - loss: 0.0703 - acc: 0.9781
Epoch 3/5
50/50 [==============================] - 72s 1s/step - loss: 0.0517 - acc: 0.9881
Epoch 4/5
50/50 [==============================] - 59s 1s/step - loss: 0.0408 - acc: 0.9900
Epoch 5/5
50/50 [==============================] - 71s 1s/step - loss: 0.0334 - acc: 0.9919
<keras.src.callbacks.History at 0x797a0e775420>
```

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

```
13/13 [==============================] - 13s 968ms/step - loss: 0.0505 - acc: 0.9850
Test Loss = 0.05049484595656395
Test Accuracy = 0.9850000143051147
```

Predictive System

```
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
```

```
1/1 [==============================] - 0s 82ms/step
```

```
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
```

```
1/1 [==============================] - 0s 52ms/step
[[ 3.2469852 -2.6003876]]
0
The image represents a Cat
```