Capstone Project **Vedangi Deshpande**

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Dog Breed Classifier using CNN

Domain Background

In this Dog breed classifier in ML statement is to spot the breed of dog, if dog image is given as input, if equipped a picture of an individual's, we've to spot the resembling dog breed. the concept is to make a pipeline of system which will method universe user equipped pictures associate degreed determine an estimate of the canine's breed. this is often a multi-class classification drawback wherever we are able to use supervised machine learning to unravel this drawback.

Problem Statement

The goal of the project is to create a machine learning model which will be used among internet app to method real-world, user-supplied pictures. The formula has got to perform 2 tasks:

- Dog face detector: Given a picture of a dog, the formula can establish AN estimate of the canine's breed.
- Human face detector: If provided a picture of an individual's, the code can establish the resembling dog breed.

Datasets and Inputs:

For this project, the input format must be of image type, because we want to input an image and identify the breed of the dog. The dataset for this project is provided by Udacity. The dataset has pictures of dogs and humans.

Dog images dataset: The dog image dataset has 8351 total images which are sorted into train (6,680 Images), test (836 Images) and valid (835 Images) directories. Each of this directory (train, test, valid) have 133 folders corresponding to dog breeds. The images are of different sizes and different backgrounds, some images are not full-sized. The data is not balanced because the number of images provided for each breed varies. Few have 4 images while some have 8 images.
Human images dataset: The human dataset contains 13233 total human images which are sorted by names of human (5750 folders). All images are of size 250x250. Images have different background and different angles. The data is not balanced because we have 1 image for some people and many images for some.

Solution Statement

For performing arts this multiclass classification, we are able to use Convolutional Neural Network to unravel the matter. A Convolutional Neural Network (CNN) could be a Deep Learning formula which may soak up AN input image, assign importance (learnable weights and biases) to numerous aspects/objects within the image and be able to differentiate one from the opposite. the answer involves 3 steps. First, to observe human pictures, we are able to use existing formula like OpenCV's implementation of Haar feature primarily based cascade classifiers. Second, to observe dog-images we are going to use a pretrained VGG16 model. Finally, when the image is known as dog/human, we are able to pass this image to AN CNN model which is

able to method the image and predict the breed that matches the most effective out of 133 breeds.

Benchmark Model

- The CNN model created from scratch should have accuracy of a minimum of 10 percent. This would make sure that the model is functioning as a result of a random guess will give an accurate answer roughly one in 133 times, that corresponds to Associate in accuracy of but 1%.

Evaluation Metrics

Metrics the information is split into train, check and valid dataset. The model is trained with the train dataset. we have a tendency to use the testing information to predict the performance of the model on unseen information. we are going to use accuracy as a metric to judge our model on check information. Accuracy=Number things|of things} properly classified/ All classified items additionally, throughout model coaching, we have a tendency to compare the check information prediction with validation dataset and calculate Multi category log loss to seek out the most effective playacting model. Log loss takes into the account of uncertainty of prediction supported what proportion it varies from actual label and this may facilitate in evaluating the model.

Project Design

Step 1: Import the necessary dataset and libraries, Pre-process the data and create train, test and validation dataset. Perform Image augmentation on training data.

Step 2: Detect human faces using OpenCV's implementation of Haar feature based cascade classifiers.

Step 3: Create dog detector using pretrained VGG16 model.
Step 4: Create a CNN to classify dog breeds from scratch, train, validate and test the model.

Step 5: Create a CNN to Classify Dog Breeds using Transfer Learning with resnet101 architecture. Train and test the model.
Step 6: Write an algorithm to combine Dog detector and human detector.

- If dog is detected in the image, return the predicted breed.
- If human is detected in the image, return the resembling dog breed.
- If neither is detected, provide output that indicates the error.

References 1.

References

1. Original repo for Project - GitHub: https://github.com/udacity/deep-learning-v2- pytorch/blob/master/project-dog-classification/

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5. https://towardsdatascience.com/a-comprehensive-guide-to-convolutional-neuralnetworks-the-eli5-way-3bd2b1164a53

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