Capstone Project-Dog Breed Classifier (Machine Learning Nanodegree):

Domain Background:

The domain to which this project belongs is Computer Vision. Computer Vision is the domain which helps the computers to understand the videos and real world images and extract useful images out of it.The Dog breed classifier belongs to this domain. The project helps to detect the breed of a doh from a picture provided. In this problem I would be using supervised learning to train the neural network and then test the model on images.It belongs to a set of problems called multiclass classification problem.

Problem Statement:

The problem statement is to solve the recognition of dog breed from images provided to it.It should recognize whether the object present in an image is a dog or a human.
It should also identify the type of dog(breed)
It should also detect human if present and detect the breed of dog that human resembles to.

Problem Solution:

The solution aims to do this by means of following ways as provided to us in the provided jupyter Notebook:

1. Do the classification with the help of pretrained model(VG Net)
2. Do it with the help of a CNN (defined layers).
3. Do it by means of transfer learning on Resnet.

Data Sets and Inputs:

Data plays a major role in the accuracy of the trained model.It is a well known phrase “Garbage in Garbage out”. So Data plays a major role in determining the accuracy of the model.The data set used for this problem consists of images of Dogs , Humans. The model is trained on this dataset which contains images of dogs of different breeds which eventually helps us to make predictions with our model.
The Dog Images dataset has 8351 images with 133 categories and the Human Images data set has 13233 human images.

Benchmark Model:

The benchmark model for this problem can be VGG model which is already trained on Image Net data so It has high accuracy.
. The CNN model which I have created should possess some accuracyto understand that the model is working.It should be able to classify one dog breed from 133 classes.This makes sure that the model is working.It should be able to predict with high precison and high recall.
The model with transfer learning should possess at least 60 per cent accuracy.

Evaluation metric:

Evaluation metric plays an important role for assessing the problem.
This is a computer vision problem that includes classification.
Here in our dataset there is class imbalance and some other critical parameters due to which Precison and Recall can be great choice for evaluating our model

Project Design:

The project is divided into various subparts :
Here we can first import datasets, libraries etc. Then I installed pytorch and all the dependencies required After that I loaded the pre trainedmodel, made my CNN and finally used transfer learning and then tested the model for different test cases using image of dogs and humans .

1. Import all the datasets.
2.Install pytorch and dependencies on the notebook instance.
3. Download the pretrained models. VG Net
4. Test the model.
5. Define a new CNN.
6. Define all the layers.
7. Do the training.
8. Test the model.
9. Do transfer learning on the model.
10. Test the model.
11. Print Human if human is detected
12. Print dog breed after classification
13. Print invalid image if the provided image is invalid

Specifications and Environment Used:

The environment used includes AWS sagemaker notebook.
Instance.

Pytorch for models
Torchvision
Python as a language.

References:

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