Project Proposal

Convolutional Neural network for Dog breed Classification

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Domain Background:

This project would involve application of convolutional neural network for predicting different kinds of dog breeds. This task is very relevant in this era as several similar types of Dog breeds exist, and it could be sometimes difficult for humans to distinguish them. The work would involve exploration of several CNN architecture and techniques for training them.

Problem statement:

The primary task is to distinguish between several types of dog breed using Convolutional neural network (CNN. The end goal of the project would be an application that:

- Predict the type of dog breed in an image if present
- Guess the resemblance of a human to a type of dog breed

Datasets:

Dog datasets (made available in the Udacity workspace) which contain 133 folders each corresponding to a different dog breed (total of 8351 dog images)

I would also experiment with a Human dataset consisting of 13233 total human images.

This dataset was made available in the workspace of Udacity.

Solution statements:

The first solution would involve experimenting with a pretrained convolutional neural network specifically the VGG16 architecture, which is a popular type of deep CNN that was trained on the ImageNet dataset which consist of over 14 million images belonging to over 1000 classes

including several dog breeds. This was done to ensure the applicability of CNN for the task at hand.

The next step would be to train a custom CNN architecture for the task to see if we could get better results. Lastly, we would apply transfer learning to the VGG-19 architecture which is a variant from the VGG CNN architecture type.

Benchmark Model

The performance of the trained dog breed classifier would be compared with using a pretrained VGG-16 architecture and a custom CNN.

Evaluation Metrics:

The performance of the trained model would be the accuracy metric since we have a balanced dataset.

Project Design:

The task would be completed in the following steps:

- Import the required datasets (Dog and human)
- Experiment on OpenCV Haar feature-based cascade classifiers for detecting human faces in images.
- Use a pretrained VGG-16 network to predict the several classes of dog breeds, this would serve as a benchmark for trained model
- Train a custom CNN architecture from scratch to achieve the same goals
- Employ transfer learning in training a variant of VGG architecture to achieve the project goals
- Test the trained model on real images.