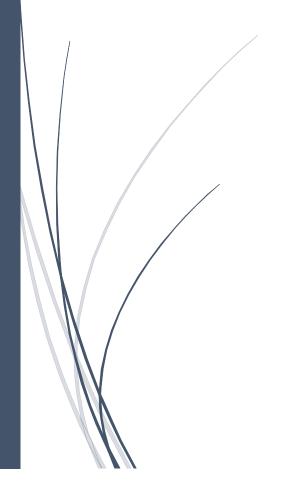# Proposal for CNN Project: Dog Breed Classifier

Udaciy Machine Learning Engineer Nanodegree

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Domain Background

There are 450 globally recognized dog breeds, some of which are so alike that even the experts find difficulties classifying them correctly. The technology advancement over the last decades allowed us to use complex architectures like Convolutional Neural Networks for image recognition with very high accuracy. Can a CNN model be used to predict a dog breed correctly?

Problem Statement

In this project we will try to answer the above question. We will build a model which accepts a real-life image of a dog and returns the predicted breed. If we provide the model with an image of a human, it should identify the resembling dog breed.

Datasets and Inputs

The datasets and inputs for this project are provided by Udacity and consist of human and dog images which will be used to train and test the model. The dog dataset is divided in 133 classes, which means the model will be able to distinguish 133 breeds.

Solution Statement

We will use OpenCV implementation of Haar feature-based cascade classifiers to detect human faces in images. We will also use VGG16 pretrained model to detect dog images. Then we will compare the performance of two CNN models - first one designed from scratch and second one using transfer learning based on RESNET50.

Benchmark Model

Our dog predicting algorithm will use our transfer learning CNN model based on RESNET50, since it is expected this model to achieve higher accuracy compared to the model designed from scratch.

Evaluation Metrics

We will use model accuracy as evaluation metric, which is defied as all correct predictions (true positives and true negatives) over all predictions (true positives, true negatives, false positives, false negatives). We don't consider neither precision nor recall as more suitable since we are interested more in general accuracy rather than classifying some sick as healthy (recall) or classifying non-spam as spam (precision).

Project Design

The project is broken into the following steps:

Step 0: Import Datasets
Step 1: Detect Humans
Step 2: Detect Dogs
Step 3: Create a CNN to Classify Dog Breeds (from Scratch)
Step 4: Create a CNN to Classify Dog Breeds (using Transfer Learning)
Step 5: Write your Algorithm
Step 6: Test Your Algorithm

References

Dog breeds, Wikipedia https://en.wikipedia.org/wiki/Dog_breed

LFW Dataset, Udacity https://s3-us-west-1.amazonaws.com/udacity-aind/dog-project/lfw.zip

Dog Image Dataset, Udacity https://s3-us-west-1.amazonaws.com/udacity-aind/dogproject/dogImages.zip