Machine Learning Engineer Nanodegree

Capstone Proposal

Dog Breed Classifier

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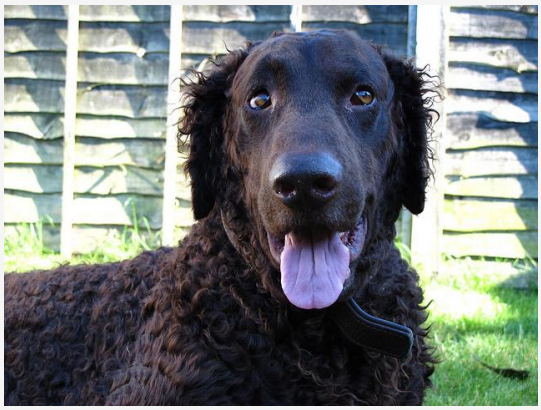
Domain Background

The task of assigning breed to dogs from images is considered exceptionally challenging. To see why, consider that *even a human* would have trouble distinguishing between a Brittany and a Welsh Springer Spaniel.

Brittany	**Welsh Springer Spaniel**
	

It is not difficult to find other dog breed pairs with minimal inter-class variation (for instance, Curly-Coated Retrievers and American Water Spaniels).

Curly-Coated Retriever **American Water Spaniel**



Likewise, recalling that convolutional neural networks can be used to classify images with high accuracy and at scale, the goal of this capstone project is to apply deep learning techniques to the classification of dog breeds.

Problem Statement

The main objective of this project will be to build a pipeline to process real-world, user-supplied images. Given an image of a dog, your algorithm will identify an estimate of the canine's breed. If supplied an image of a human, the code will identify the resembling dog breed.

Datasets and Inputs

Both the human (LFW) dataset and dog dataset are provided by Udacity. There are 13233 total human images and 8351 total dog images with 133 total dog categories.

Solution Statement

Use transfer learning to create a CNN that can identify dog breed from images. This way would reach higher accuracy than the

following benchmark model, because the architecture is based on the pre-trained model as a feature extractor, and a global average pooling layer and a fully connected layer are added.

Benchmark Model

Setting aside the fact that the classes are slightly imbalanced, a random guess will provide a correct answer roughly 1 in 133 times, which corresponds to an accuracy of less than 1%. A better benchmark model will be to create a CNN to classify dog breeds from scratch, which should improve the accuracy.

Evaluation Metrics

The evaluation metric that can be used to quantify the performance of both the benchmark model and the solution model is the accuracy score.

Project Design

Data Preprocessing:

Resize the images to (224, 224, 3) and rescale the images by dividing every pixel in every image by 255.

Architecture Constructing:

Split the data into train, test, and validation sets, define the CNN structure, specify loss function and optimizer.

Model Training and Evaluation:

Train and validate the proposed model, save the final model parameters, test the model based on the evaluation metric presented above. Finally, provide 3 possible points of improvement.