

Capstone Proposal – Dog Breed Classifier

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Domain Background

Since I am late on my deadlines, I decided to complete one of the project frameworks provided by Udacity – the dog breed classifier. The methodology of this task is interesting to me and this will be my first project with image recognition and CNNs.

Problem Statement

This is a project in which I will be using CNNs and pretrained models to build a dog breed classifier – it will take an image and identify if a dog or a human is present. If it detects a dog, it will give a breed prediction and if there is a human – it will give the breed that the human resembles, which may generate some funny situations. I will be assessing the accuracy of the models and will test them with additional data.

Datasets and Inputs

I will be using a total of 13233 human and 8351 dog images, provided by Udacity to train, validate and test different models. The data is prepared and labeled and is perfect for the project.

Solution Statement

CNNs are selected since they are very effective in image classification. I will be using a Jupyter notebook workspace equipped with a GPU, provided by Udacity for this exact project.

I will create a CNN model and will aim for at least 10% accuracy on the test data set. Later, I will add an already trained ResNet50 model to mine, to improve the accuracy to at least 60%. I will write and test the algorithm that will be classifying the images.

Benchmark Model

An already trained and proven models will be used to detect human faces and dogs in the images to form the base of the algorithm. For human detection, OpenCV's implementation of Haar feature-based cascade classifiers will be used. I will use a pre-trained VGG-16 model to detect dogs. The models are suggested by Udacity and have good accuracy for detection.

Evaluation Metrics

As mentioned above, I will be evaluating the models by their accuracy – this is suggested by the project and is adequate, since the data is diverse and balanced. Accuracy is one of the most convenient and easy to understand metrics – this is the percentage of correctly classified humans or dog breeds, out of all images provided.

Project Design

As the project guide suggests, I will be following the steps below to complete the project:

Step 0: Import Datasets – Provided by Udacity, no further data is needed for the current project. I won't be augmenting the data.

Step 1: Detect Humans – I will use OpenCV's implementation of Haar feature-based cascade classifiers to detect human faces in images.

Step 2: Detect Dogs – I will use a pre-trained VGG-16 model to detect dogs in images, along with weights that have been trained on ImageNet.

Step 3: Create a CNN to Classify Dog Breeds (from Scratch) – I will create a CNN that classifies dog breeds by myself, aiming for at least 10% accuracy.

Step 4: Create a CNN to Classify Dog Breeds (using Transfer Learning) – I will be adding an already trained ResNet50 model to mine, to improve the accuracy to at least 60%.

Step 5: Write your Algorithm – I will write an algorithm that accepts a file path to an image and determines whether the image contains a human, dog, or neither.

Step 6: Test Your Algorithm – I will test the algorithm with several photos to check if everything works as intended.

This is an interesting project for me and I think it will be a good basis for CNNs, transfer learning and image classification.