

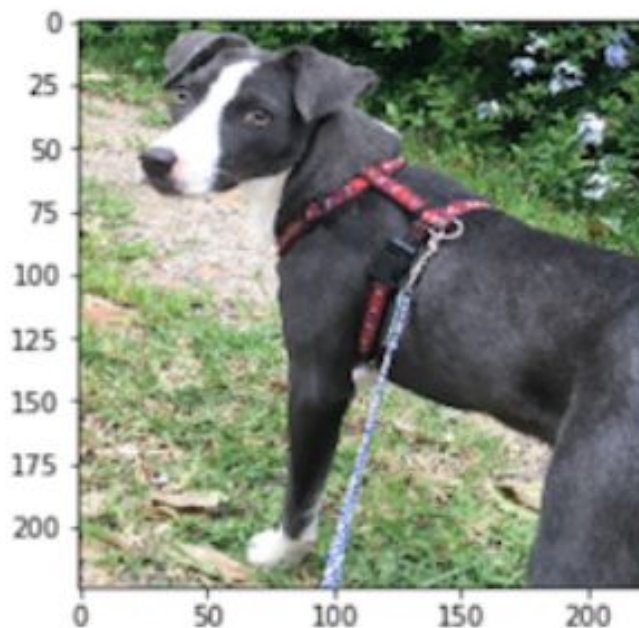
## Dog Breed Classifier using CNN

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### Domain Background

In machine learning, image classification is accomplished by extracting key features from an image and supplying the features as inputs to the supervised model. Convolutional neural network (CNN) has gained a significant interest recently as it provides excellent results in image classification. In this project, a CNN model will be used to classify a dog breed.

```
hello, dog!  
your predicted breed is ...  
American Staffordshire terrier
```



Example dog breed output.

## Problem Statement

The goal of the project is to create a CNN machine learning model to classify a dog breed given a real world image of a dog. In addition, if the model is supplied with an image of a human, the model should provide a resembling dog breed.

## Dataset and Inputs

The project dataset is provided by Udacity:

- [dog images dataset](#): 8351 images in total:
  - 133 total dog categories.
  - 6680 training dog images.
  - 835 validation dog images.
  - 836 test dog images.
- [human images dataset](#): 13233 images in total

## Solution Statement

The solution involves three steps:

1. For human image detection, OpenCV's implementation of Haar feature based cascade classifiers will be used.
2. In order to detect dog-images, pretrained VGG16 model will be used.
3. After the steps one and two are completed, the image will be supplied to the CNN model which will assign the best matching dog breed out of 133 dog breeds.

## Benchmark Model

The benchmark model will be a simple CNN classifier created from scratch, which is expected to have accuracy of at least 10%. Then the model will be improved by learning on the train dataset and using transfer learning.

- After testing, the trained CNN model should have accuracy of at least 60% and above.

## Evaluation Metrics

The evaluation metric will be a simple accuracy, which is calculated by comparing predictions to the true label and dividing the count of total correct results by the total number of predictions.

## Project Design

Workflow:

- 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 an Algorithm
- Step 6: Test the Algorithm