

Dog breed classifier using CNN

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Background domain

The problem of dog breed classification is a famous problem in machine learning and deep learning .the problem is about predicting the breed of a dog after from it is image if we were given an image of a dog and predicting the resembling dog breed if we were given a picture of human .the project is multi-class classification project in which we are going to use supervised learning .in the project I am going to use CNN (convolutional neural network) to solve it .I choose this project because I want to go deeper in deep learning and neural network

Problem statement

My goal in this project is to build a machine learning model that can predict dogs breed and assembling dog breed to human face

The algorithm here will do two tasks

1-Human face detector: if we give the model an image of human it should predict the resembling dog breed of the human

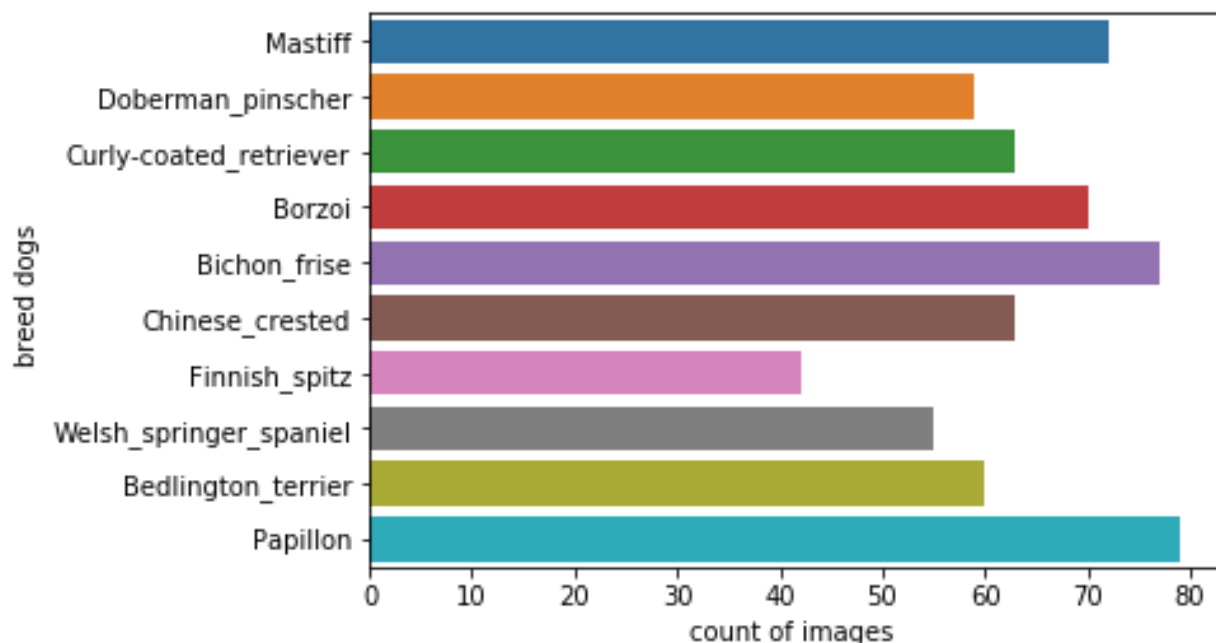
2-dog breed detector: if we give the model an image of dog it should predict the canines breed of this dog

Data sets and inputs:

The data set used in this project is provided by Udacity. the data set contains images of dogs and humans so the input type to the model is image type .the data is divided into two categories :

1-dog images data set: the data set contains 8351 total dog images with different sizes and backgrounds

The dog image data set is divided into train (6680 images), validation (835 images) and test (836 images) directories and each of these directories have 133 folders corresponding to 133 dog breeds the data is not balanced because not all the folders contain the same number of images as we see in the distribution of ten dog breeds below



2-human images dataset: the data set contains 13233 total human images with different sizes and backgrounds

Solution statement:

To solve this problem we are going to use CNN(conventional neural network),CNN is a deep learning algorithm used to classify images by

assigning a new values to it's weights and bias .the solution has three steps, firstly we are going to use OpenCV's implementation of Haar feature-based cascade classifiers to detect human faces in images Secondly ,we are going to use VGG16 model to detect dogs in images. Finally we are going to pass the image to CNN to predict the breed that matches the best out of 133 breed

Benchmark model:

We can see that the CNN model is working if we get accuracy greater than 10% as the accuracy of random guess in classification of 133 breed is less than 1%(exactly one per every 133 times)

Also, the CNN model created after the transfer learning must have accuracy more than 60%

Evaluation matrices:

For evaluation of the model, I will use accuracy function and for the CNN model from scratch getting accuracy more than 10% make the model acceptable

Project design :

Step 0: importing necessary libraries and data set, create train, test and validation data set

Step1: using OpenCV's implementation of Haar feature-based cascade classifiers to detect human faces in images

Step 2: using VGG16 model to detect dogs in images.

Step 3: creating CNN model to predict the breed that matches the best out of 133 breed (train, test and validate the model)

Step4: using transfer learning to create a CNN model to classify dog breeds with accuracy greater than 60%

The transfer learning model will be created with resnet 101 or VGG16 architecture then train and test the model

Step 5: writing algorithm that combine dog detector and human detector

- If human is predicted, it will return the resembling dog breed
- If dog is predicted it will return the breed of this dog

Step6: testing the model using images from the data set to see how the model doing