Machine Learning Engineer Nanodegree

Capstone Proposal

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Proposal

Domain Background

Machine learning (ML) is widely used in different areas nowadays such as image recognition, and classification. One insteresting application is to use ML for classifying animal's breed which is challenging for human beings. And using ML could be more accurate and fast.

Problem Statement

Identify if a given image is a dog, and if the image is a dog, identify the breed. If the image is a human, resembling dog breed will be identified.

Datasets and Inputs

1. 13233 total human images.
2. 8351 total dog images with 133 differen breeds.

Solution Statement

1. Data loaded into the local repository.
2. Design a human detector based on opencv face detection algorithm to detect whether there is a human being in the image.
3. Design a dog detector to detect whether there is a dog in the image using the ImageNet pre-trained model.
4. If a dog is detected, its breed will be identified using a deep learning network trained on dog breed images.
5. If a human is detected the resembling dog will be detected using the deep learning network trained in step 3.

Evaluation Metrics

The precision is calculated using accuracy on test dataset.

Benchmark Model

For our benchmark model, we will use the Convolutional Neural Networks (CNN) model created from scratch with an accuracy approximately 15%. This should be enough to confirm that our model is working because random guess would be 1 in 133 breeds which are less than 1% if we don’t consider unbalanced data for our dog images.

Project Design

1. Faces detection: – initialize pre-trained face detector -load image -convert image to grayscale -find faces in the image -return true if the number of faces is more than 0 else return false
2. Dog detection. We will use the pre-trained model VGG16 for this. – first, we define our VGG16 model – we will use GPU for better performance – load and pre-process the image – send an image to the VGG16 model – model return index

from 0 to 999 (dog classes are from 151 to 268) – return true if the index is >=158 and <=268 else return false

Our data is already divided into training, validation and test partitions so we can now use our train data to make a benchmark model using Convolutional Neural Networks. After creating a model we will test it with test data. When we get accuracy over 15% we will proceed on building a new model using transfer learning. With transfer learning, we can build our model with fewer data to give us a better result. We will use the same training data as before. We will then test our model with the same test data as before but know we expect our accuracy to be over 60%. Then we can try to experiment with different model parameters to get better results. We will use f1 score and log loss to evaluate our models.

Before submitting your proposal, ask yourself. . .

- Does the proposal you have written follow a well-organized structure similar to that of the project template?
- Is each section (particularly **Solution Statement** and **Project Design**) written in a clear, concise and specific fashion? Are there any ambiguous terms or phrases that need clarification?
- Would the intended audience of your project be able to understand your proposal?
- Have you properly proofread your proposal to assure there are minimal grammatical and spelling mistakes?
- Are all the resources used for this project correctly cited and referenced?