Machine Learning Engineer Nanodegree

Capstone Proposal

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Real time recognition of letters of American Sign Language

Domain Background

The ASL is an important method of communication for deaf community in United States and in part of Canada. It's a very complex visual-spatial language, where all movements it's important and represents something [1]. Very colleges and universities are beginning recognize the ASL as a cultural and important language to study [2].

Nevertheless we have a large quantity of people which not have knowledge of this language and sometimes think it's a mimicry or thing in this kind, but it's not.

With this was thinking about create a recognition system for ASL in real time, however for all language it would being very hard get the data, so with the ASL letters' database found in Kaggle could solve the problem.

Estimates from the SIPP indicate that fewer than 1 in 20 Americans are currently deaf or hard of hearing [3]. Would like start help this peoples for in the future anyone, or myself, continuous this work and, maybe, create a "Google Translate" for ASL.

Problem Statement

The mainly problem of this project is the recognition and the image processing, this problem will required the concepts of deep learning which can be learn this on extracurricular part of nanodegree. This concepts of neural networks, image processing, and other are treated in this part of course and this generate a good base for solve the problem.

Datasets and Inputs

The database of images of ASL Alphabet is a database of images of American Sign Language, where we have a group of images contain the letters of ASL. This dataset was lifted up in Kaggle, the Kaggle is a website where we have many datasets where we can use in personal projects.

The images of dataset compose 87,000 images with 200x200 pixels, and this images was divided in 29 classes, of which 26 are for the letters A-Z, and the others 3 are for the SPACE, DELETE and NOTHING, and this classes are for very helpful in real time application, which are very useful in this application. Below, we can see a example of the ASL Alphabet.

Solution Statement

For being a problem of deep learning, this problem will be solved with the helpness of deep learning libraries like keras, pytorch and others. Already the tests will be done with the OpenCV Library, that is I will run the model in openCV and see the results and what we can do for improve them.

Benchmark Model

This project is a Kaggle datasets project, with this the Kaggle benchmark model would be the best Kaggle score for the test set. I can upload the model generated in Kaggle website and see the result which I will obtain, this result, or score, can be the benchmark of the project.

Benchmark Model

The model which I will obtain can be evaluated with the Kaggle metrics, but I will evaluate with the library metrics too, and see how good and how the model can be improve.

Benchmark Model

First I will see the teh datas and how them are organizated in dataset, with this I will parametrize the datas with the helpness of the libraries, I can do the cross validate for obtain bests models, can too make a split in datas for separed them better.

For this I will use the libraries: Numpy, Matplotlib, Scipy, Pandas, and for deep leraning Keras or Pytorch. Others libraries can be added in the project if we need.

[1] About American Sign Language – Deaf Resorce Library

http://www.deaflibrary.org/asl.html

[2] ASL as a Foreign Language Fact Sheet – University of New Mexico

http://www.unm.edu/~wilcox/UNM/facts.html

[3] How Many Deaf People Are There in the United States? Estimates From the Survey of Income and Program Participation – Ross E. Mitchell

https://academic.oup.com/jdsde/article/11/1/112/410800

[4] Kaggle Dataset of ASL Alphabet

https://www.kaggle.com/grassknoted/asl-alphabet