Sign Language Recognition using F-R CNN and Text Conversion

A Project Synopsis

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Introduction

The goal of this project is to build a neural network able to classify which letter of the American Sign Language (ASL) alphabet is being signed, given an image of a signing hand. This project is a first step towards building a possible sign language translator, which can take communications in sign language and translate them into written and oral language. Such a translator would greatly lower the barrier for many deaf and mute individuals to be able to better communicate with others in day-to-day interactions. This goal is further motivated by the isolation that is felt within the deaf community. Loneliness and depression exist in higher rates among the deaf population, especially when they are immersed in a hearing world. Large barriers that profoundly affect life quality stem from the communication disconnect between the deaf and the hearing. Some examples are information deprivation, limitation of social connections, and difficulty integrating in society. In this project, we identify the sign language gesture using Image recognition, which further trains the model using Faster Region based CNN for better accuracy. Thus, each trained gesture will be classified accordingly helping the user to translate sign language in real time. The recognized sign is thus converted to equivalent text and displayed on a LED screen for better comprehension. Later on, this CNN model is to be deployed on an android app so that it is handier and easier to use in daily life.

Problem Definition

For interaction between normal people and Deaf and Mute people a language barrier is created as sign language structure which is different from normal text. So, they depend on vision-based communication for interaction. If there is a common interface that converts the sign language to text, the gestures can be easily understood by the other people.
Understanding the exact context of symbolic expressions of deaf and dumb people is a challenging job in real life and requires expert knowledge of sign language to be able to communicate/ understand people using these forms of expression.

Sign language is learned by deaf and dumb, and usually it is not known to normal people, so it becomes a challenge for communication between a normal and hearing-impaired person.

Objective

- The project is primarily aimed at recognition of sign language to bridge the communication gap between a normal and a deaf and dumb person.
- To apply F-R based CNN to the model to convert sign language to text.
- To implement this model into a handy android application.

Dependencies:

Software

- Python 3.6.6
- TensorFlow 1.11.0
- OpenCV 3.4.3.18
- NumPy 1.15.3
- Matplotlib 3.0.0
- Keras 2.2.1
- PIL 5.3.0

Work Plan

1. Research and strategy development on the problem definition.
2. Selection of tools and frameworks.
3. Installation and environment set-up.
4. Dataset creation.
5. Training and testing the model.
6. Improving accuracy and parameter tuning.
7. Deploying the model on an android app.

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