PROJECT REPORT

On

SIGN LANGUAGE RECOGNITION USING HAND GESTURE

COMPUTER SCIENCE AND ENGINEERING
B.E. Batch-2018

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Under the Guidance of:
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<u>CERTIFICATE</u>

This is to be certified that the project entitled "Sign language Recognition using Hand Gesture" has been submitted for the Bachelor of Computer Science Engineering at Chitkara University, Himachal Pradesh during the academic semester July 2020-December 2020 is a bonafide piece of project work carried out by "Sandeep Kumar – 1811981275,Sangum Walia – 1811981276, Owais Imam- 1811981213, Md. Gulam Gaush Ansari – 1811981183" towards the partial fulfillment for the award of the course Professional Practices-Python for Data Science (CS254E) under the guidance of "Dr. Ravita Chahar" and Dr. Ashutosh Kumar Dubey.

Signature of Project Guide:

Dr. Ravita Chahar

(Designation & Departmen)

CANDIDATE'S DECLARATION

We, **Sandeep Kumar – 1811981275,Sangum Walia – 1811981276, Owais Imam- 1811981213, Md. Gulam Gaush Ansari – 1811981183,** B.E.-2018 of the Chitkara University, Himachal Pradesh hereby declare that the "Name of the Course" Report entitled **"Sign language Recognition using Hand Gesture"** is an original work and data provided in the study is authentic to the best of our knowledge. This report has not been submitted to any other Institute for the award of any other course.

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Place: Chitkara University Himachal Pradesh
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CONTENT

1. ABSTRACT

Sign language is one of the oldest and most natural form of language for communication, but since most people do not know sign language and interpreters are very difficult to come by we have come up with a real time method using neural networks for fingerspelling based american sign language. In our method, the hand is first passed through a filter and after the filter is applied the hand is passed through a classifier which predicts the class of the hand gestures.

2. INTRODUCTION

Sign language recognition is a collaborative research area which involves pattern matching, computer vision, natural language processing, and linguistics. Its objective is to build various methods and algorithms in order to identify already produced signs and to perceive their meaning. There have been a few progressions in innovation and a great deal of examination has been done to help the individuals who are tragically challenged. Helping the reason, Deep learning can be utilized too to have an effect on this reason.

This can be extremely useful for the not too sharp individuals in speaking with others as realizing communication through sign isn't something that is normal to all, in addition, this can be reached out to making programmed editors, where the individual can undoubtedly compose by their hand signals. Project Overview: In this communication via gestures acknowledgment venture, we make a sign identifier, which distinguishes numbers from 1 to 10 that can without much of a stretch be reached out to cover a huge large number of different signs and hand signals including the letters in order. We have built up this venture utilizing OpenCV, Keras and Tensorflow modules of python

2.1 Background

American sign language is a predominant sign language Since the only disability D&M people have is communication related and they cannot use spoken languages hence the only way for them to communicate is through sign language. Communication is the process of exchange of thoughts and messages in various ways such as speech, signals, behavior and visuals. Deaf and dumb(D&M) people make use of their hands to express different gestures to express their ideas with other people. Gestures are the nonverbally exchanged messages and these gestures are understood with vision. This nonverbal communication of deaf and dumb people is called sign language.

In our project we basically focus on producing a model which can recognize Fingerspelling based hand gestures in order to form a complete word by combining each gesture. The gestures we aim to train are as given in the image below.
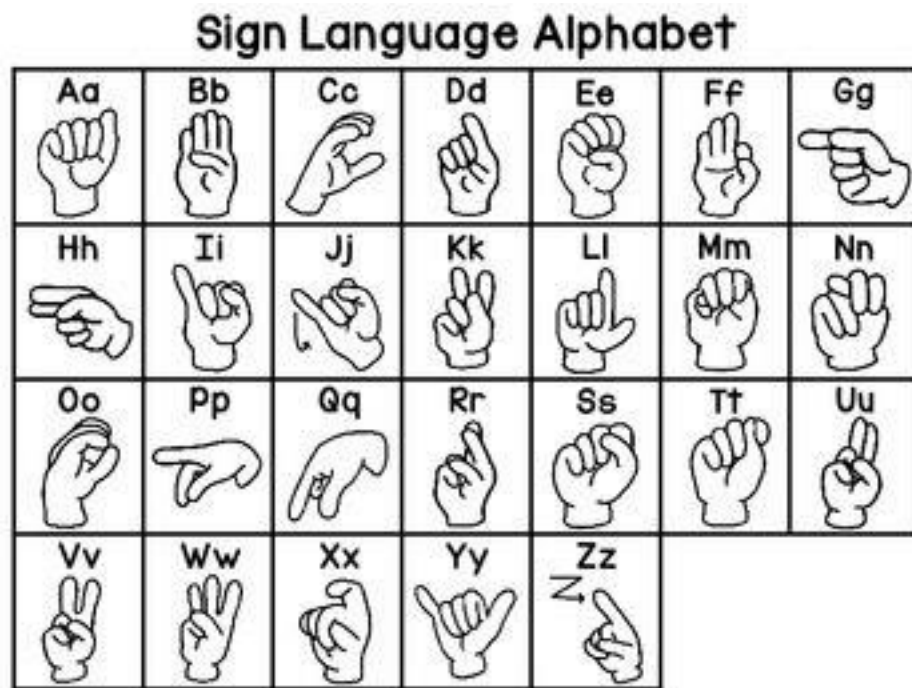

Fig-1 Sign Language Alphabet

2.2 Problem Statement

To design a real time software system that will be able to recognize hand-gestures using deep learning techniques and that will help us to understand the meaning of deaf and mute people who uses sign language for communication

3. Software and Hardware Requirement Specification

3.1 Methods

We will be using Convolutional Neural Network (ConvNet/CNN) it is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other. The pre-processing required in a ConvNet is much lower as compared to other classification algorithms. We created our own dataset by capturing raw images and converting it into histogram
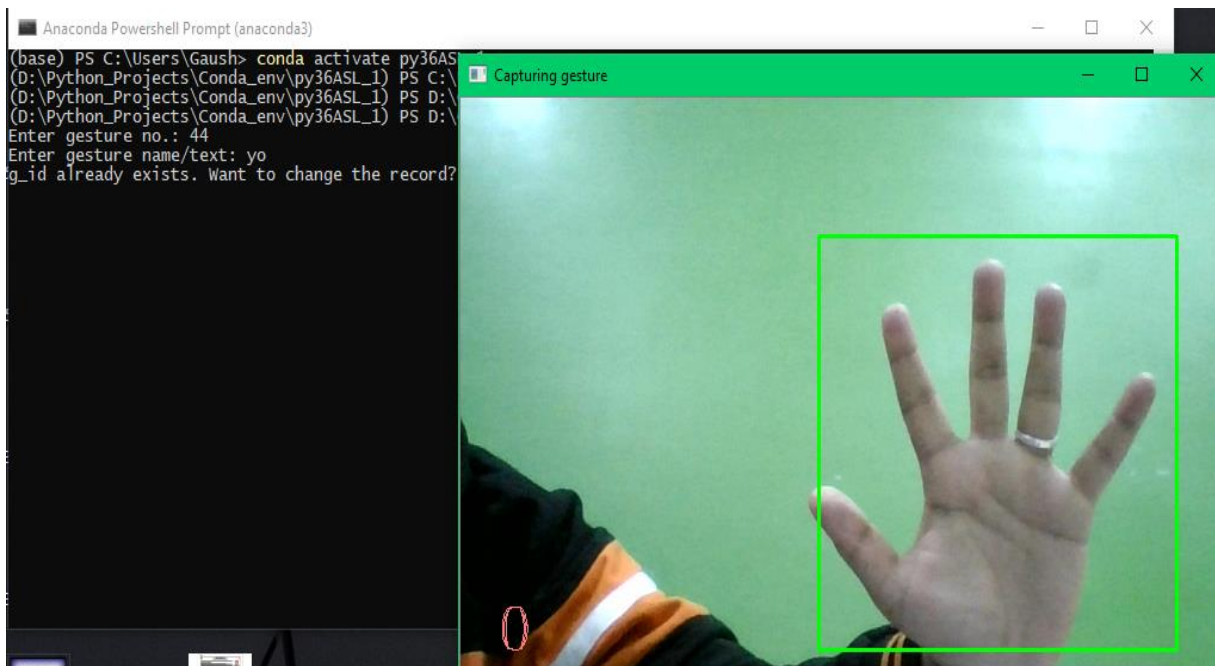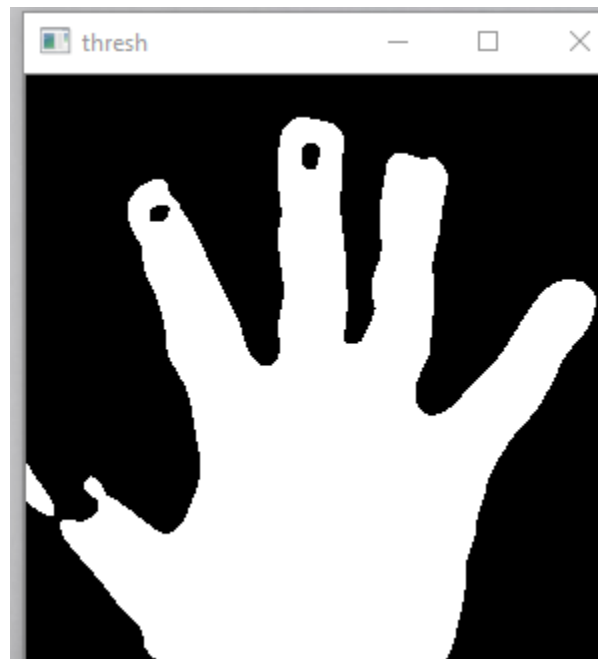

Fig-2 Capturing RAW image

Fig-3 Histogram

3.2 Programming/Working Environment

We were working in windows environment we created a virtual python environment using anaconda and to install all dependencies and libraries needed to work with it.

3.3 Requirements to run the application

- Tensorflow
- Keras
- Numpy
- h5py
- scikit-learn
- sklearn
- opencv-python
- pyttsx3

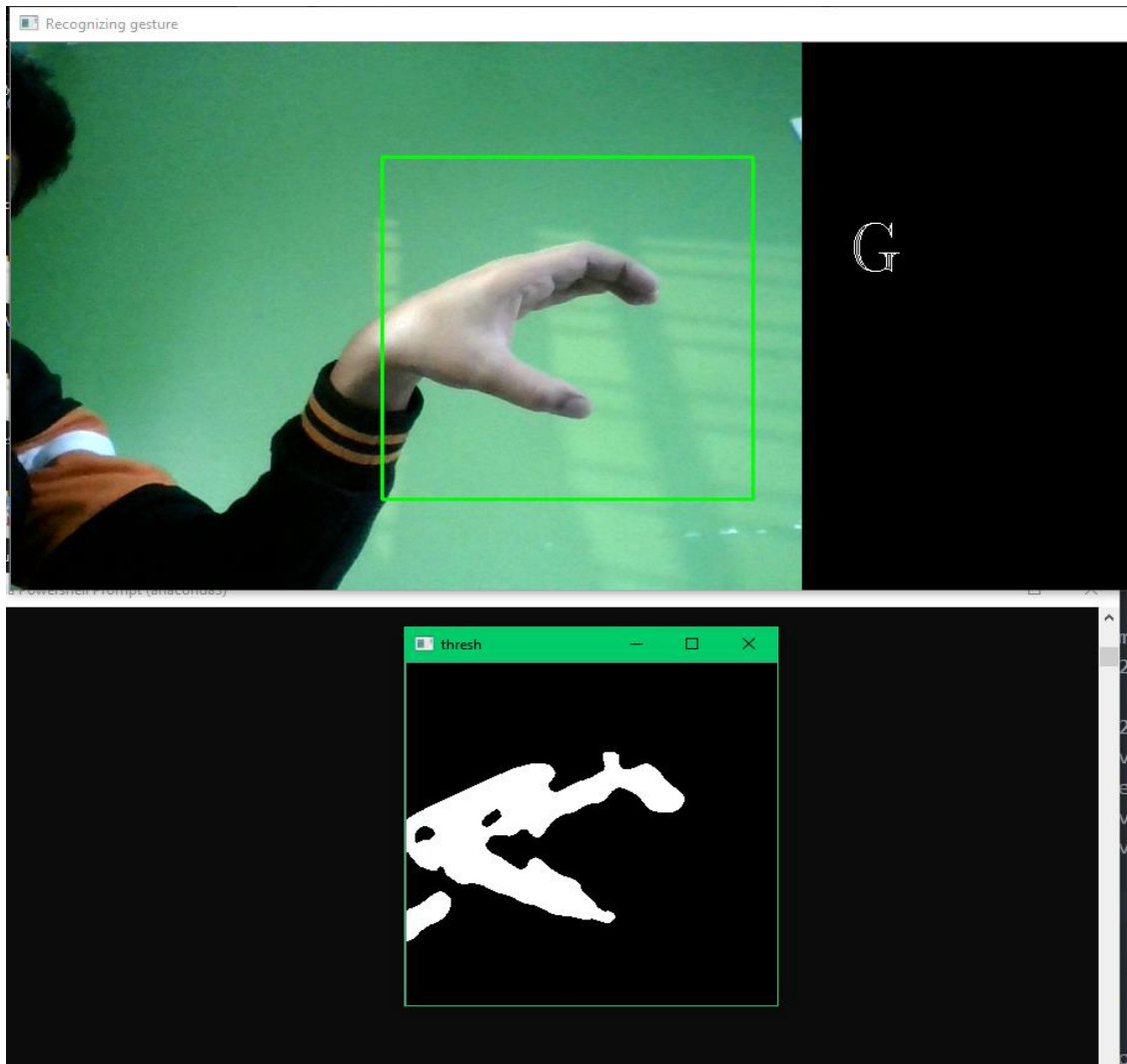# 4. Program's Structure Analyzing and GUI Constructing (Project Snapshots

Fig-4 GUI

5. Limitations

We set ROI for recognition so person has bring his hand in place ROI and than make the hand sign. While testing with different skin tones, the model dropped accuracy if it hadn't been trained on a certain skin tone was made to predict on it. The model also suffered from loss of accuracy with the inclusion of faces. Faces of signers vary, which leads to model to train incorrect features.

The model also performed poorly when there was variation in lighting and background Color.

6. Conclusion

In this report, a functional real time vision based american sign language recognition for D&M people have been developed for asl alphabets. We are able to improve our prediction after implementing one layers of algorithms in which we verify and predict symbols which are more similar to each other. This way we are able to detect almost all the symbols provided that they are shown properly, there is no noise in the background and lighting is adequate.

7. Future Scope

We are planning to achieve higher accuracy even in case of complex backgrounds by trying out various background subtraction algorithms. We are also thinking of improving the preprocessing to predict gestures in low light conditions with a higher accuracy and providing a GUI(Graphical User Interface).

8. Bibliography/References

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