ABSTRACT

This paper focuses on experimenting with different segmentation approaches and unsupervised learning algorithms to create an accurate sign language recognition model. To more easily approach the problem and obtain reasonable results, we experimented with just up to 10 different classes/letters in the our self-made dataset instead of all 26 possible letters. We collected 12000 RGB images and their corresponding depth data using a Microsoft Kinect.Up to half of the data was fed into the autoencoder to extract features while the other half was used for testing. We achieved a classification accuracy of 98% on a randomly selected set of test data using our trained model. In addition to the work we did on static images, we also created a live demo version of the project which can be run at a little less than 2 seconds per frame to classify signed hand gestures from any person.

INTRODUCTION

The goal of this project was 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 exists 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

PROBLEM STATEMENT

Dumb people use hand signs to communicate, hence normal people face problem in recognizing their language by signs made. Hence there is a need of the systems which recognizes the different signs and conveys the information to the normal people.

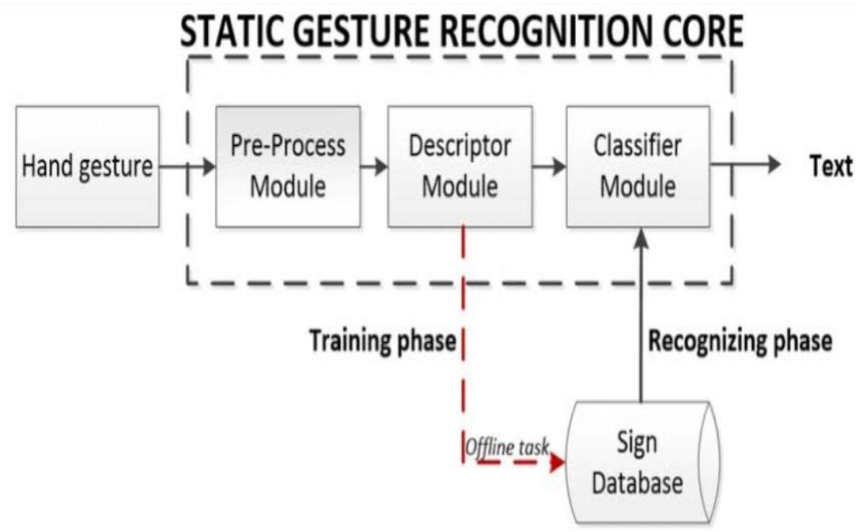
PROPOSED SYSTEM

In the proposed system the unable or dumb person should provide a gesture or sign image to the system. The system evaluates the sign input with matlab image processing technique and classifies the input to the recognized identification. Later it initiates the voice media through the system when the input image matches with the given dataset. And the output will be shown in the text format too. This is a prototype to develop the concept of converting the language to speech and text. The aim of this paper is to provide an application to the society to establish the ease of communication between the deaf and mute people by making use of image processing algorithm.

Advantages of proposed system

- When comparing with existing system user can give more signs
- The module provides two way communications which helps in easy interaction between the normal people and disables
- Easy to Interface
- Flexible

DATA FLOW DIAGRAM



IMPLEMENTATION AND RESULTS

README.md

About the Dataset

The dataset consists of RGB images of 25 sign language gestures of the Indian Sign Language taken from 7 subjects. There are a total of 175 images. The following is the table of vocabulary considered for the project:

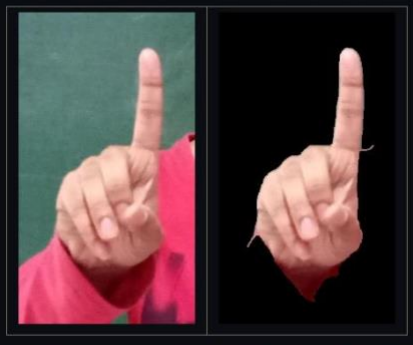
Sign Number	Meaning	Sign Number	Meaning	Sign Number	Meaning
1	1	2	2	3	3
4	4	5	5	6	6
7	7	8	8	9	9
11	A	12	Add	13	Appreciation
14	A-Signle Handed	15	Assistant	16	B
17	Bell	18	Between	20	Bite
22	Bottle	24	Boxing	25	B-Signle Handed
26	Bud	27	C	28	Conversation
29	Control				

Procedure

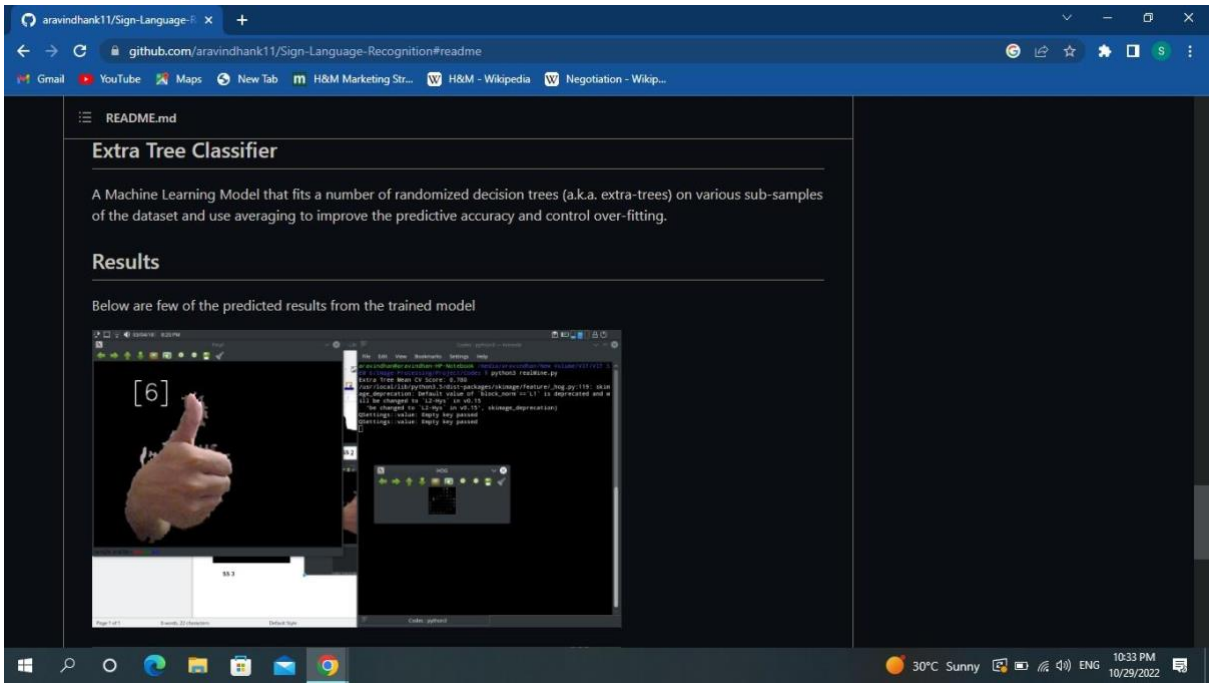
README.md

Procedure

1. The Dataset is subjected to hand boundary detection effected by means of strict Skin detection algorithm along with opening, closing, to minimise noise level.



2. The above steps converts images in directory USER-userID-signID-trialNo to processed boundary detected hands in directed in USER-PROCESSED-userID-signID-trialNo.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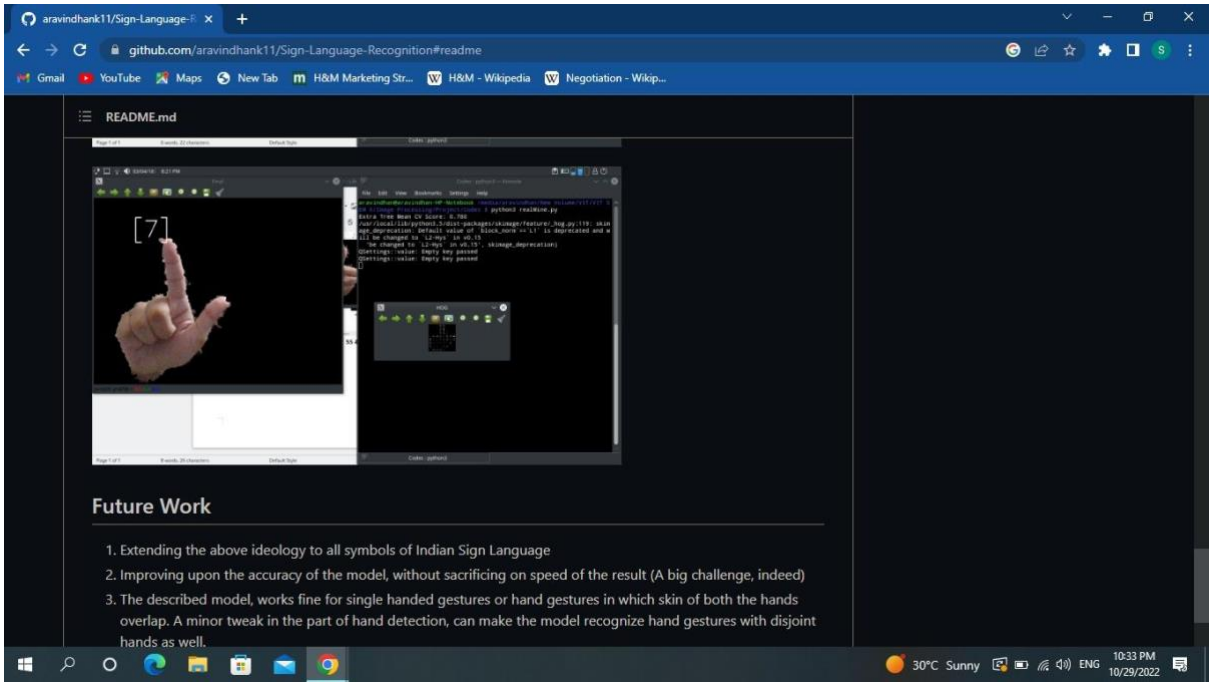
Extra Tree Classifier
A Machine Learning Model that fits a number of randomized decision trees (a.k.a. extra-trees) on various sub-samples of the dataset and use averaging to improve the predictive accuracy and control over-fitting.
Results
Below are few of the predicted results from the trained model
[6]
30°C Sunny
ENG
10:33 PM
10/29/2022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YouTube
Maps
New Tab
H&M Marketing Str...
H&M - Wikipedia
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[7]
Future Work
1. Extending the above ideology to all symbols of Indian Sign Language
2. Improving upon the accuracy of the model, without sacrificing on speed of the result (A big challenge, indeed)
3. The described model, works fine for single handed gestures or hand gestures in which skin of both the hands overlap. A minor tweak in the part of hand detection, can make the model recognize hand gestures with disjoint hands as well.
30°C Sunny
ENG
10:33 PM
10/29/2022

CONCLUSION

Automatic analysis of SL gestures has come a long way from its initial beginnings in merely classifying static signs and alphabets. Current work can successfully deal with dynamic signs which involve movement and which appear in continuous sequences. Much attention has also been focused on building large vocabulary recognition systems.In this respect, vision-based systems lag behind those that acquire gesture data with direct-measure devices. Robustness to the image capture environment is also an issue. Two aspects of gesture recognition that have not received much attention are building signer independent recognition systems and addressing the more difficult aspects of signing, such as grammatical inflections and mimetic signs.Furthermore, NMS have received scant attention. Understanding NMS and interpreting them in conjunction with gesture recognition is vital for understanding SL communication