CONVERSION OF SIGN LANGUAGE TO SPEECH

by
Shubhika Garg
179302148

Sidharth Goenka
179302149

Bachelor of Technology

(Information Technology)

in

Department of Information Technology

Under the Guidance of
Mrs. Kavita Jhajharia
(June-2020)

SCHOOL OF COMPUTING AND INFORMATION TECHNOLOGY

MANIPAL UNIVERSITY JAIPUR

MANIPAL UNIVERSITY
JAIPUR

INTRODUCTION TO SIGN LANGUAGE

Sign Language is the primary means of communication in the community of hearing-impaired and mute people. As a normal person is unaware of the grammar or meaning of various gestures that are part of a sign language, it is primarily limited to their families and/or their community. At this emerging era of technology, it is essential to make these people feel part of the society by helping them communicate smoothly.

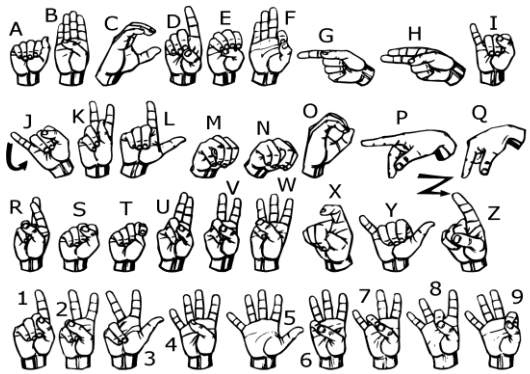


Fig 1: American Sign Language

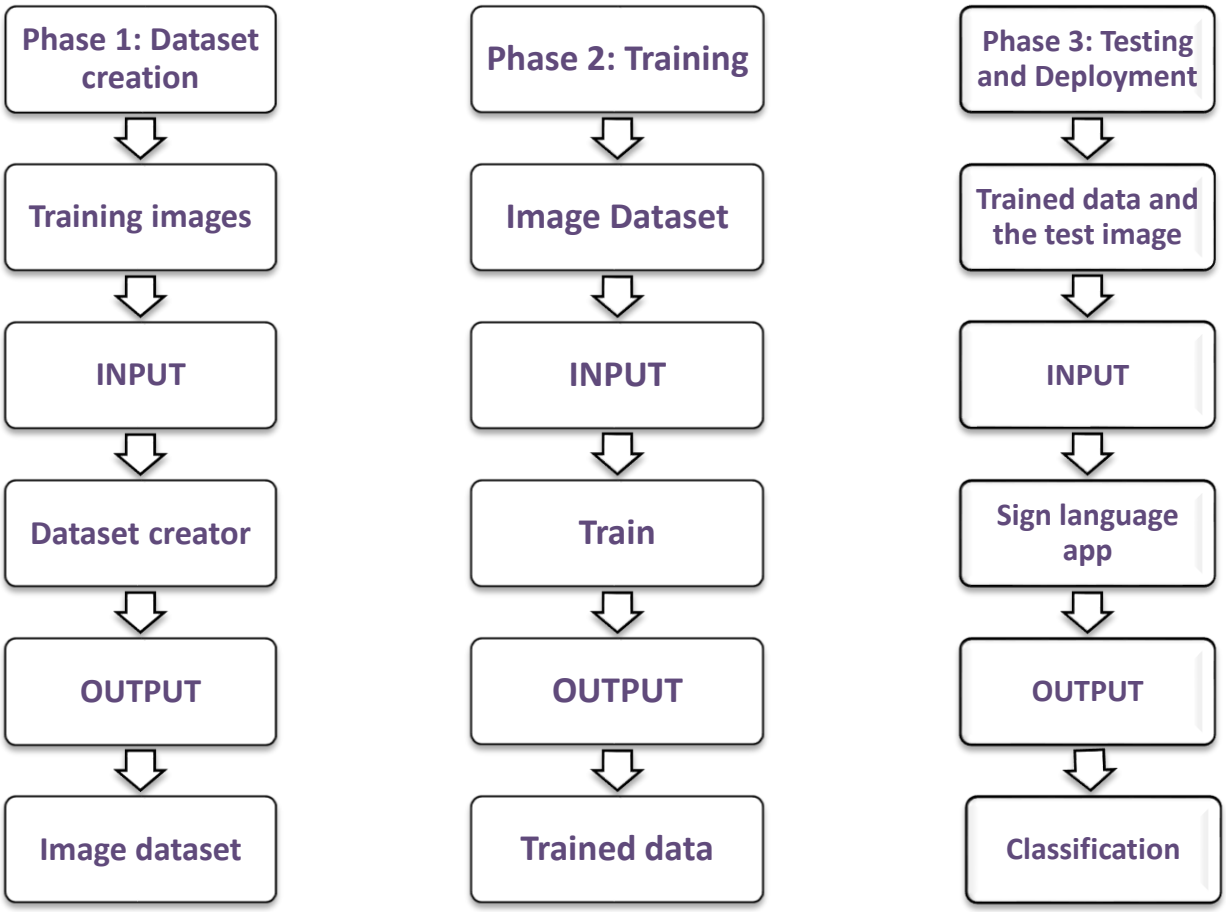
OBJECTIVE OF THE PROJECT

The primary aim of the project is to provide aid for the speech-impaired to communicate with those people who do not understand the sign language. Also this system should be very cost effective as well as easy to implement. The system should not be complicated so that even with a person with least of knowledge can utilize it, which would make is more acceptable to the large audience. The only basic requirement will be the subject to have the knowledge of American Sign Language (ASL). Hence, the objective of this project is to develop a system that is cheap as well as easy to implement and can be used by the masses.

THE PROJECT IS BUILT USING:

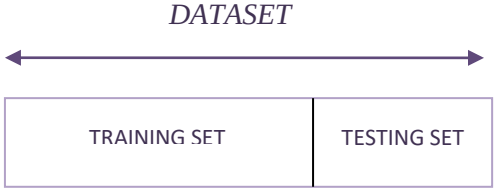
1. Python
2. Java
3. OpenCV
4. Gradle
5. Maven
6. pip
7. Android Studio
8. Numpy
9. gTTS

METHODOLOGY



TRAINING AND TESTING DATASET

- **The training dataset**: The data sample used to fit the model. The model sees and learns from this data.
- **The testing dataset**: The data sample used to provide an unbiased evaluation of a final model fit on the training dataset.



CONFUSION MATRIX

- It allows easy identification of confusion between classes i.e., one class is commonly mislabeled as the other.
- The rows correspond to what the machine learning algorithm predicted and the columns correspond to the known truth.

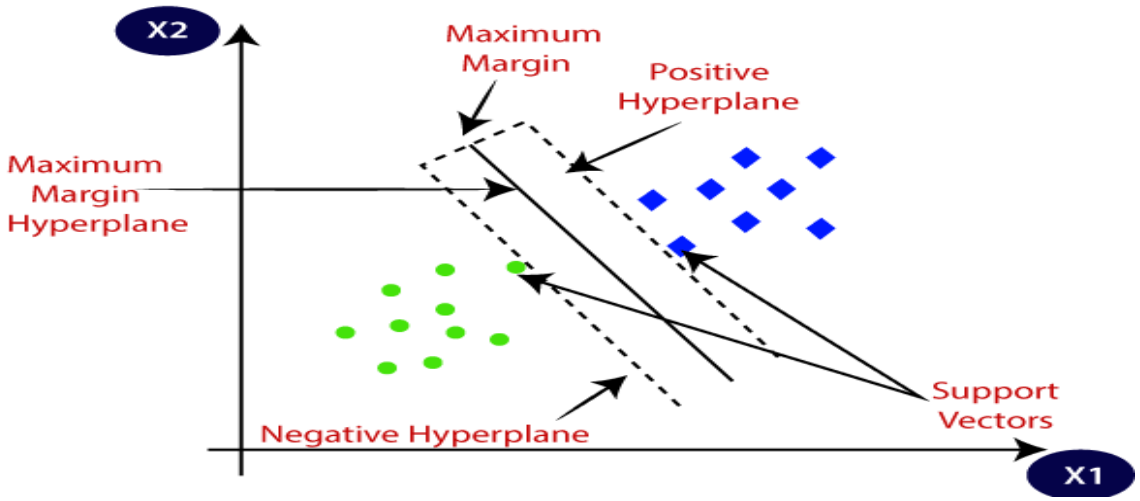
	ACTUAL POSITIVES	*ACTUAL NEGATIVES*
PREDICTED POSITIVES	TRUE POSITIVES(TPs)	FALSE POSITIVES(FPs)
PREDICTED NEGATIVES	FALSE NEGATIVES(FNs)	TRUE NEGATIVES(TNs)

GRADLE BUILD SYSTEM

Gradle is an open source system which helps in building an android application. The gradle system takes all the java files and converts them into .dex files and then compresses all of them into one single apk file. “Build.gradle” is the script that helps with all these tasks.

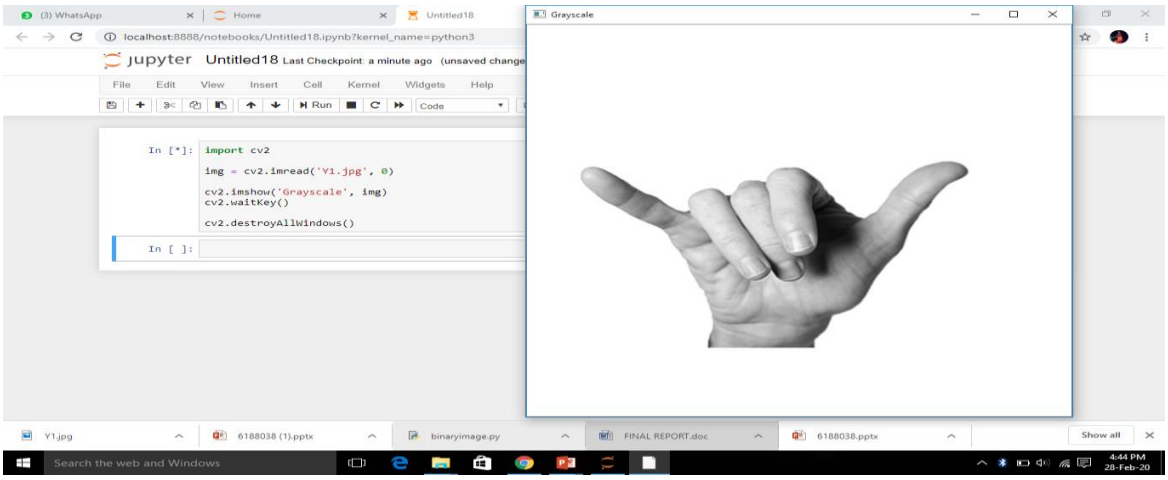
SUPPORT VECTOR MACHINE

- The main goal of SVM is to divide the datasets into classes to find a maximum marginal hyperplane.
- SVM will generate hyperplanes iteratively that segregates the classes in best way.

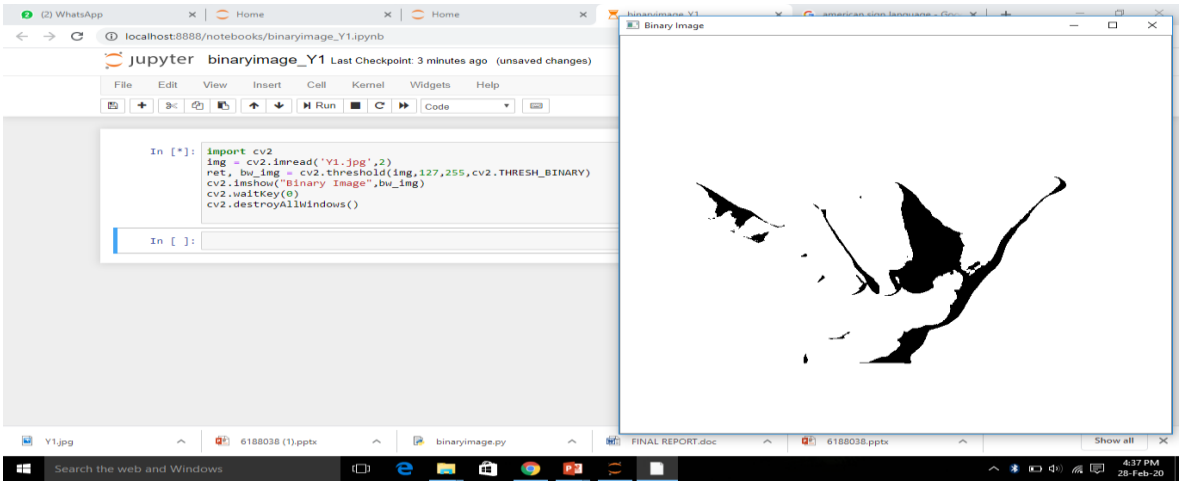


IMPLEMENTATION AND OUTPUTS

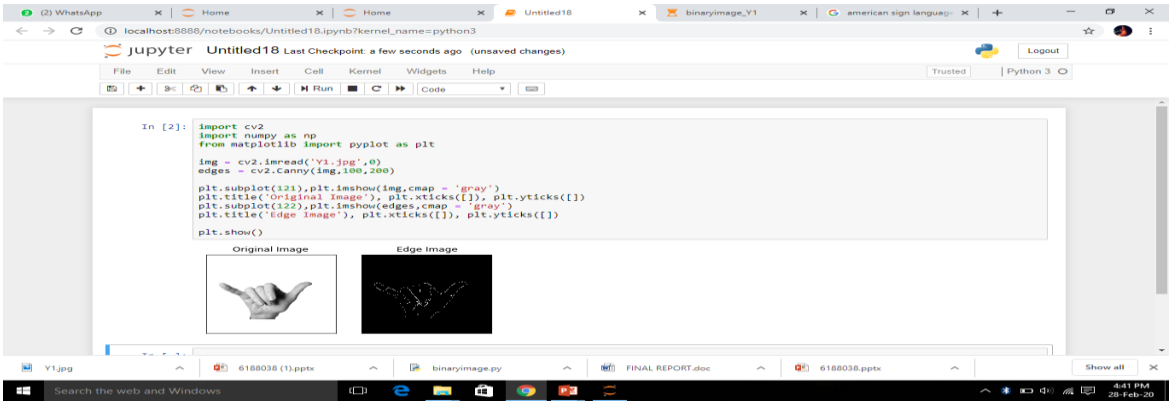
1. Grayscaling of Images using OpenCV



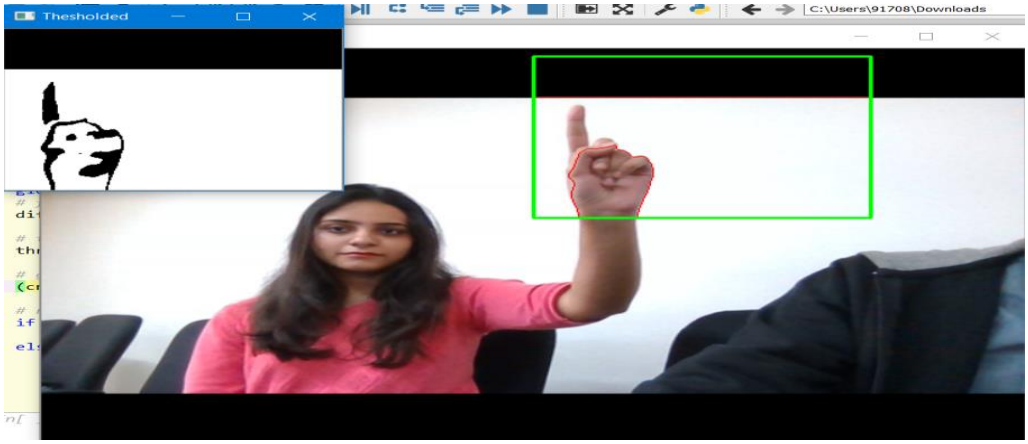
2. Binary Image using OpenCV



3. Canny edge detection



4. **Hand gesture recognition from a live video using webcam**

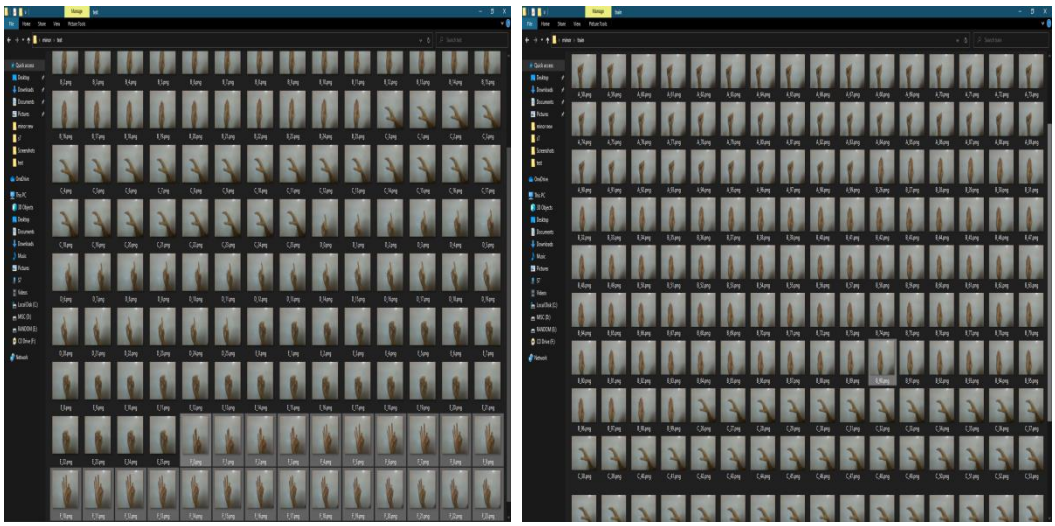


5. **Capture signs and create dataset using Python**

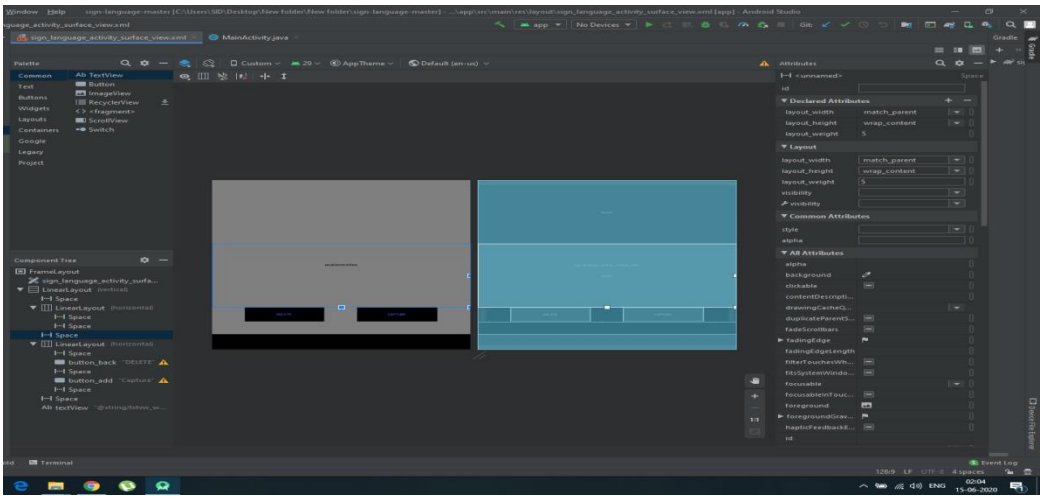
```
Alphabet: A
Number of images to captured: 10
Delay before recording (seconds): 10
Delay between image captures: 2
Path of dataset folder: MINOR PROJECT
MINOR PROJECT/A_0.png written!
MINOR PROJECT/A_1.png written!
MINOR PROJECT/A_2.png written!
MINOR PROJECT/A_3.png written!
MINOR PROJECT/A_4.png written!
MINOR PROJECT/A_5.png written!
MINOR PROJECT/A_6.png written!
MINOR PROJECT/A_7.png written!
MINOR PROJECT/A_8.png written!
MINOR PROJECT/A_9.png written!
```

```
In [ ]:
```

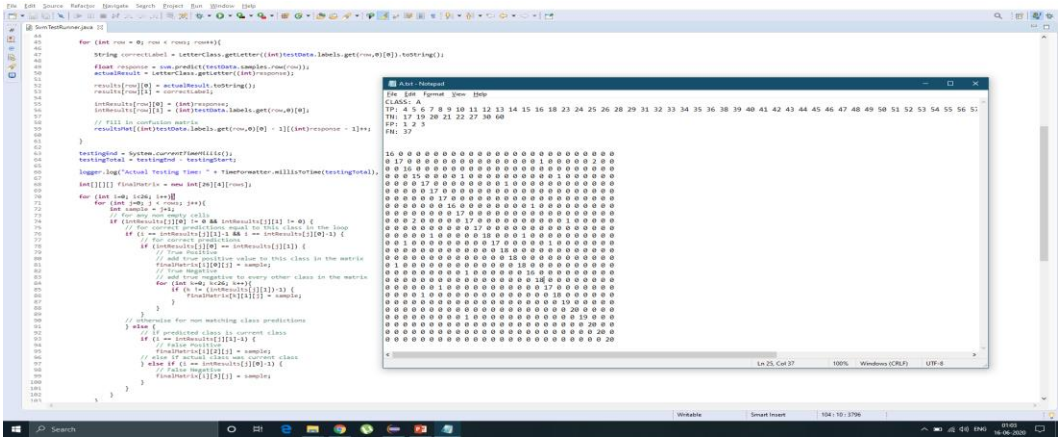
6. **Dividing our dataset into train and test in the ratio of 75:25**



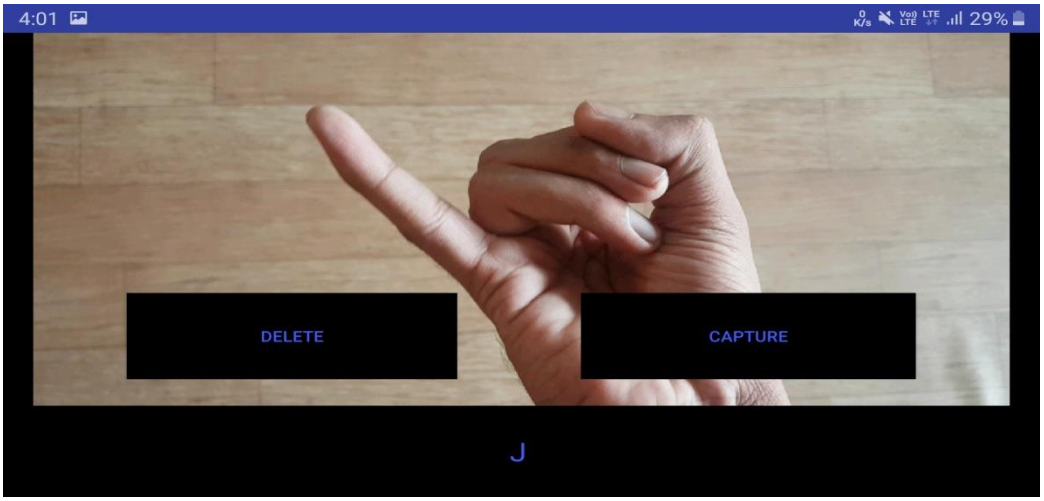
7. Layout of our Android App created using Android Studio



8. Confusion and category matrix created using train and test database



9. Android App capturing a sign from the user



10. Text to speech using gTTS