SIGN LANGUAGE TRANSLATOR

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CONTENTS

INTRODUCTION

- Gestures are the most common body language, which can be used for human computer interaction.
- Gesture recognition is a challenge while using gesture as a communication medium.
- We need to extract features and perform recognition based on those features.
- Mostly neural networks are used for this purpose.

PROBLEM DESCRIPTION

“How the problems faced by mute people can be accommodated with technological assistance and the barrier of expressing emotions can be overshadowed.”

EXISTING SYSTEM

Gesture detection :

~ Contact devices :- Data gloves

~ Non contact devices :- Information entropy algorithm

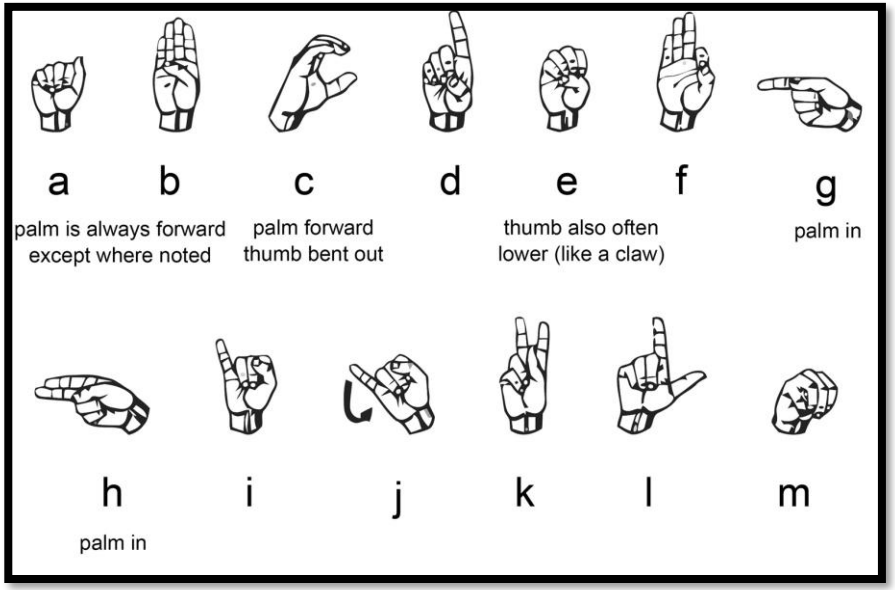
Kinect’ Sensor by Microsoft

PROPOSED SYSTEM

Application that can recognize American Sign Language using a Convolutional Neural Network

Features :

- Real time (ASL) detection based on gesture made by user.
- Customized gesture generation.
- Sentence formations and TTS assistance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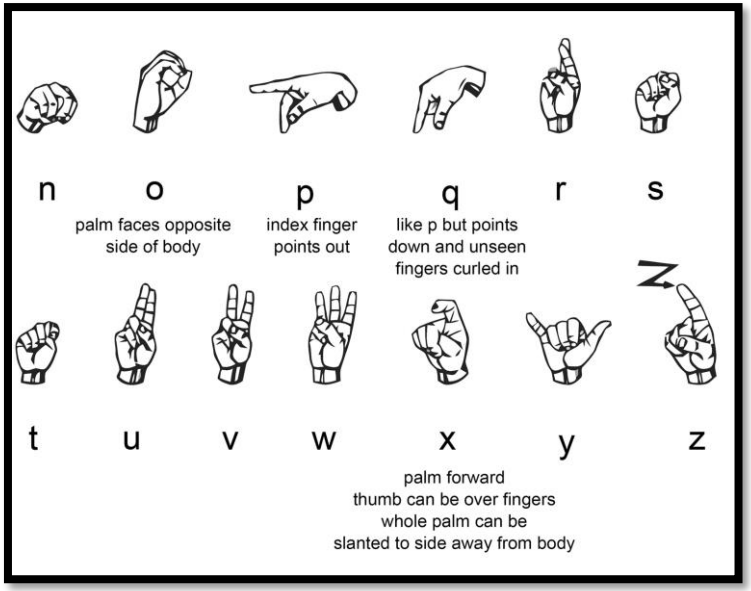
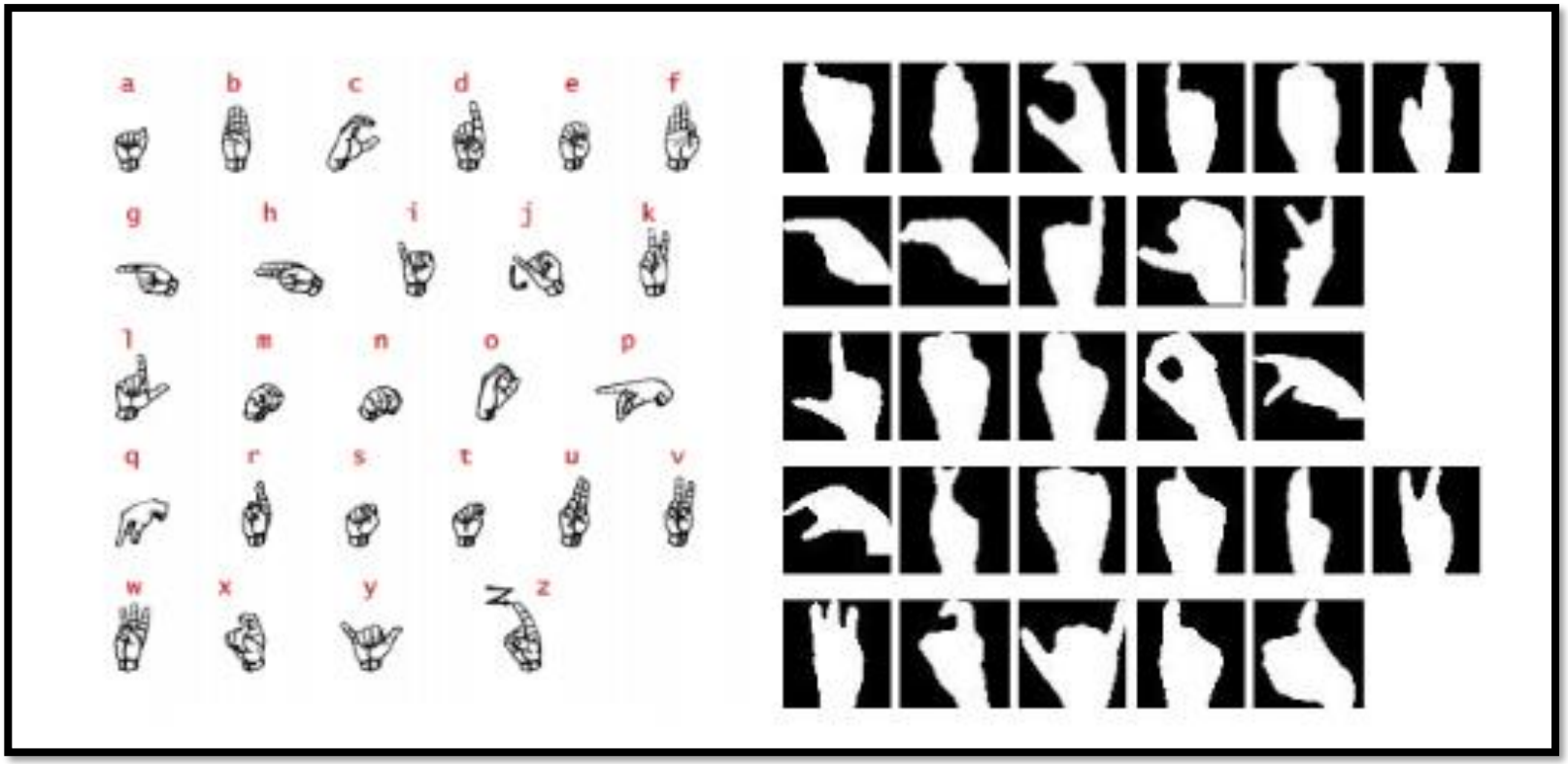
c
d
e
f
g
palm is always forward
except where noted
palm forward
thumb bent out
thumb also often
lower (like a claw)
palm in
h
i
j
k
l
m
palm in


n
o
p
q
r
s
palm faces opposite
side of body
index finger
points out
like p but points
down and unseen
fingers curled in
t
u
v
w
x
y
z
palm forward
thumb can be over fingers
whole palm can be
slanted to side away from body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MODULES DESCRIPTION

Core Modules :

1. Scanner
2. Data Pre-Processing
3. Gesture Processing
4. Custom Gestures
5. Predicted Output

Scanner

- The module that uses the webcam to capture images
- OpenCV is used for capturing the images

Data Pre-Processing

- Here we are converting the image to HSV format
- HSV is alternative representation of RGB
- This HSV values are adjusted to get sharper image
- OpenCV package is used

Gesture Processing

- This module act as the classifier .
- We are using a CNN with 3 convolution layers.
- Dataset : ASL alphabet by Kaggle
- Training Data : 45500 (1750x26)
- Test Data : 6500 (26x250)
- The Evaluation Results 90% of accuracy with 9% loss.
- This module returns an alphabet corresponding to the sign.

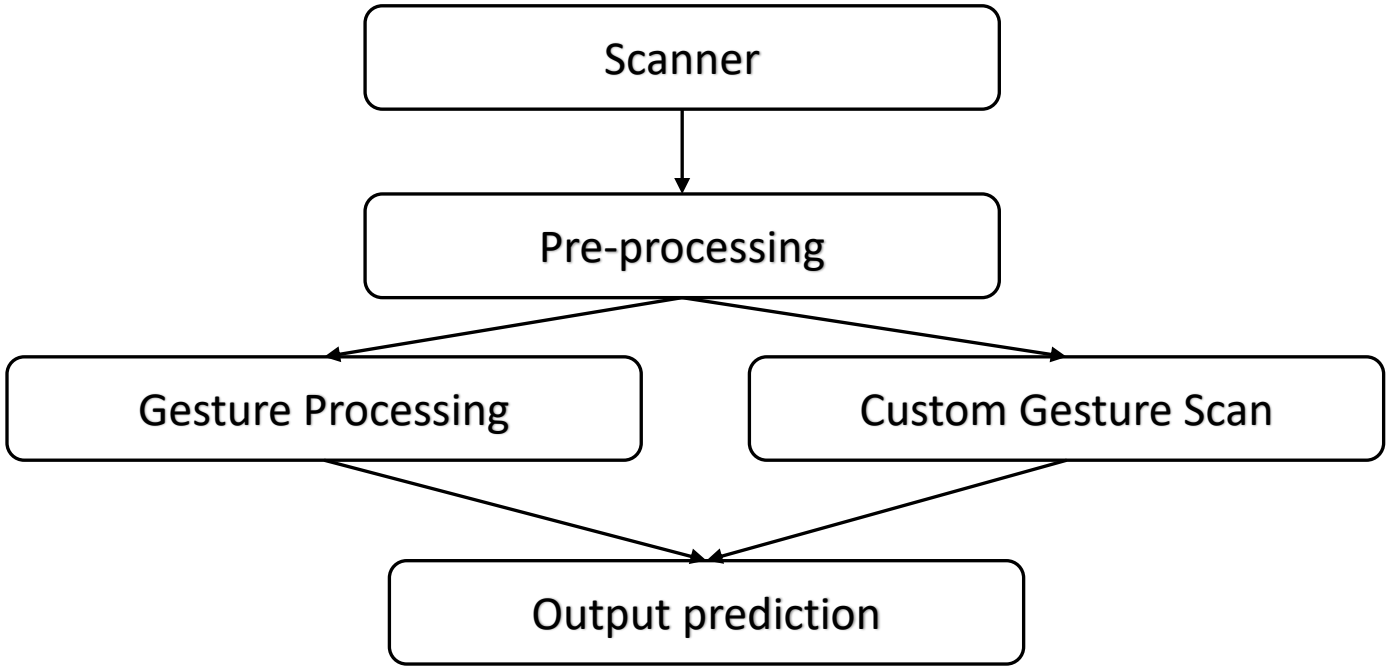
Custom Gestures

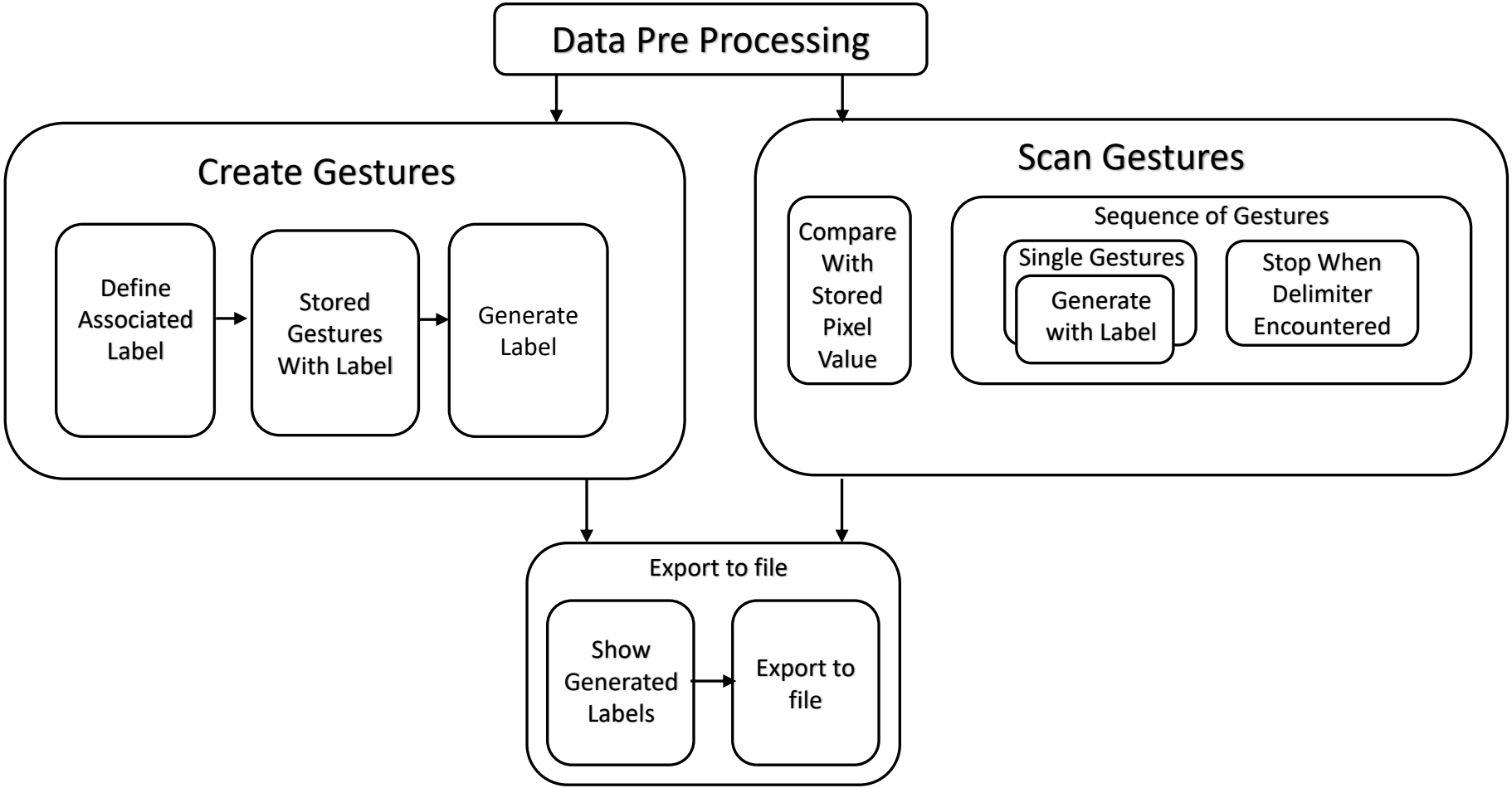
- User can define gesture with custom meaning like words, emotions etc.
- Initially image is captured and its HSV mask is generated
- HSV file is saved as a .png file
- The file is saved in a directory named with the word that means

Predicted Output

- Gestures are recognized and corresponding meaning can be displayed
- These outputs can be combined to form sentences

DATA FLOW DIAGRAM




Data Pre Processing
Create Gestures
Define Associated Label
Stored Gestures With Label
Generate Label
Scan Gestures
Compare With Stored Pixel Value
Sequence of Gestures
Single Gestures
Generate with Label
Stop When Delimiter Encountered
Export to file
Show Generated Labels
Export to file

REQUIREMENTS

Minimum Hardware Requirements

- Intel Pentium Dual Core E6600 2.6Ghz / AMD Athlon II X2260
- 512 MB Disk Space
- 2GB RAM
- 256 MB VRAM
- USB Keyboard, Mouse & Speaker
- 2MP VGA webcam & Monitor

Software Requirements

- OS : Window 7 or later, Linux or macOS
- Python 3.6.
- TensorFlow framework, Keras API
- Real-time computer vision using OpenCV
- Industrial standard GUI application (PyQT5), Tkinter.
- Offline TTS assistance for python

SAMPLE OUTPUT SCREENSHOTS

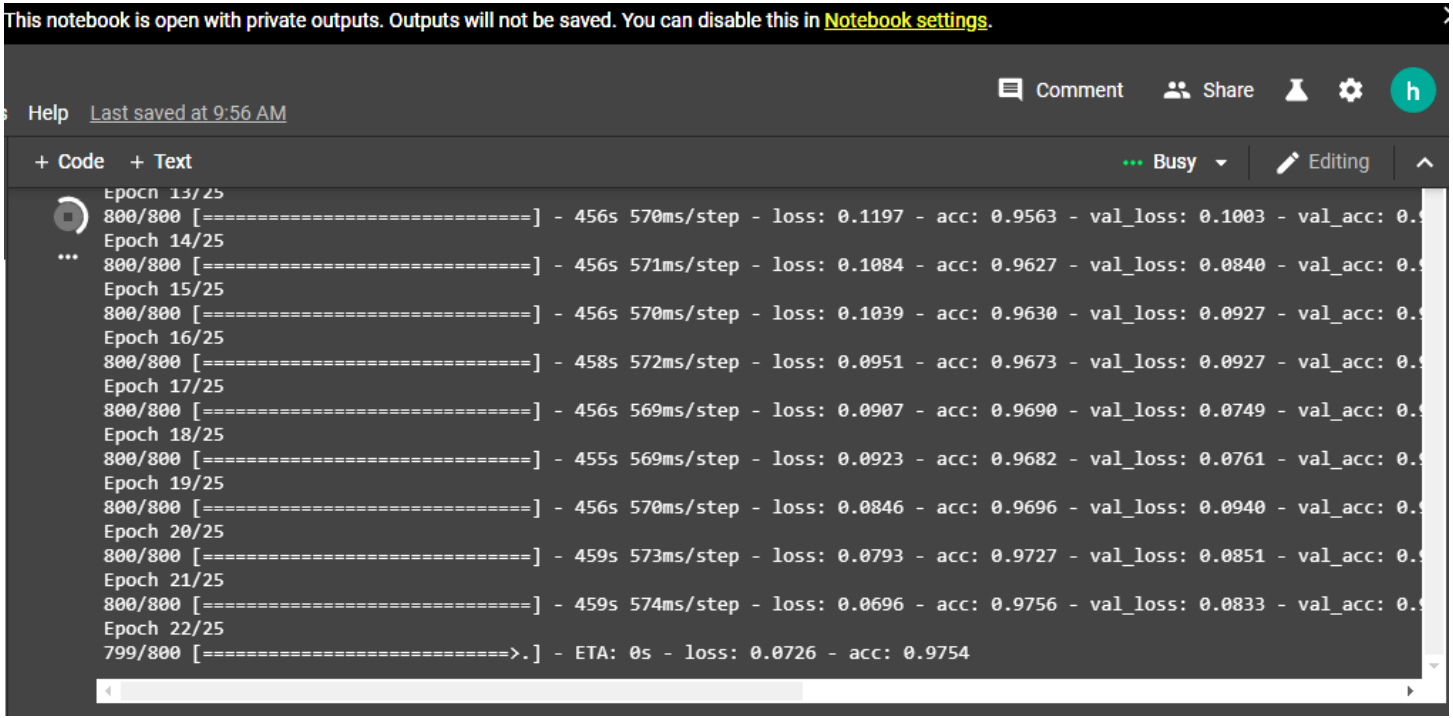


Fig 1 : Model Training

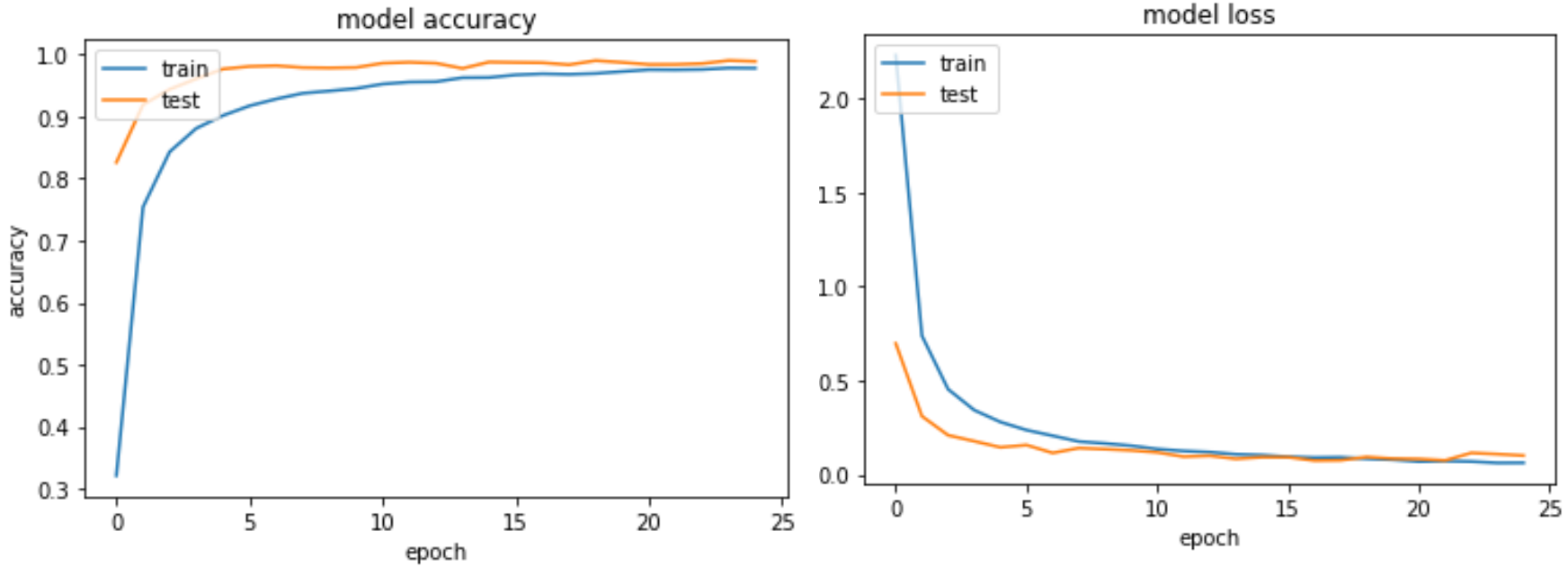
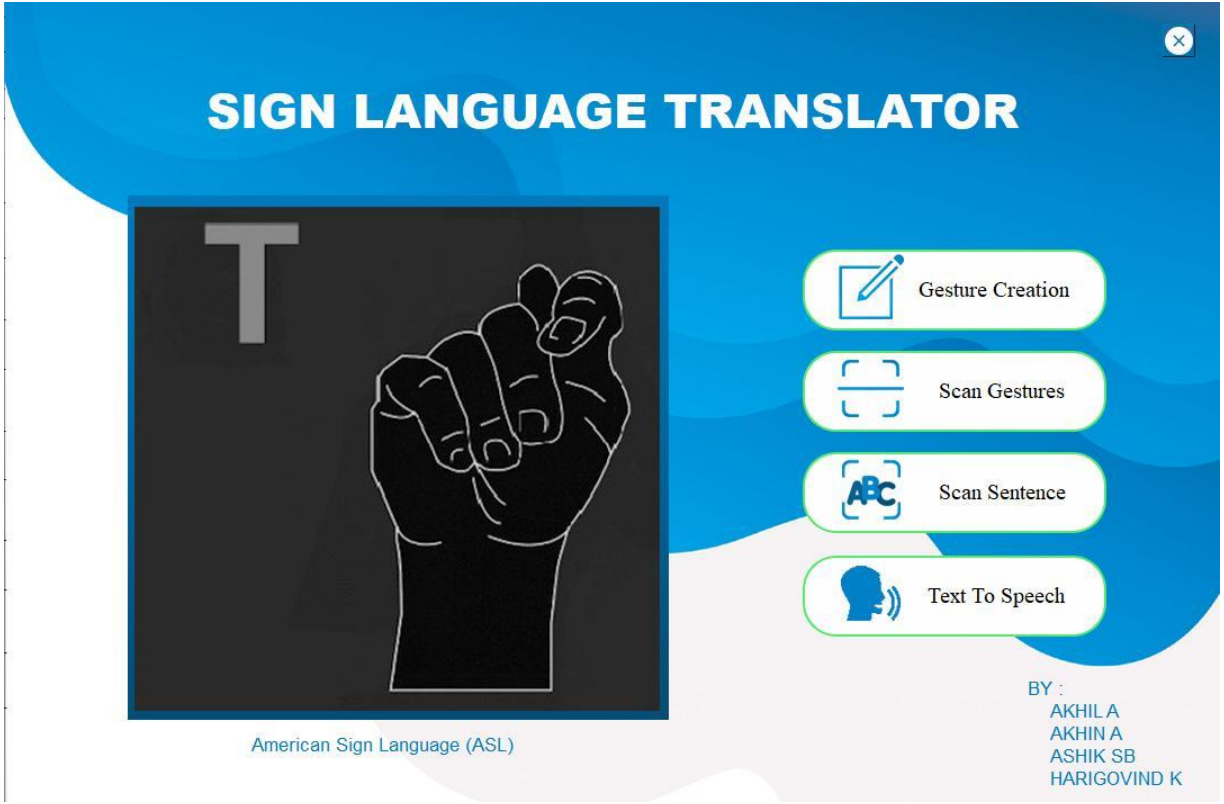


Fig 2 : Model Evaluation


SIGN LANGUAGE TRANSLATOR
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American Sign Language (ASL)
Gesture Creation
Scan Gestures
Scan Sentence
Text To Speech
BY :
AKHIL A
AKHIN A
ASHIK SB
HARIGOVIND K

Fig 3 : Main UI

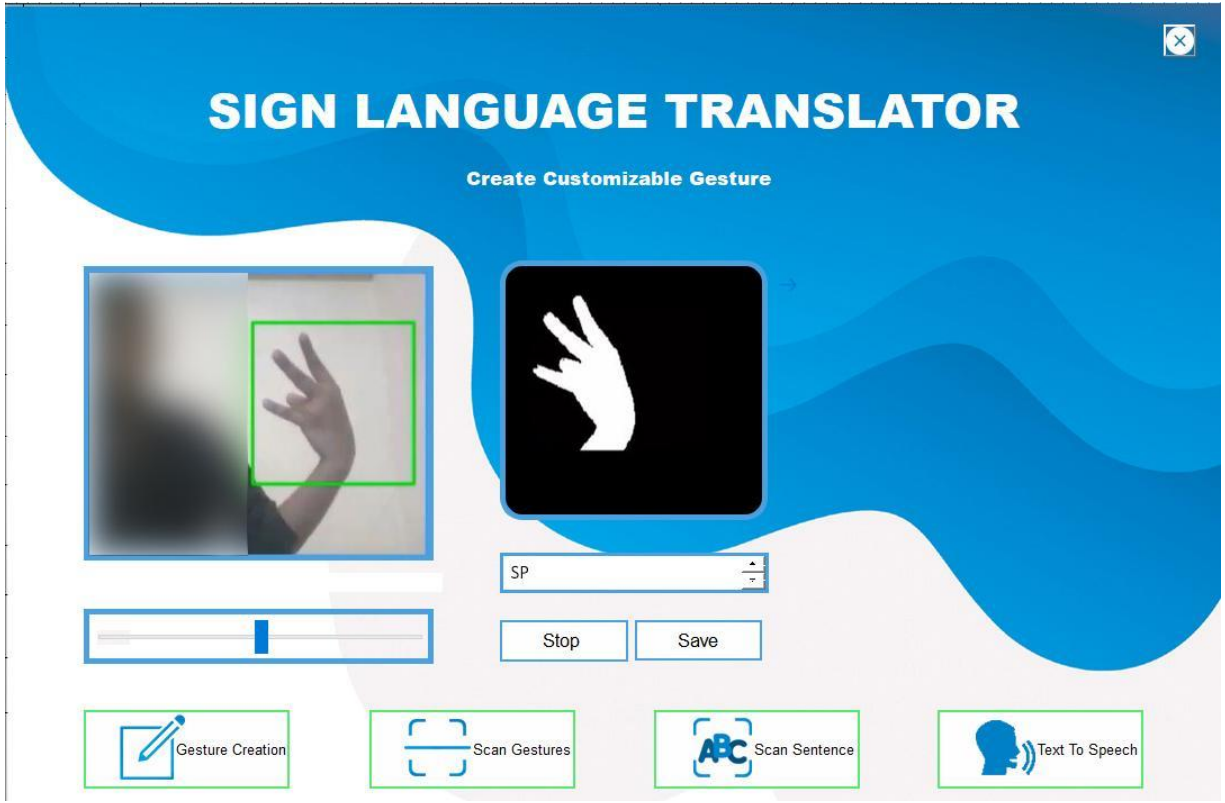

Fig 4 : Create Customizable Gesture

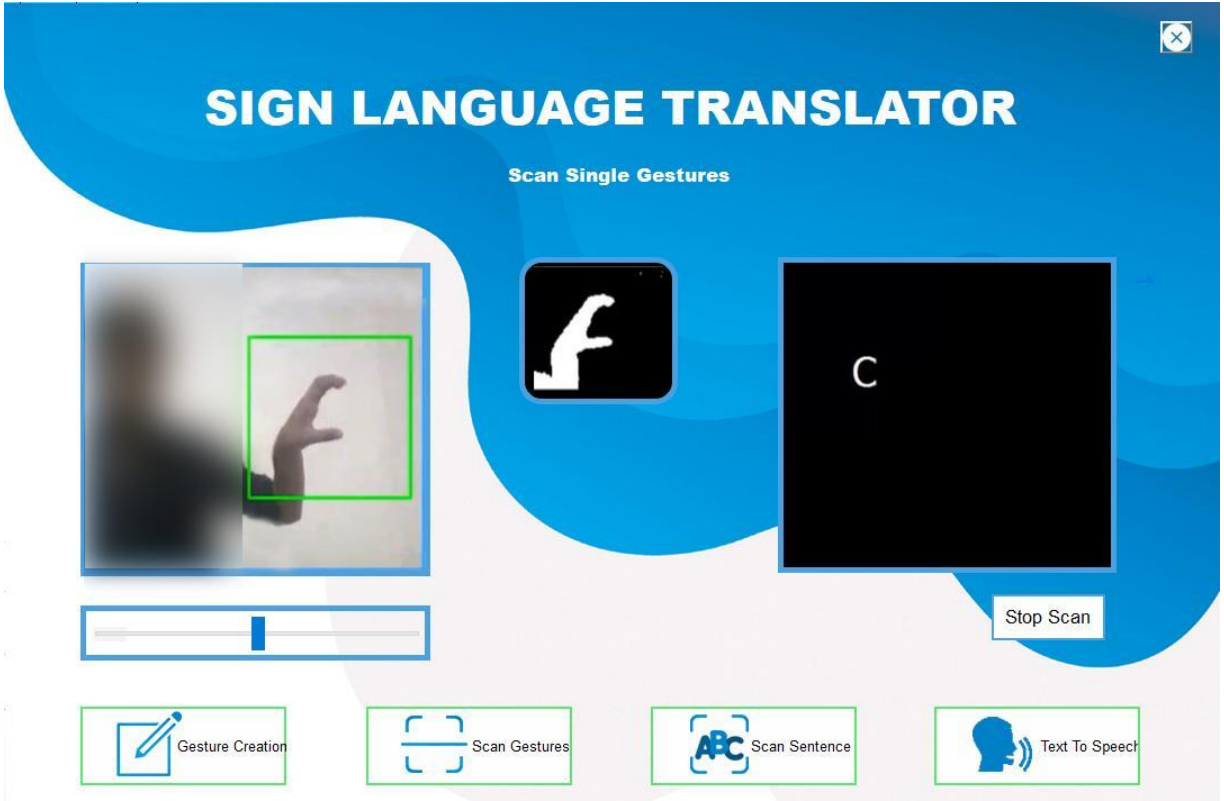

Fig 5 : Scan Single Gesture

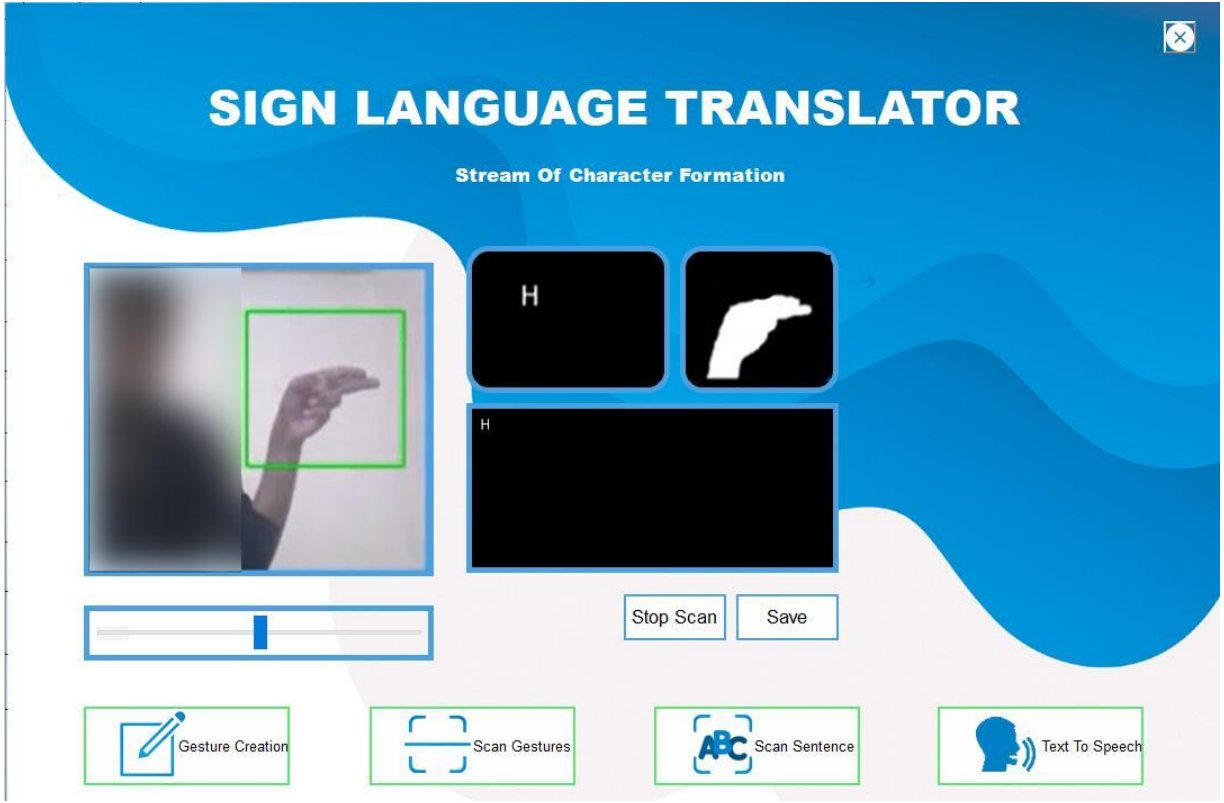

Fig 6 : Stream Of Character Formation

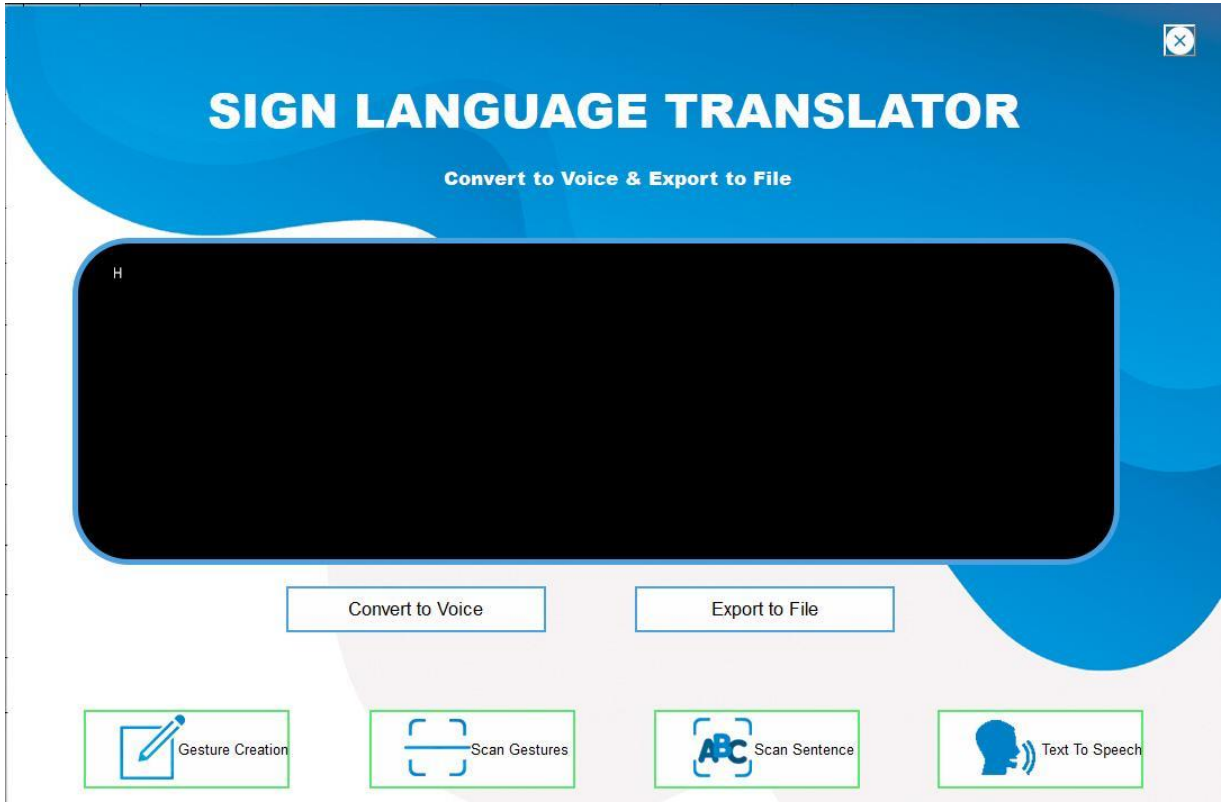

Fig 7 : Convert to Voice & Export to File

FUTURE ENHANCEMENT

- Image pre-processing can be improved using advance algorithms
- Contrast slider can be automated
- Software can be embedded in wearables
- Software can be modified for playing games and chatting

CONCLUSION

A method of gesture recognition based on CNN is introduced and evaluation of the model in a real-world environment.The experimental results show that our model can achieve good results.The network also supports the addition of more gestures. In the future, we can even use gestures to play games, chat and email with others. Although the accuracy obtained by the experiment has been very high, we feel that it is necessary to further improve for the application to real life

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