Sign Language Translation using Real Time

Group 7

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OVERVIEW

- *Introduction*
- *Methodology*
- *DIP techniques*
- *Models*
- *GUI*
- *Results (DEMO)*
- *Performance overview*
- *References*
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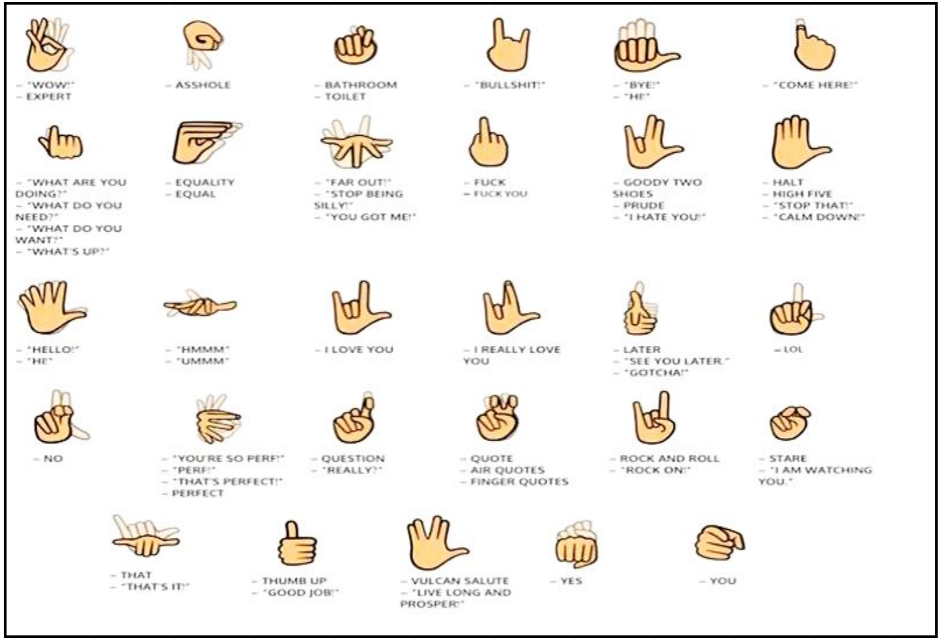
Overview

INTRODUCTION

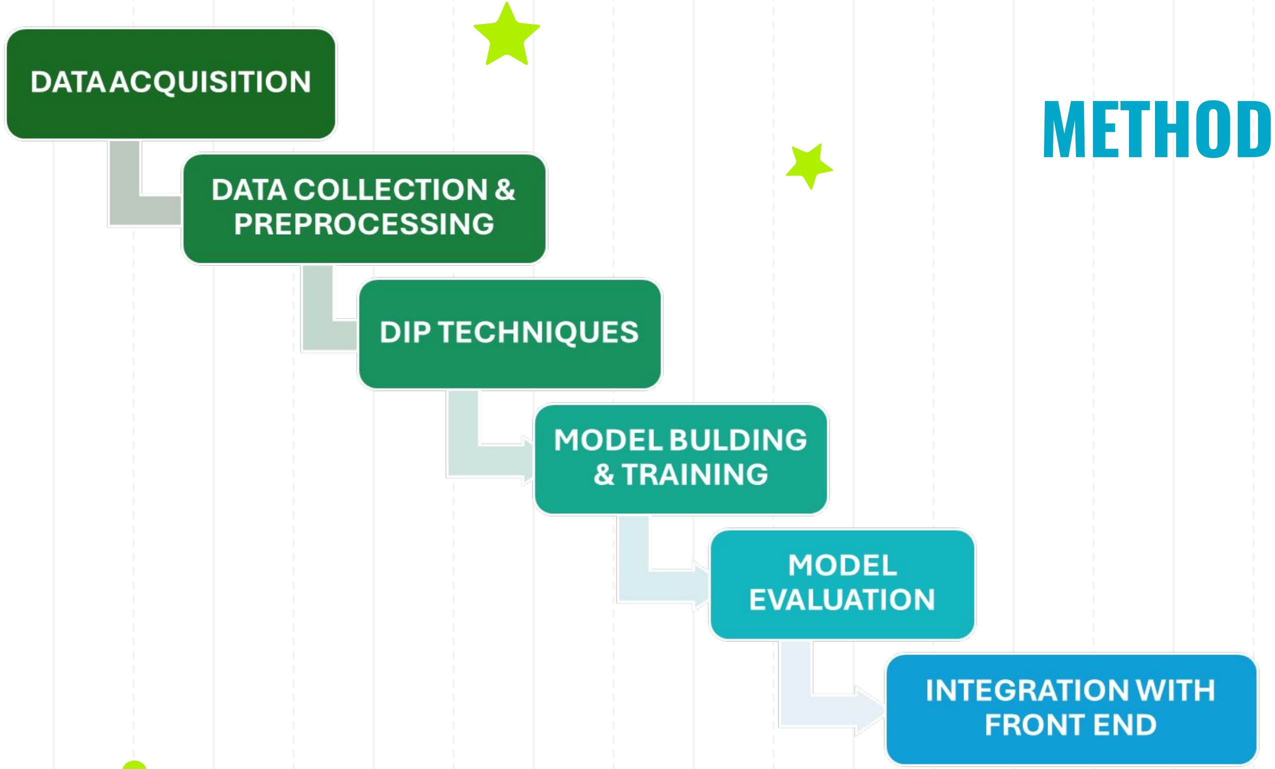
- **Goal:** To detect and recognize hand gestures in real time video
- **Real World Application:** This project takes sign language gestures and translates it in real time to allow people who do not know sign language understand what the person is signing
- **Technology Stack:** Python, Mediapipe ,opencv,pygame,TensorFlow ,ML&DL models



– "WOW!" – EXPERT
– ASSHOLE
– BATHROOM – TOILET
– "BULLSHIT!"
– "BYE!" – "HI!"
– "COME HERE!"
– "WHAT ARE YOU DOING?" – "WHAT DO YOU NEED?" – "WHAT DO YOU WANT?" – "WHAT'S UP?"
– EQUALITY – EQUAL
– "FAR OUT!" – "STOP BEING SILLY!" – "YOU GOT ME!"
– FUCK – FUCK YOU
– GOODY TWO SHOES – PRUDE – "I HATE YOU!"
– HALT – HIGH FIVE – "STOP THAT!" – "CALM DOWN!"
– "HELLO!" – "HI!"
– "HMMM" – "UMMM"
– I LOVE YOU
– I REALLY LOVE YOU
– LATER – "SEE YOU LATER." – "GOTCHA!"
– LOL
– NO
– "YOU'RE SO PERF!" – "PERF!" – "THAT'S PERFECT!" – PERFECT
– QUESTION – "REALLY?"
– QUOTE – AIR QUOTES – FINGER QUOTES
– ROCK AND ROLL – "ROCK ON!"
– STARE – "I AM WATCHING YOU."
– THAT – "THAT'S IT!"
– THUMB UP – "GOOD JOB!"
– VULCAN SALUTE – "LIVE LONG AND PROSPER!"
– YES
– YOU

Introduction

METHODOLOGY



DATA ACQUISITION

DATA COLLECTION & PREPROCESSING

DIP TECHNIQUES

MODEL BULDING & TRAINING

MODEL EVALUATION

INTEGRATION WITH FRONT END

DIP TECHNIQUES

- BGR TO HSV CONVERSION
- BINARY THRESHOLDING
- HIGH PASS FILTERING
- KEY POINT EXTRACTION
- EDGE DETECTION
- IMAGE RESIZING

DIP TECHNIQUES

CNN - DEMO

Model Architecture:

- We used a model trained using Convolutional Neural Network
- Three convolutional layers are used, each followed by max-pooling layers
- The last layer is a fully connected dense layer with softmax activation for classification

Training and Evaluation:

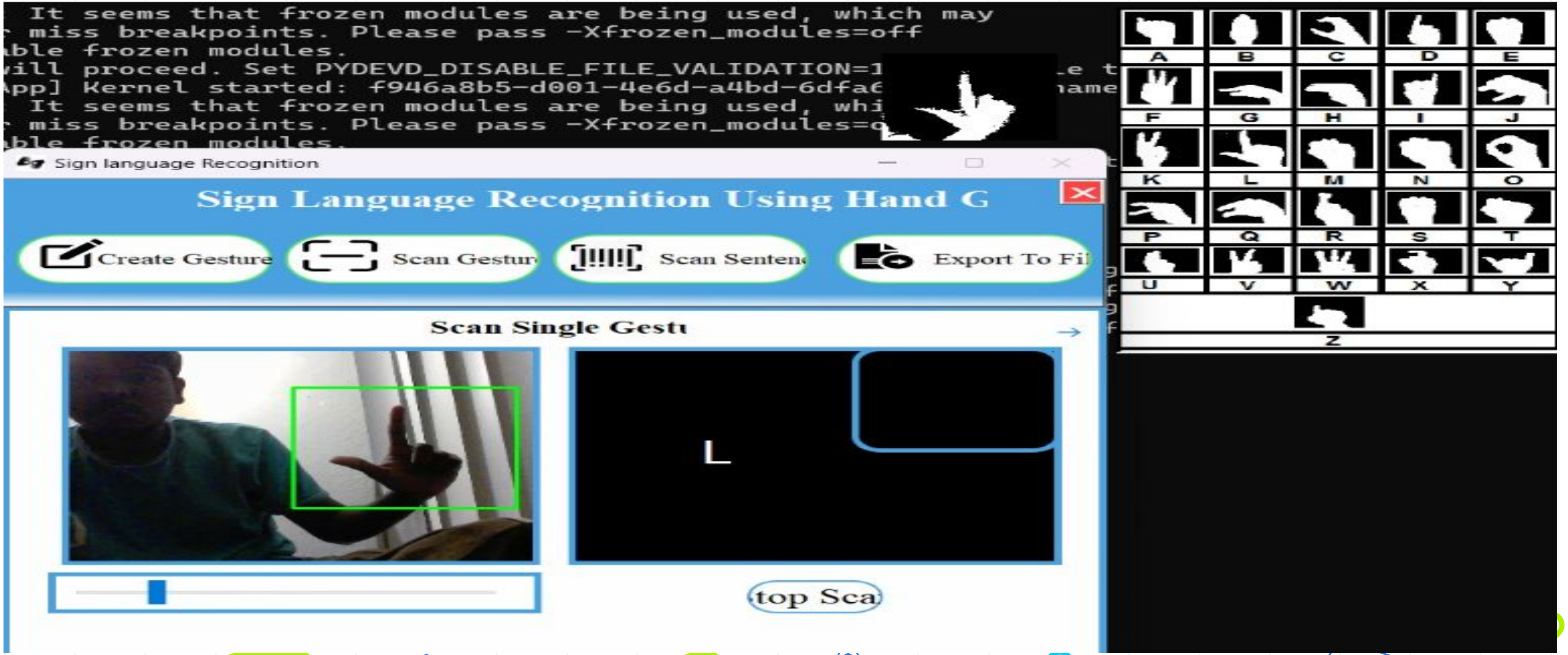
- Stochastic Gradient Descent (SGD) optimizer is used weight updation
- Based on the accuracy,learning rate hyperparameter is chosen accordingly

Integration and Deployment:

- Used PyQt5 for integration

CNN

CNN - GUI



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  It seems that frozen modules are being used, which may
- miss breakpoints. Please pass -Xfrozen_modules=off
ble frozen modules.
will proceed. Set PYDEVD_DISABLE_FILE_VALIDATION=1            .e t
App] Kernel started: f946a8b5-d001-4e6d-a4bd-6dfa6            name
  It seems that frozen modules are being used, whi
- miss breakpoints. Please pass -Xfrozen_modules=o
ble frozen modules.
```

LSTM - DEMO

Model Architecture:

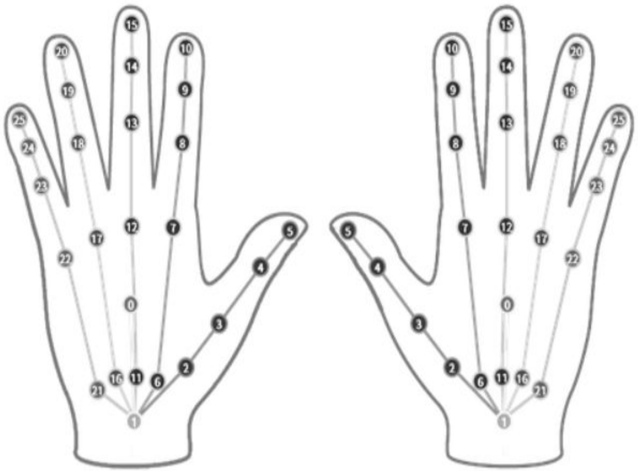
- Hand Tracking using MediaPipe
- LSTM Network for sequence learning
- Output Layer for gesture classification

Training and Evaluation:

- Train LSTM network on preprocessed data
- Evaluate model performance using accuracy metrics

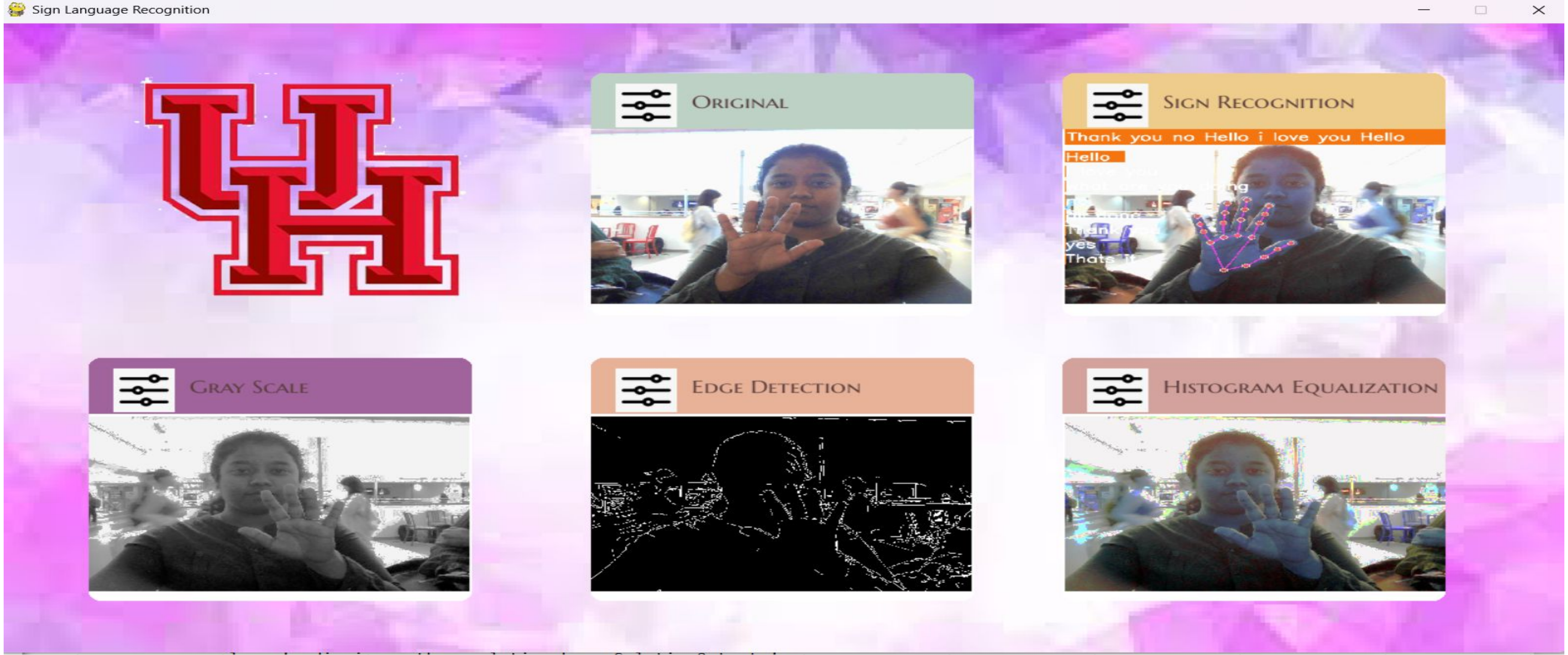
Integration and Deployment:

- Integrate trained model with MediaPipe for real-time detection
- Considerations for deployment in practical applications



LSTM

LSTM - GUI



Sign Language Recognition

```
Thank you no Hello i love you Hello
Hello
[illegible]
[illegible]ng
[illegible]
[illegible]
yes
Thats it
```

RANDOM FOREST/CNN/LSTM COMPARISON

RANDOM FOREST

- Image dataset utilized
- Achieved 80% accuracy

CHALLENGES:

- Experiences increased training time with video data

CNN

- Successfully trained letters

CHALLENGES:

- Considers background information and requires more data for improved performance

LSTM

- Successfully trained words

PROS:

- Requires less data
- Faster training and detection

PROJECT DEMO

SIGN LANGUAGE DETECTION USING CNN (DEMO)

SIGN LANGUAGE DETECTION USING LSTM (DEMO)

PROJECT DEMO

CONCLUSION AND FUTURE PROSPECT

- In this project, we successfully trained a deep learning model to classify real-time actions. “Hello”,“Thank you”, “I love you”, “what are you doing” ,”Yes”, “No”, “That's it”,”All Done” and the model will predict the action successfully
- We can improve the project by using NLP techniques to train the model on additional words and sentences. This expansion will enhance the model's capabilities and make it more inclusive and versatile for users

Future Prospect

REFERENCES

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- *https://ieeexplore.ieee.org/document/10080705/authors#authors:*
- *https://medium.com/@zgnxwky/sign-language-detection-using-long short term memroy-model-5258ed3e5e34*
- *https://data-flair.training/blogs/sign-language-recognition-python-ml-opencv*

THANK
YOU