

# Sign Language Detection

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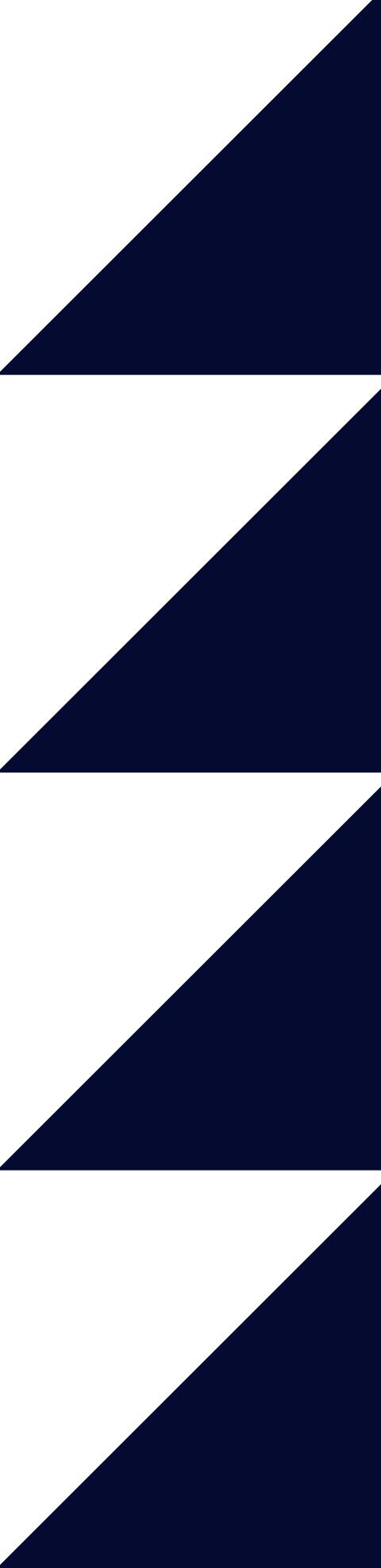
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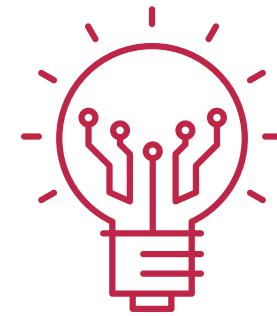
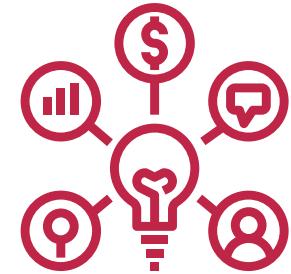
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# Introduction



## Problem:

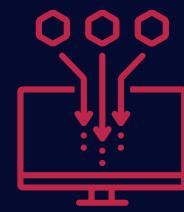
- Deaf people suffer from the way of communicating with others, especially in dealing with government and private agencies, public services, and stores. With the difficulty of providing a sign language translator for all parties, The difficulty of communication for them is increasing.
- 5% of the world's population and 1.4% of Saudis are deaf people, while 90% of the service providers do not provide facilitative arrangements for deaf people.

## Solutuation

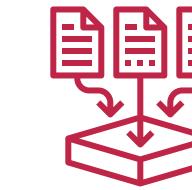
- Develop a technical solution that translates sign language and makes it understandable to all people by using deep learning

## Objectives

- Build Arabic sign language translator
- Removing communication barriers.
- Raise the quality of the provided services.



# Data Collection:



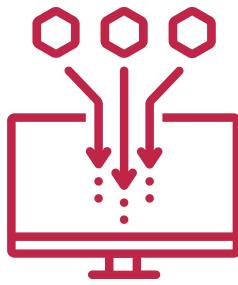
## Data :

- The data for this project are videos of Arabic sign language



## Tools:





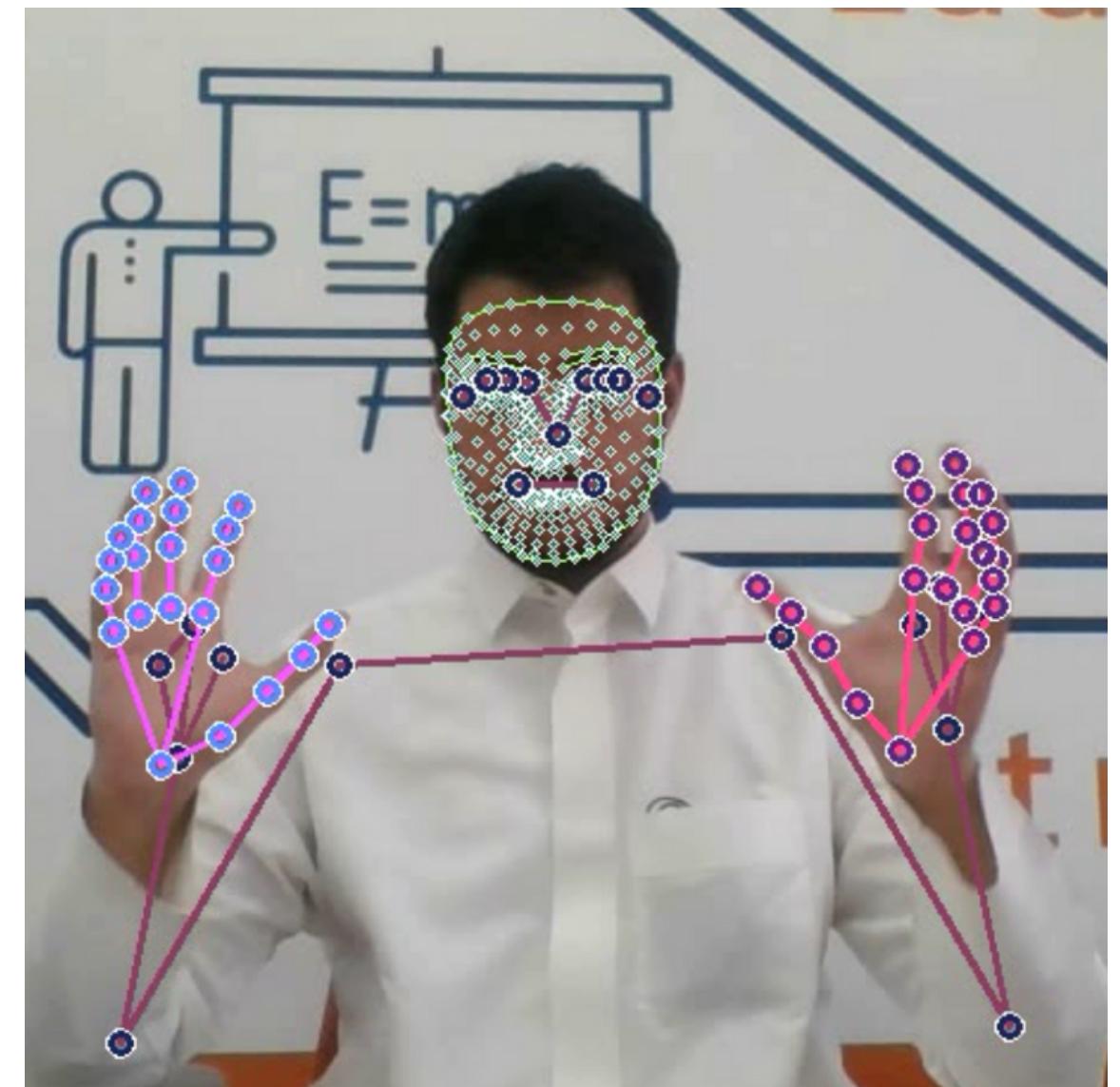
# Data Collection:

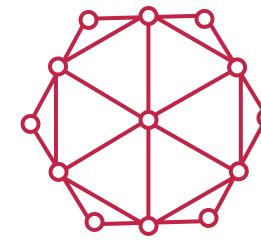
## MediaPipe Holistic:

This library enable the model to simultaneously detect face and hands and extract key points to pass on to a computer vision model.

## We collected the following words:

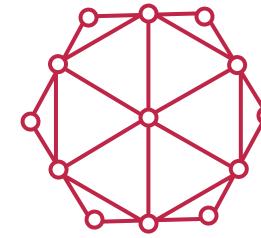
- I need , Ambulance , Where , Street , Work , Thank you Bootcamp , in this , I want , Report , Accident
- **30 clips** recorded for each word
- Each clip contains **30 frames**
- Each frame contains **1662 landmarks (points)**





# Model Architecture

- GRU(256, tanh, input\_shape=(30,1662))
- GRU(128, tanh)
- Dense(64, ReLU)
- Dense(32, ReLU)
- Dense(8, SoftMax)
- Optimizer: Nadam
- Loss: Categorical Cross entropy
- Metrics: Categorical Accuracy



## Gated recurrent units (GRUs)

- Reset and Update gates only (LSTM: input, output and forget gates)
- Computationally more efficient



## Model Performance

### Categorical Accuracy

Train

99%

Validation

96%

Test

89%

### Categorical Cross entropy Loss

Train

0.04

Validation

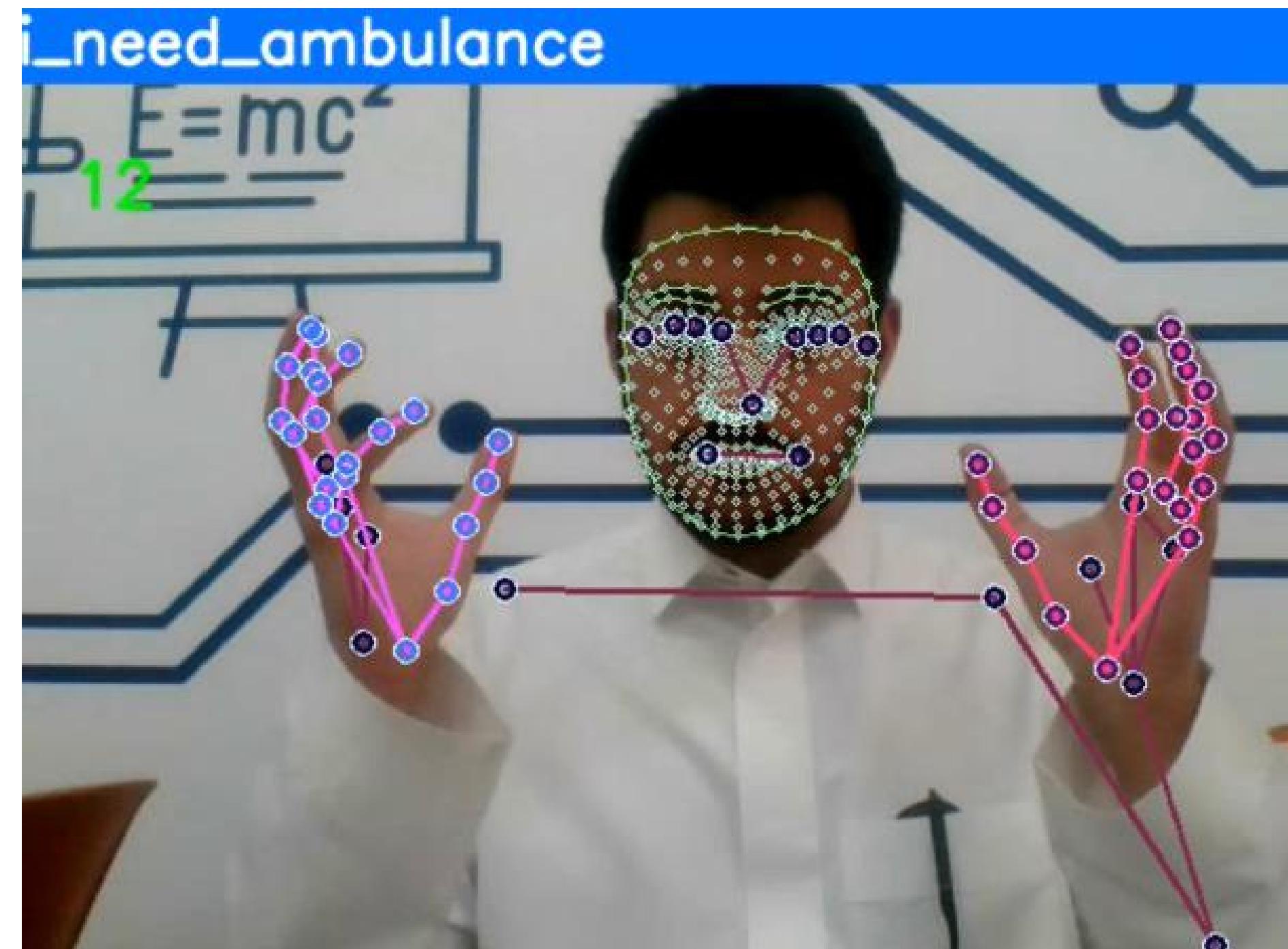
0.17

Test

0.45

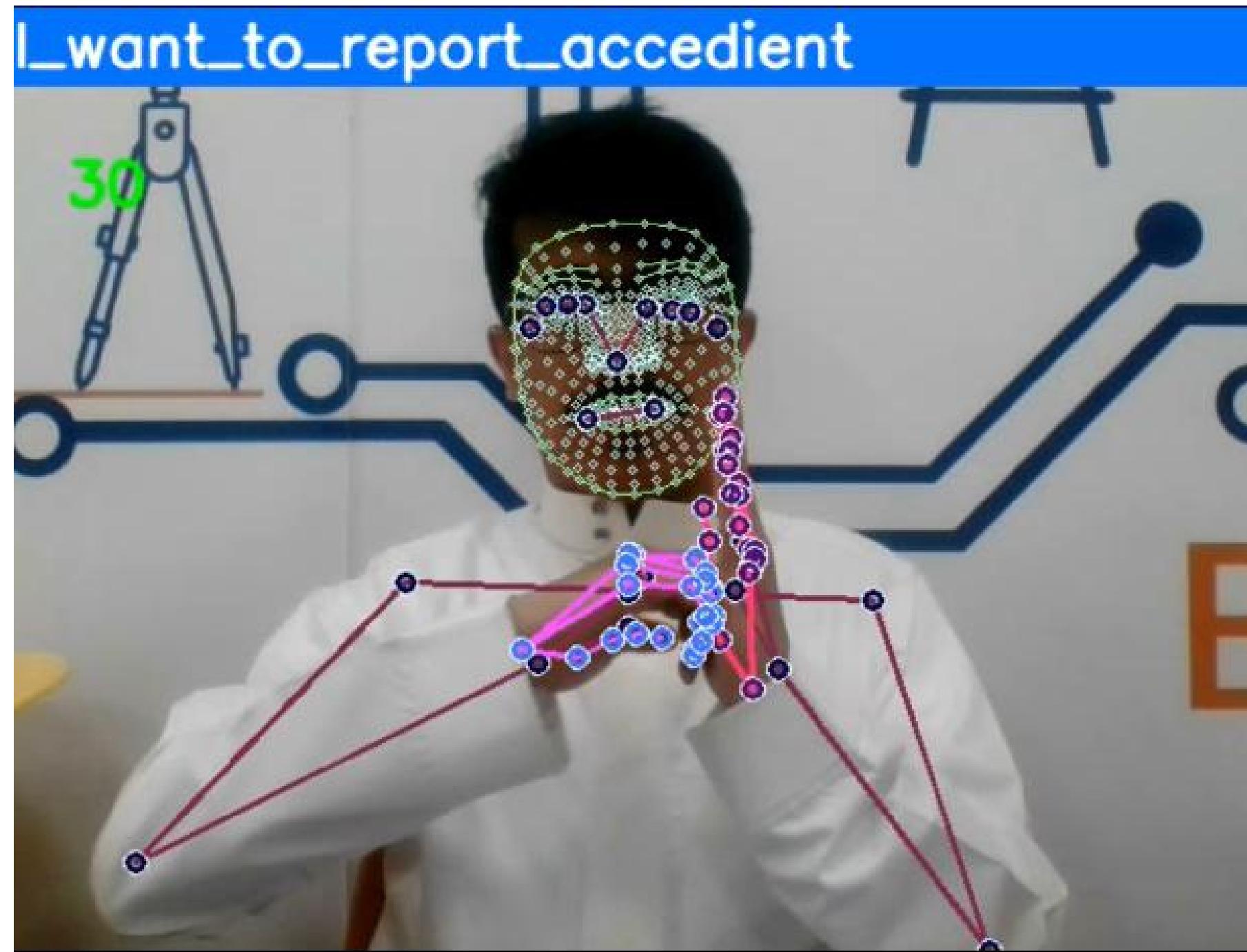
# Results

## Clip 1

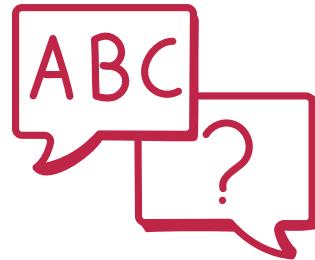


# Results

## Clip 2



# Difficulties



Learn sign language.

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Looking for Arabic resources for sign language.

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Different accent between Arabic sign language

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Improve the model results from LSTM model to GRU model, because the LSTM model was slow

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We face some Problem in our devices because the model



# Conclusion:

In this project, we applied several types of machine learning models in a data set of different words to learn about the Arabic sign language. We also noticed the diversity of words and some machine learning algorithms trained the system on Match gestures with words and expressions more accurately. Finally, the main purpose of our project is to help people from the deaf community to be able to communicate more easily with others.

# Future work

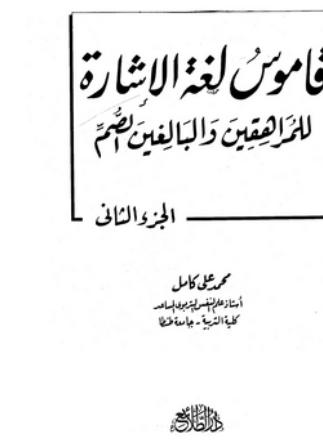
- Add more words to optimize our deep learning
- Planning in the future to make it a mobile application



# References



**TAWASAL Association of Assistive Technology for People with Disability**



**Arabic dictionary of sign language**



**Mohammad Alfaid**

Our Arabic Sign Language Translator

# Thank you!

