Realization and Implementation of Communication for Hearing Impaired and Inarticulate People

September 23, 2021

Department of Electrical Engineering

(Group Members)

Muhammad Faizan Ikram	**2018-UET-NML-ELECT-27**
Tanzila Iram	**2018-UET-NML-ELECT-34**

(Supervisor)

Dr. Sajjad Ur Rehman
Department of Electrical Engineering

(Co-Supervisor)
Dr. Majid Ali
Department of Electrical Engineering

Namal Institute, Mianwali Affiliated with University of Engineering and Technology, Lahore

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1. Abstract

Natural language processing is one of the most growing fields of research. It deals with human-computer interaction and natural languages. Humans share ideas and thoughts with people around them using speech and hearing abilities. But this is not the case for hearing impaired and inarticulate people. Through sign recognition, communication is possible with hearing impaired and inarticulate people. This project aims to develop a mobile application-based system for recognizing sign language and converting it into text and speech, which provides smooth communication between the deaf-mute community and normal people, thereby reducing the communication barrier between them. Our proposed system will consist of a mobile application that would be used for communication. The project will mainly consist of two parts, i.e., sign-to-speech conversion and mobile application development. In sign-to-speech conversion, the sign will be recognized using a mobile camera with the help of image processing and machine learning algorithms and based on the recognized sign, it will be converted into text, and text will be used to generate speech. With the incorporation of the mobile app, this system will ease people with disabilities to communicate with non-disabled people and reduce the communication barrier between them.

2. Project Problem

"To design a system that will help in reducing communication barrier between specially-abled and normal people."

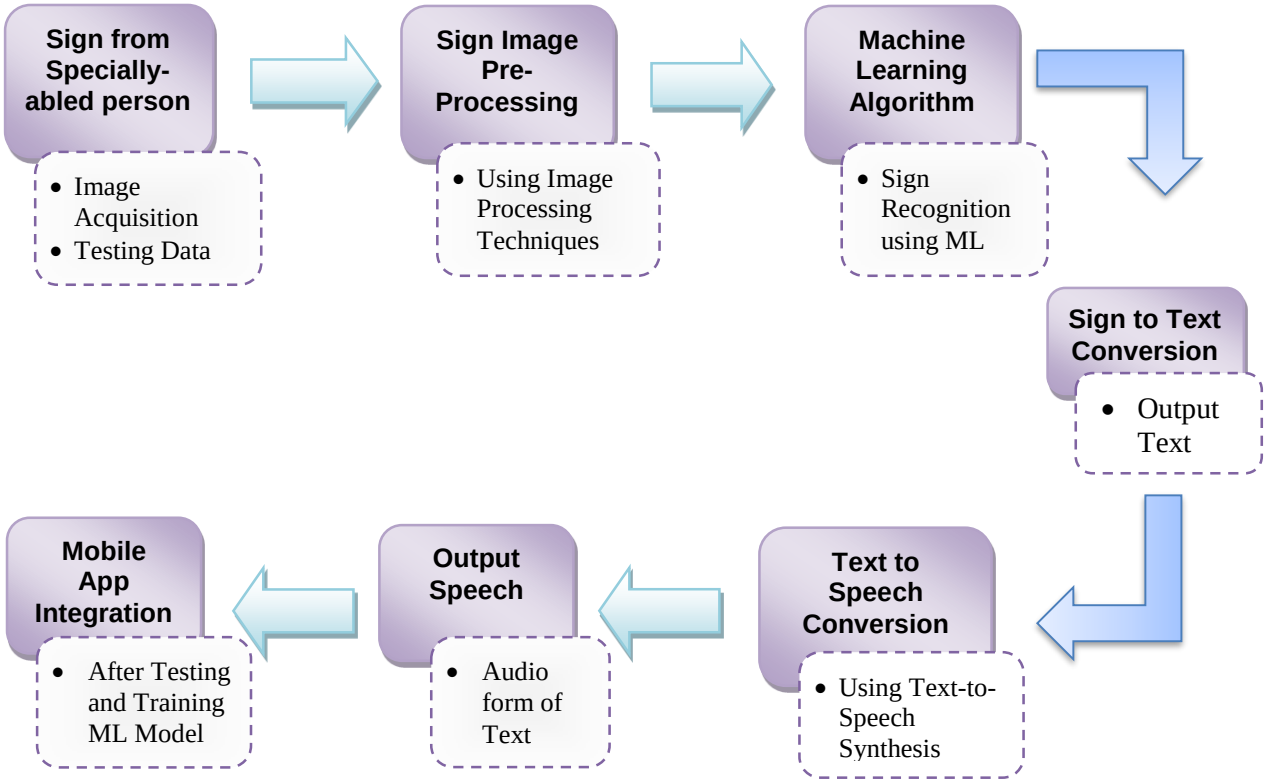
Communication with hearing impaired and inarticulate people is difficult because normal person cannot understand their sign language in normal circumstances. In this proposed project, we'll try to reduce this communication barrier between specially-abled and normal person.

3. Project Description:

Natural Language Processing (NLP) is an emerging field which helps in conveying information and meaning with semantic cues such as words, signs or images. This project is based on NLP which is a step for developing a system that can convert sign language into textual and audio form with mobile application interface.

In this project, sign language of hearing-impaired and inarticulate people will be recorded in the form of images using image processing and machine learning algorithms and will be used to convert into text. In next step, the text will be converted into speech using Text-to-Speech synthesis. The ML model based on deep learning algorithm will be used to perform above mentioned tasks and will be incorporated in mobile application for easy user interface.

4. Block Diagram:



5. Project Budget/Resources

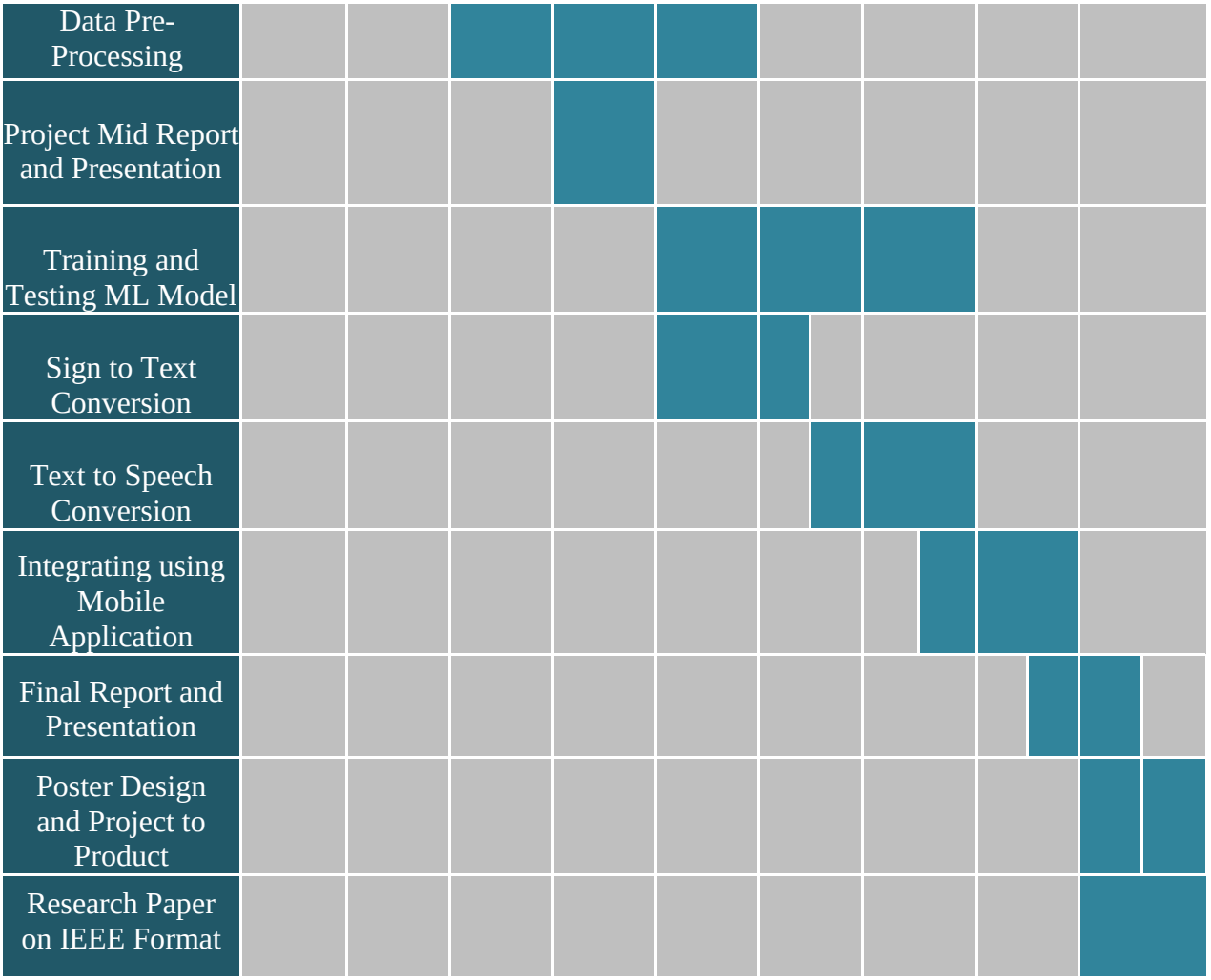
Project Cost Category	Estimated Amount
Travelling Expenses (Travelling to different locations for project data collection)	**Rs. 15000**
Research Expenses (Data and papers for project)	**Rs. 10,000**
Material Resources (All material that we might need to complete project, including paid APIs, web servers, equipment etc.)	**Rs. 15,000**
Total Amount	**Rs. 40,000**

6. Work Distribution

Task Type	Action Plan	Responsibility		Deliverable
		Leading Role	Supporting Role	
Reading and Research	Literature Review Research Papers	Both Group Members		Project Idea + Implementation Plan
Writing	Proposal Writing	Tanzila Iram	Faizan Ikram	Proposal
	Technical Report	Faizan Ikram	Tanzila Iram	Technical Report
	Presentation	Tanzila Iram	Faizan Ikram	Presentation Slides
	Research Paper	Tanzila Iram	Faizan Ikram	Research Paper
	Poster Design	Faizan Ikram	Tanzila Iram	Final Poster
	Proofreading	Faizan Ikram	Tanzila Iram	
Software	Sign to Speech Conversion	Tanzila Iram	Faizan Ikram	ML Algorithm
	Data Collection	Faizan Ikram	Tanzila Iram	Training Data
	Training & Testing ML Models (Sign to Speech)	Tanzila Iram	Faizan Ikram	Sign to Speech Conversion
	Integrating systems using Mobile Application	Faizan Ikram	Tanzila Iram	Final Product - A mobile Application

7. Project Plan/Timeline

Activity	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Write-up									
Project Proposal and Presentation									
Training Data Collection									
Literature Review									



8. Project Constraints

1) Time limitation can limit the complete design of prototype.
2) Low resolution mobile camera can affect the system performance.
3) Mobile RAM and storage.

9. Project Scope and Deliverables

The developed system in this project will provide best support to deaf-mute community to communicate, and normal people to understand their sign language, thereby reducing communication barrier between them. This will help hearing impaired and inarticulate people to convey information and also normal people to understand them in a better and easy way.

The project covers Image Processing, Computer Vision, Natural Language Processing, Mobile Application Development and Machine Learning modules.

Deliverables:

- A complete system that can convert sign language into speech.
- A complete product in the form of proposed integration of the system with mobile/web application.

10. References

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[6] A. P. S. M. A. T. D. D. P. Ankit Ojha, " Sign Language to Text and Speech Translation in Real Time Using Convolutional Neural Network," *INTERNATIONAL JOURNAL OF ENGINEERING RESEARCH & TECHNOLOGY (IJERT) NCAIT*, vol. 8, no. 15, 2020.