Real-Time Communication System Powered by AI for Specially Abled

Abstract:
People with impairments are a part of our society. Although technology is constantly evolving, little is being done to improve the lives of these people. The ability to communicate with a deaf-mute person has always been difficult. It is quite challenging for mute people to communicate with non-mute people because hand sign language is not taught to the general public. It might be quite challenging for them to communicate at times of crisis as well. In such circumstances where other modes of communication, like speech, are not possible, the human hand has remained a common alternative for information transmission. To have proper communication between the speech-hearing impaired person and a normal person, in any language, a voice conversion system with hand gesture recognition and translation will be beneficial.

The project intends to create a system that can translate speech into specified sign language for the deaf and dumb as well as translate sign language into a human hearing voice in the desired language to communicate a message to normal people. A Convolution Neural Network (CNN) is being used to build a model that is trained on various hand motions. This model is available to the end user as an app for the speech and hearing-impaired people.

Keywords:
Deaf, mute, hand gestures, speech-hearing transmission, convolution neural network

Objectives:

- To develop a system that would enable communicating with the deaf-mute people easier using Python, CNN, IBM Cloud, IBM Watson Studio, IBM Cloudant DB, Deep Learning and Python-Flask.
- To detect facial emotion.
- To offer language customization and provide a user-friendly interface.
- To obtain greater accuracy.

Literature Survey

SNO	AUTHOR NAME	PAPER TITLE	JOURNAL/CONFERENCE NAME OF PUBLICATION	PAGE NO/ VOLUME NO	YEAR OF PUBLICATION	DESCRIPTION
1	Ong Chin Am, Marlene lu,Bee Theng lau Pallavi Varma,Richa Priyadarshini, Shimi S	Design of communication Interpreter for deaf and dumb person	IGI Global publishing	Vol-3	2011	This paper represents an automated facial expression recognition system for monitoring disabled added with a feature to send short messaging system,using the viola-jones face detection algorithm which uses haarcascade algo.The failure part in this paper is that worked less intelligent for real time video capturing.

2	Bayam Mohammad saleh, Reem Ibrahim AlBeshr, Muhamamd usman Tariq	D-Talk: Sign Language Recognition system for people with disability using ML and image processing	International journal of advanced trends in computer science and engineering.	Vol-9	2020	This paper shows how AI is being used to help people who are unable to do what most people do in their everyday lives,Aligned with communication.Using ML.The problem is in real time supervised learning classification gone wrong some time
3	Kalpattu s-abishek, LeeChuunFai, Qubeley,Derek Ho	Glove-based hand gesturing recognition sign language translator using capacitive touch sensor	IEEE		2016	This paper represent a gesture recognition glove based on charge-transfer touch sensors for the translation of the american sign language.But the problem is it can recognize gestures only for the numbers from 0-9 and the 26 alphabets.
4	Matten Ahmed,Mujtaba Idress,zan Ul abideen,rafeena mumtaz	Deaf talk using 3d animated sign language	SAI computing conference		2016 2015	This paper represents the usage of sign langiuage interpreter using kinect v2. It is useful in the areas like airport,shops,hospitals etc..but in day to day life it is not possible to setup te 3D monitor

5	Pallavi Varma,Richa Priyadarshini, Shimi S	Design of communication Interpreter for deaf and dumb person	International Journal of science and research	Vol-4 Issue 1		This paper reprsents the usage of smart gloves which is a cost effective system.Using flex sensors,microcontroller and RF transceiver.

Drawbacks of the Existing System:

- Not cost effective.
- The model developed was not light weight for detecting emotions of the face.
- It included very less vocabulary.
- It required expensive technologies that are not usually affordable.

Problem Definition:

In our society, we have people with disabilities. The technology is developing day by day but no significant developments are undertaken for the betterment of these people. Communications between deaf-mute and a normal person has always been a challenging task. It is complicated for mute people to convey their message to normal people. Since normal people are not trained on hand sign language. In emergency times conveying their message is very difficult. The human hand has remained a popular choice to convey information in situations where other forms like speech cannot be used. Voice Conversion System with Hand Gesture Recognition and translation will be handy to have a proper conversation between a normal person and an impaired person in any language.

Proposed Solution:

The project aims to develop a system that converts the sign language into a human hearing voice in the desired language to convey a message to normal people, as well as convert speech into understandable sign language for the deaf and dumb. We use CNN to create a model that is trained on different hand gestures. An app is built which uses this model. This app enables deaf and dumb people to convey their information using signs which get converted to human-understandable language and speech is given as output.