

Project Design Phase - I
Solution Architecture

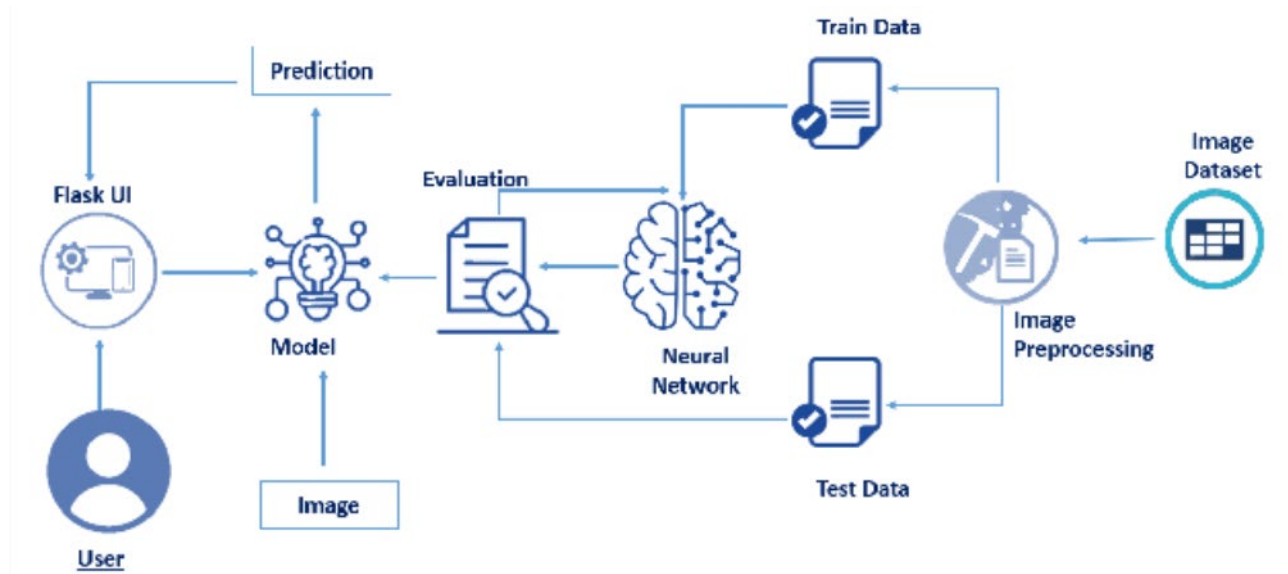
| | |
|---------------|--|
| Date | 19 September 2022 |
| Team ID | PNT2022TMID09233 |
| Project Name | Real-Time Communication System Powered by AI for Specially Abled |
| Maximum Marks | 4 Marks |

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 very difficult 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 very useful to have a proper conversation between a normal person and an impaired person in any language.

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 are making use of a convolution neural network 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.

Technical Architecture:



Components of Architecture:

- **Image Database:** The database contains images of different hand signs. These images are taken from different users with multiple repetitions. The resolution of the images may be varying.
- **Image Pre-processing:** Training the raw images as it might lead to poor performance. Thus, simple image processing algorithms can be implemented to achieve maximum accuracy. Image processing algorithms such as RGB to grey conversion reduce the training time and power consumption. The noise from the images can be eliminated.
- **CNN Training & Training Options:** Deep learning is used for the project. Training options are set accordingly before training the database using any CNN architecture. The training options are maximum batch size, number of the epoch, and learning rate.
- **Image Acquisition:** Any camera, even a laptop webcam can be used to acquire the image to be recognized. Because in the end the image captured will be reduced to the input size of the CNN. Hence the camera need not be high-resolution.
- **Display Output:** The recognized sign can be displayed in text format or can be also conveyed with audio description.