Capstone 3 Project Proposal

ASL to text translation application

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● Problem statement formation

How can hearing impaired citizens, without expensive resources, be able to communicate effectively in any daily situation in their personal or professional lives, with other citizens who do not know any type of Sign Language.

● Context

American Sign Language (ASL) is the natural language of around 500,000 hearing impaired people in the US and Canada. A “natural” language is a language that is learned as a first language in childhood. However, not all people with this problem learn ASL as their first language.

The National Center for Health Statistics estimates that 28 million Americans (about 10% of the population) have some degree of hearing loss. About 2 million of these 28 million people are classified as deaf (they can’t hear everyday sounds or speech even with a hearing aid). Only about 10% of these 2 million people were born deaf. The other 90% became deaf later in life.

Moreover, according to the World Federation of the Deaf, there are more than 70 million deaf people worldwide. More than 80% of them live in developing countries.

Many hearing people are fluent in ASL. Sign language has become more and more popular in recent years and many hearing people are registering for high school and college ASL classes. And according to The Rhode Island Commission on the Deaf and Hard of Hearing (RICDHH) ASL is the third most used language in the United States, after English and Spanish.

But, what is Sign Language?

According to Wikipedia, ASL is a complete and organized visual language that is expressed by both manual and nonmanual features.

ASL is not English at all. ASL is a distinct language with its own syntax and grammar and has been developed over many years by deaf people as a means of communication.

Deaf people who use ASL see this language as not only a means of communication, but a source of cultural unity and pride.

Due to the importance of sign languages around the world, there must be a simple way to be able to communicate with each other as simple as any daily life activity.

● **Criteria for success**

To develop a mobile application that can effectively translate any message in real time from American Sign Language (ASL) to text.
For effects of this project, and as a first step, the deliverable will be a model that can correctly classify any image of a sign as the correct letter of the alphabet.

● **Scope of solution space**

The scope of this solution will be to translate from the American Sign Language to text. The solution will be available as a mobile app.

● **Constraints**

1. Not enough data. Lack of datasets for other than the alphabet
2. To be able to concentrate different datasets as one for training and testing
3. The scope only being the alphabet from ASL (as a start)
4. There are around 300 different Sign Languages in the world
5. Time, knowledge, and cost of developing a mobile app

● **Stakeholders**

1. Any country's Government, Company or Institution who have citizens that use ASL
2. Any person who uses ASL or interacts with people with hearing loss problems

● **Data sources**

https://www.kaggle.com/code/abdul390/asl-recognition-with-convolutional-neural-networks/data

Dataset containing 87,000 color images of 200 x 200 pixels of 29 classes for the 26 letters of the alphabet, space, delete and nothing expressions.

https://www.kaggle.com/datasets/datamunge/sign-language-mnist

Dataset containing over 34,000 grayscale images of 28 x 28 pixels of 24 classes for 24 letters of the alphabet (except "J" and "Z").