REAL-TIME COMMUNICATION SYSTEM POWERED BY AI FOR SPECIALLY-ABLED: A LITERATURE SURVEY

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I. INTRODUCTION:

A real time sign language detection is a significant step forward in improving communication between the deaf and the general population. We are pleased to showcase the creation and implementation of sign language recognition model based on a Convolutional Neural Network(CNN).We utilized a Pre-Trained SSD Mobile net V2 architecture trained on our own dataset in order to apply Transfer learning to the task. We developed a robust model that consistently classifies Sign language in majority of cases. Additionally, this strategy will be extremely beneficial to sign language learners in terms of practising sign language. Various human-computer interface methodologies for posture recognition were explored and assessed during the project. A series of image processing techniques with Human movement classification was identified as the best approach. The system is able to recognize selected Sign Language signs with the accuracy of 70-80% without a controlled background with small light.

II. LITERATURE SURVEY:

1. Full Duplex Communication System for Deaf & Dumb People by Shraddha R. Ghorpade, Surendra K. Waghamare (2015) [2]

Abstract: One of the important problems that our society faces is that people with disabilities are finding it hard to cope-up with the fast-growing technology. Access to communication technologies has become essential for handicapped people. Generally, deaf and dumb people use sign language for communication but they find difficulty in communicating with others who don't understand sign language. Sign language is an expressive and natural way of communication between normal and dumb people (information majorly conveyed through hand gesture). So, we need a translator to understand what they speak and communicate with us. The sign language translation system translates normal sign language to speech and hence makes communication between a normal person and dumb people easier. But the question arises, how the deaf person understands the speech of a normal person and hence we need a system which converts the speech of normal person to text and the corresponding gesture is displayed on display. So, the whole idea is to build a device that enables two-way communications between deaf-mute person and a normal person.

Methodology: The methodology used is similar to [1] except that, instead of bare hands, the system requires the user to wear gloves to extract hand gesture.

Limitations: Gloves are mandatory. Without them, the system would not work. It is not feasible to carry gloves all the time. These are expensive as well.

2. Sign Language Recognition System by Er. Aditi Kalsh, Dr N.S. Garewal (2013) [3]

Abstract: Communication is the process of exchanging information, views and expressions between two or more persons, in both verbal and non-verbal manner. Hand gestures are the non-verbal method of communication used along with verbal communication. A more organized form of hand gesture communication is known as sign language. In this language each alphabet of the English vocabulary is

assigned a sign. The physically disabled person like the deaf and the dumb uses this language to communicate with each other. The idea of this project is to design a system that can understand the sign language accurately so that the less fortunate people may communicate with the outside world without the need of an interpreter. By keeping in mind, the fact that in normal cases every human being has the same hand shape with four fingers and one thumb, this project aims at designing a real time system for the recognition of some meaningful shapes made using hands.

Methodology: The image is converted into grayscale and the edges of the fingers are detected using Canny edge detection. Then using the detected finger tips the gesture is recognized.

Limitations: The background of an image must be free from external objects. Also, the distance between the image and the camera is kept fixed.

3. Intelligent Sign Language Recognition Using Image Processing by Sawant Pramada, Deshpande Saylee, NalePranita, NerkarSamiksha, Mrs. Archana S. Vaidya (2013) [4]

Abstract: Computer recognition of sign language is an important research problem for enabling communication with hearing impaired people. This project introduces an efficient and fast algorithm for identification of the number of fingers opened in a gesture representing an alphabet of the Binary Sign Language. The system does not require the hand to be perfectly aligned to the camera. The project uses image processing system to identify, especially English alphabetic sign language used by the deaf people to communicate. The basic objective of this project is to develop a computer based intelligent system that will enable dumb people significantly to communicate with all other people using their natural hand gestures. The idea consisted of designing and building up an intelligent system using image processing, machine learning and artificial intelligence concepts to take visual inputs of sign language's hand gestures and generate easily recognizable form of outputs. Hence the objective of this project is to develop an intelligent system which can act as a translator between the sign language and the spoken language dynamically and can make the communication between people with hearing impairment and normal people both effective and efficient. The system is we are implementing for Binary sign language but it can detect any sign language with prior image processing.

Methodology: The RGB image is converted into a binary image. Certain coordinates are mapped to the binary image. Using a pattern matching algorithm the coordinates are then compared to the coordinates in a database. Based on the comparison, the gesture is identified.

Limitations: There is a specific camera orientation and specification. Thus, it is not feasible in every environment.

4. AAWAAZ: A Communication System for Deaf & Dumb by Anchal Sood, Anju Mishra (2016) [1]

Abstract: The paper proposes a framework for recognizing hand gestures which would serve not only as a way of communication between deaf and dumb and mute people but also, as an instructor. Deaf and dumb individuals lack in proper communication with normal people and find it difficult to properly express themselves. Thus, they are subjected to face many issues in this regard. Sign language is very popular among them and they use it to express themselves. Thus, there is a need for a proper translator. The deaf and dumb are not idle as past, they are working outside and doing great at it. So, an efficient system must be set up, to interact with them, and to know their views and ideas. The framework here, acts as a communication system for deaf and dumb individuals. It would take the sign language as an input which would display the result not only in the form of text but also in the form of audio. Similarly, if there is any input in the form of text, it would display the corresponding image.

Methodology: From the input RGB image, the hand is separated and morphological operations are performed to identify the region of interest. The features of the gesture are then extracted and compared to a database of features of standard gestures. Finally, based on the comparison the output is generated.

Limitations: The proposed framework is good for recognizing hand gestures. But it is not feasible in every environment.

III. CONCLUSION:

From the above literature survey, we can conclude that all those papers follow a more or less similar methodology. We also like to follow that methodology with some improvements to overcome some of the limitations mentioned above. The input image is processed to isolate the hand. Then it is passed to a trained convolution neural network to identify the gesture with greater accuracy.

IV. REFERENCES:

[1] Shraddha R. Ghorpade, Surendra K. Waghamare, "Full Duplex Communication System for Deaf & Dumb People," International Journal of Emerging Technology and Advanced Engineering (IJETAE), Volume 5, Issue 5, May 2015, ISSN 2250-2459.

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