Ideation Phase
Literature Survey

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Project Name	Real-Time Communication System Powered by AI for Specially Abled

Literature Survey:

Research in the sign language system has two well-known approaches are Image processing and Data glove. The image processing technique using the camera to capture the image/video. After a comprehensive literature review, the commonly intelligent predictors utilized for recognition of sign language are k-nearest neighbor (KNN), artificial neural network (ANN), support vector machine (SVM), hidden Markov Model (HMM), Convolutional Neural Network (CNN), fuzzy logic and ensemble learning. This section briefs about machine learning techniques used to recognize sign language. The main drawback of vision based sign language recognition system image acquisition process has many environmental apprehensions such as the place of the camera, background condition and lightning sensitivity. Camera place to focus the spot that capture maximum achievable hand movements, higher resolution camera take up more computation time and occupy more memory space. User always need camera forever and cannot implement in public place. Another research approach is a sign language recognition system using a data glove. User need to wear glove consist of flex sensor and motion tracker. Data are directly obtained from each sensor depends upon finger flexures and computer analysis sensor data with static data to produce sentences. It's using neural network to improve the performance

of the system. The main advantage of this approach less computational time and fast response in real time applications. Its portable device and cost of the device also low.

Using their ideas and limitations for the Sign Language Recognition System, comparing one method to another is still subjective. Deep learning-based approaches like CNN, RNN, LSTM, and Bi-Directional LSTM Models provide good recognition accuracy in the sequence of images and video streams.

Another approach using a portable Accelerometer (ACC) and Surface Electro Myogram (sEMG) sensors used to measure the hand gesture. ACC used to capture movement information of hand and Arms. EMG sensor placed, it generates different sign gesture. Sensor output signals are fed to the computer process to recognize the hand gesture and produce speech/text. But none of the above methods provide users with natural interaction. This proposed system will be capable of performing the conversation without any wearable device instead using the human motion and gesture recognition.

Research in the sign language system has two well-known approaches are Image processing and Data glove. The image processing technique using the camera to capture the image/video. Analysis the data with static images and recognize the image using algorithms and produce sentences in the display, vision based sign language recognition system mainly follows the algorithms are Hidden Markov Mode (HMM), Artificial Neural Networks (ANN) and Sum of Absolute Difference (SAD) Algorithm use to extract the image and eliminate the unwanted background noise. The main drawback of the vision-based sign language recognition system image acquisition process has many environmental apprehensions such as the place of the camera, background condition,s and lightning sensitivity. The camera is placed to focus on the spot that capture maximum achievable hand movements, a higher resolution camera takes up more computation time and occupy more memory space. Users always needs camera forever and cannot implement in public place. Another research approach is a sign language recognition system using a data glove . Users need to wear glove consist of flex sensor and motion tracker.

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Starner and Pentland's American Sign Language system could recognize short sentences of American Sign Language (ASL) with 40 vocabularies, each was attached with its part of speech, which greatly reduced the computational complexity. The feature vector was fed to a hidden Markov model (HMM) for recognition of the signed words. This system gracefully integrated a useful concept in computational linguistics into gesture recognition. Furthermore, Nam's system tried to recognize hand movement patterns. A HMM-based method for recognizing the space-time hand movement pattern was proposed, and 10 kinds of movement primes could be recognized successfully.

Priyanka Pandurang Patil, in their paper, the purpose of this system is to represent a real-time two way communication interpreter based on Indian Sign Language (ISL) with higher accuracy.Our motive behind this implementation is to create a complete language that involves movement of hands, facial expressions and gestures of the body. This system captures hand gesture images of ISL with a system camera for feature extraction. The analyzing phase, the pre-processing unit is used for the noise removal, greyscale conversion by using Gaussian filter, binary conversion of images done by using OTSU's method

followed by feature extraction. In real-time scenario we have achieved accuracy above 90% in each trained model.

Noor Saliza Mohd Salleh et al. have presented a research progress and findings on techniques and algorithms for hand detection as it will be used as an input for gesture recognition process. Rini Akmelia et al. have develop real time Malaysian sign language translation using colour segmentation and neural network where it achieved the recognition rate of over 90%