Real-Time Communication System Powered By AI For Specially Abled

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Github Link: IBM-EPBL/IBM-Project-11148-1659270620: Real-Time Communication System Powered by AI for Specially Abled (github.com)

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. 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 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 mainadvantage of this approach less computational time and fast response in real time applications. Itsportable device and cost of the device also low.

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.

Fel's Glove Talk focused on a gesture-to-speech interface. Moreover, a multilayer perceptron model was used in Beale and Edward's posture recognizer to classify sensed data into five postures in ASL. To help people with disabilities, Newby worked on the recognition of the letters and numbers of the ASL manual alphabet based upon statistical similarity. A simplified method, using approximate spline, was proposed by Watson. Gestures are represented by a sequence of critical points (local minima and maxima) of the motion of the hand and wrist. This approach is more flexible in matching a gesture both spatially and temporally and thus reduces the computational requirement.

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.

Liang and Ouhyoung proposed a sign language recognition system using hidden Markov model and integrated statistical approach used in computational linguistics. Real-time Continuous Gesture Recognition System for Sign Language by Rung-Huei Liang , Ming Ouhyoung intended to recognize large set of vocabularies in a sign language by recognizing constructive postures

andcontext information. The system uses position, orientation, and motion model, in addition to the posture model, are implemented to enhance the performance of the system.

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%.