SIGN LANGUAGE BASED EMAIL SYSTEM FOR DEAF AND DUMB

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Problem Statement:

Communication is defined as the act of sharing or exchanging information, ideas or feelings. To establish communication between two people, both of them are required to have knowledge and understanding of a common language. But in the case of deaf and dumb people, the means of communication are different. Deaf is the inability to hear and dumb is the inability to speak. They communicate using sign language among themselves and with normal people but normal people do not take seriously the importance of sign language. Not everyone possesses the knowledge and understanding of sign language which makes communication difficult between a normal person and a deaf and dumb person. To overcome this barrier, one can build a model based on machine learning. A model can be trained to recognize different gestures of sign language and translate them into English. This will help a lot of people in communicating and conversing with deaf and dumb people. The existing Indian Sign Language Recognition systems are designed using machine learning algorithms with single and double-handed gestures but they are not real-time. In this propose, we propose a method to create an Indian Sign Language and email system.

Existing System:

A plenty of research works in automatic Sign Language Recognition (SLR) have been started two decades ago especially for American, Australian, Indian, Korean, Chinese, Polish and Arabic. Many techniques based on different sensor types have been developed. These approaches employed variety of methods based on the combination of multiple sensors, machine learning, and pattern recognition and image analysis techniques. The approaches used to solve sign language recognition problems can be classified into sensor-based and vision based methods. In the sensor-based approaches, signer almost wears a special glove or sensor in order to present information of hand orientation, position, rotation and movements.

Proposed System:

In this project, a new signer independent finger spelling recognition method is proposed based on leaning features from depth image using Convolutional Neural Network (CNN).

Extracted high-level features from CNN can efficiently represent the shape of hand gestures more robustly than that of hand-crafted features. The overwhelming success of convolutional neural network models and deep leaning algorithms motivates many researchers to apply them in sign language recognition problems. However, the complex structure of recent CNN architectures and the high computational cost of training prevent their utilization in real-time applications. Motivated by the successful achievements of PCANet deep learning architecture in many object recognition problems, our proposed method employs this model to automatically learn depth features from the segmented hand regions.

- A new efficient hand segmentation and wrist line detection algorithm based on depth image is proposed.
- A simple unsupervised convolutional neural network using PCANet is employed to describe hand gestures.
- Evaluation of the proposed method using real database of dept ASL alphabetic for signer independent scenario.
- Build new Email system a based on sign language used by deaf and dumb.

Methodology:

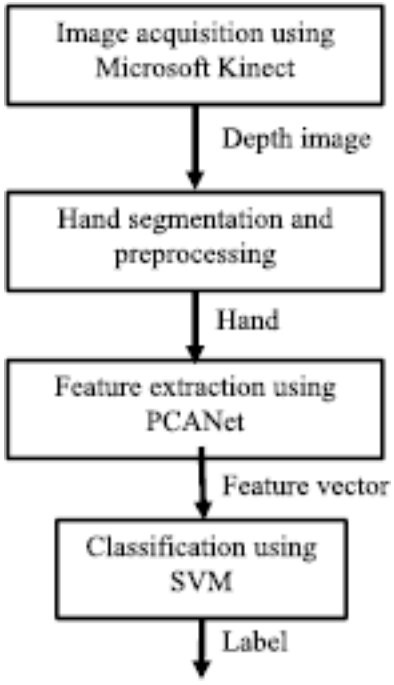

Figure 1. Flowchart of proposed work

The proposed signer independent fingerspelling recognition method comprises three different stages, hand segmentation and preprocessing, feature extraction, and classification. Fig. 1 shows the block diagram of the proposed method. Hand segmentation is an important step of the method and can be efficiently achieved by thresholding depth image to find the pixels which represent hand region. After segmenting hand from depth image, precise hand region

is cropped by finding the wrist line and remove hand forearm region. Pixel values of the cropped hand is then normalized to limit their values within small range.

Reference:

1. Geethu G Nath and Arun C S, "Real Time Sign Language Interpreter," 2017 International Conference on Electrical, Instrumentation, and CommunicationEngineering (ICEICE2017).
2. Manasa Srinivasa H S and Suresha H S, "Implementation of Real Time Hand Gesture Recognition," International Journal of Innovative Research in Computer and Communication Engineering, Vol. 3, Issue 5, May 2015.