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An Introduction to Sign Language Recognition

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Abstract: Sign Language recognition symbols have limited vocabulary. Earlier various techniques were used for sign language recognition for gestures, various postures recognition on different Sign Languages like American, Korean, and British Sign Languages. This work helps us to recognize and learn various sign language symbols used by hearing impaired people for communication. Sign language is basically used to the between hearing impaired person and normal person, so that they can express their feeling in an easy way by using gestures. This paper provides a novel approach for sign language recognition. Proposed system uses hand and fingers for making symbols for Images. The Proposed work has two stages: initial stage and tracking stage.

Keywords: Sign Language Recognition, Image, Gestures, Initial Stage, Tracking Stage.

1. Introduction

A sign language is a language which uses gestures instead of sound to convey meaningful information by combining movement of the hands, arms or body, lip-patterns and facial expressions. A gesture is a form of non-verbal communication made with the help of a body instead of verbal communication. Generally, all people use gestures to say their feelings even if they are able to speak. Gestures are expressive, meaningful body motions involving physical actions of the hands, arms, fingers, head, face and body with the intent of: Conveying meaningful information or Interacting with the environment. In Sign Language three major components are used , Finger-spelling that is used to spell words letter by letter, Word level sign vocabulary that is used for the majority of communication and Non-manual features that is facial expressions and tongue, mouth and body position. In linguistic terms, sign languages are as rich and complex language, despite the common delusion that they are not actual languages. Specialized linguists have studied many sign languages and found that they exhibit the fundamental properties that exist in all languages. Sign languages have emerged naturally in deaf communities alongside or among spoken languages, they are not linked to spoken languages and have different grammatical structures at their core. Sign Language may propagate through migration, through foundation of deaf schools or soverginity of politician parties.

2. Literature Survey

Sign language is a language which is used for communication by the deaf and mute people, its recognition using a computer had a history of past 20 years. It was developed in 1983 by G.J. Grimes of American Telephone and Telegraph Co. used the digital data glove for sign language recognition on the basis of vision and sensor equipment. He performed recognition on short sentences using vision which resulted in high recognition rate of 91.3% and with grammatical constraints results in 98% recognition, and on set of Chinese Sign Language words using different kind of gloves like Accele glove and data gloves, resulting in recognition rate of 94.5%. From 1990s sign language recognition research rapidly developed [1]. In the early 90.s sign language recognition is performed using neural networks that makes system independent of context later on layer of neural networks are used in order to perform recognition and it is used in American sign language for determining different words of American Sign Language manual alphabet [2], after that some researchers worked on coordinates of an image to perform recognition using HMMs(Hidden Markov Models) [3], KNNs and decision to improve the results for different signs[4]. Fuzzy logic also used in 90.s for phoneme recognition in Korean sign language without including the grammar [5]. Disadvantages in recognition by Hidden Markov Model (HMMs) are also improved by combining motion analysis and vision to improve the performance. At the end of 90.s the work is carried out on Taiwanese Sign language with a vocabulary of 250 signs and subset of American sign language using single data glove [6]. A parallel Hidden Markov Model is used to overcome the problem of scalability faced by factorial HMMs and coupled HMMs for handling phonemes in nature of sign [7]. In 20th century various new inventions taken place in the field of Sign Language Recognition research to perform recognition of signs which are enumerated as follows: Multicolored gloves were developed and used to perform recognition the glove have different color for palm and fingers [8]. Machine translation concepts like unigram and n-gram approach used for recognition also proved to results in good recognition rates [9]. Research in linguistics enlighten the requirement of sending sign video across a network for this encoding of Sign video is

compressed and encoded after its recognition using SLR into Signing Gesture Markup Language (SiGML) for efficient transmission [10]. Korean Sign Language Recognition System was developed using Finite Automata irrespective of the grammar [11].

3. Proposed Work

Sign Language Recognition can be done using one hand, two hands but the hearing impaired people also uses their facial expressions to represent their feelings. Therefore to understand the hearing and speech impaired language that they convey using signs includes face and hand detection and tracking for sign language recognition. Figure 1 showing the database for my proposed work. The Sign Language recognition system is basically composed of two stages that is Initial Stage and Tracking Stage.

1. Initial Stage: - The first step in initial stage is to take the input of image in order to form Skin color segmentation, after finding the skin regions we detect face and hand, which acts as an input to the tracking stage.

2. Tracking Stage: - The features extracted in initial stage and skin color segmented image is divided into four quadrants, which helps in tracking the position of hand on a face and performing recognition by applying a threshold value on quadrant values. The whole system framework includes various sub stages for the complete recognition of symbol and conversion to a text.

Database of Indian Sign Images

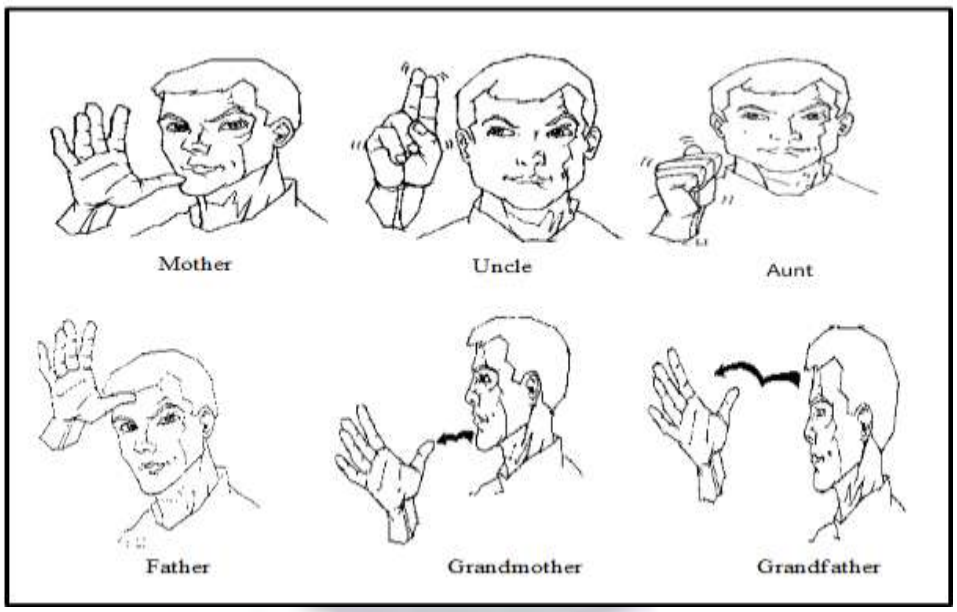

Figure 1

Conclusion and Future Work

Sign Language recognition is widely used over a decade. It gives the different results for different applications in different areas which are very useful for those people who are not able to listen and not able to express their feelings without these Sign Language symbols. Future work for recognition of different images with implementation details.

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