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A Sinhala finger spelling interpretation system

Deaf people in Sri Lanka use the Sinhala sign language to communicate. Thus normal speech will not be productive to communicate between a deaf person and a normal person, since the deaf person can't hear, and the sign language will make sense only if the normal person understands it; which is not the case in most situations. Of course they can use written language to communicate, which is a cumbersome and lengthy process.

Thus a computer system that can act as an interpreter between the sign language and the normal language would be ideal in such situations. The aim of this study is to build a system that can interpret Sinhala sign languages' finger spelling into Sinhala text using a nearest neighbor classification method.

Mainly this project proposes a new feature vector that will enable the recognition of 2-dimensional hand configurations from hand gesture images. The feature vector proposed is 15 dimensional and consists of the visibility of the fingertips, distances of the fingertips from a reference point on the hand and the angles between the fingers.

In order to make the feature extraction task simple the gesture performer has to wear a color-coded white cotton glove and a uniform white background has been used.

Training the implemented system is done in a supervised manner. Sine the system assumes that each gesture is distributed as a normal distribution, at least 30 different images for a gesture must be presented to the system in order to train it properly. Training is done according to a profile basis. The system can keep any number of different profiles.

The pattern classification is done using hierarchical classification method. In fist phase, gesture images are classified into 32 subgroups. Afterwards a variation of the nearest neighbor classifier is used to pinpoint what the gesture is.

The system was tested using the set of training images and achieved a recognition rate of about 98% and when tested using a set of new images the overall recognition rate was about 62%. Since the recognition rate for the training set is 98% it can be said that if the system were trained using a larger set of training images the recognition rate for new images would improve.