Hidden markov model-based gesture recognition with overlapping hand-head/hand-hand estimated using Kalman filter

Abstract

In this paper, we introduce a hand gesture recognition system to recognize isolated Malaysian Sign Language (MSL). The system consists of four modules: collection of input images, feature extraction, Hidden Markov Model (HMM) training, and gesture recognition. First, we apply skin segmentation procedure throughout the input frames in order to detect only skin region. Then, we proceed to feature extraction process consisting of centroids, hand distance and hand orientation collecting. Kalman Filter is used to identify the overlapping hand-head or hand-hand region. After having extracted the feature vector, the hand gesture trajectory is represented by gesture path in order to reduce system complexity. We apply Hidden Markov Model (HMM) to recognize the input gesture. The gesture to be recognized is separately scored against different states of HMMs. The model with the highest score indicates the corresponding gesture. In the experiments, we have tested our system to recognize 112 MSL, and the recognition rate is about 83%.