

## Abstract

Area of Hand gesture recognition is very vast. Hand recognition system can be useful in many fields like robotics, human computer interaction. This project recognizes static hand gesture recognition system. That is able to recognize 24 static gestures from the American Sign Language hand alphabet. The objective of this project is to develop an system for recognition of hand gestures with reasonable accuracy. So here we propose a model with three phase:

- Preprocessing
- Feature Extraction
- Classification

The **segmentation** of gray scale image of a hand gesture is performed using **Otsu thresholding algorithm**. Otsu algorithm treats any segmentation problem as classification problem. Total image level is divided into two classes one is hand and other is background. The optimal threshold value is determined by computing the ratio between class variance and total class variance. A **morphological filtering** method is used to effectively remove background and object noise in the segmented image. Morphological method consists of dilation, erosion.

The reason that the value of pixel cannot be directly used as feature to describe hand gesture is that the number of the pixels is tremendous. For instance, a gray scale image with the size 20\*20 has 400 pixels which equal to 400 features, but most of which are redundant and not important for classification. In order to reduce the amount of calculation, certain mathematical approaches can be used to evolve in another set of feature which has obvious different type.

The feature extraction from image we are use **Hu**, **Zernike** and **krawtchouk** moments. Hu moments (or Geometric moments) computation on image can be easily preformed and implement as compared to other moment with complex kernel function. Zernike and Krawtchouk moment are have complex moments. Zernike and Krawtchouk moment is able to store image information with minimum redundant and have the properties of being rotational invariants.

Any classification task usually involves separating data into training and testing sets. svm-train and svmpredict are used for train the system and classify. The libsvm package was used to train and classification. Libsvm packages are freely available at [6]. We train SVM using Radial Base Function (RBF) kernel for different input file for Zernike moments, krawtchouk and Hu moments. A comparative study of above three image moments have been done based on classification accuracy. We find accuracy for Hu moments 81.3zernike 94.80% and Krwatchouk 97.55%. We conclude that the Krawtchouk moments are more robust features for user independent gesture recognition.

**key words:** Segmentation, Hu, Zernike, Krawtchouk, LibSvm, Cross validation.