Motivation and Goals

- Develop modern and mobile method of sign language interpretation
- Concepts can be expanded to real-time gesture recognition
- Goal: Real-time implementation on Android app

Visualization Using PCA

- Visualize first 2 principal components of 1074-dim data
- Early insight: PCA may help reduce overfit from Gabor filters

Feature Extraction

- Histogram of centroid distances (HOCD): distance from centroid to each edge pixel in the hand mask
- Gabor filters: flexible gradient operators (reflect different scales and orientations)

Classification and Error Analysis

- Methods: Fine KNN, SVM with RBF Kernel, Linear Discriminant Analysis, Random Decision Forest
- Performance also analyzed using PCA for dimensionality reduction (from 1074 to 34) to retain 95% variance.
- Precision and Recall values are averaged over each class.

Future Work - Hand Model

- Feature extraction that fits a 20-DoF hand model to image
- Optimization problem, solution with learning method
- Symbol classification in the model parameter space
- Status: Model and projection defined
- Gradient Descent considered for hand model fit

Classification

- Methods: Fine KNN, SVM with RBF Kernel, Linear Discriminant Analysis, Random Decision Forest
- Performance also analyzed using PCA for dimensionality reduction (from 1074 to 34) to retain 95% variance.
- Precision and Recall values are averaged over each class.

Prediction Pipeline and Implementation

- Capture image on Android app & send to server
- Extract Gabor features
- Extract HOCD features
- Classify using pre-trained model
- Display result on Android App