

## Speech Recognition Using Linear Prediction Coding and Support Vector Machines

The purpose of the project was to successfully distinguish speech. The coefficients produced from linear predictive coding were used to produce a feature vector. These feature vectors each uniquely represent a given segment of audio. A feature vector was generated for each sample of audio used as training data. Using this training data a support vector machine classifier can be trained to separate the feature space. New feature vectors can be passed to the classifier and the nearest class returned as a result. This method of feature extraction and classification was applied on four types of vocabularies. The first was a vocabulary of the words “start,” “stop,” “left,” and “right.” This vocabulary can be thought of the words necessary to control a remote control vehicle. Another vocabulary was created which contained the notes of the C major scale played on a piano. A vocabulary was also developed which could distinguish between speakers. Finally, a vocabulary was developed which could be used for simple arithmetic. All four of these use cases can be seen in the presentation by clicking the play button in the header of the appropriate slide. If this does not work the videos can be found in the “presentation->images” folder. The presentation also expounds on the parameters used to train the classifier. The following segment is a walk through of using the software to generate ones own speech recognition system.

1. **Record audio samples**, use the “record.m” Matlab program to record the words in your desired vocabulary, at least ten samples is recommended
2. **Set LPC Parameters**, set the parameters in the Matlab function “get\_lpc.m” to your desired settings, the optimal configuration will vary based on the vocabulary
3. **Generate a Library File**, use the “get\_data.m” Matlab program to generate a library, specify the audio samples to use
4. **Train the SVM Classifier**, use the “train.m” Matlab program to generate a new SVM classifier, specify the words which correspond to SVM class labels
5. **Real Time Prediction**, use the generated SVM classifier with the “rtp.m” Matlab program