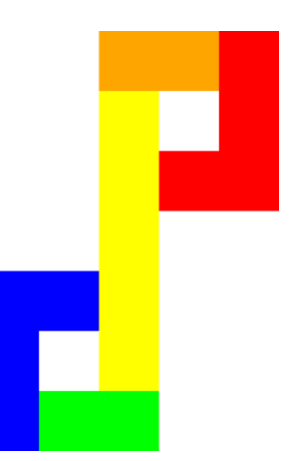




Accelerometer Gesture Recognition

Michael Xie, David Pan



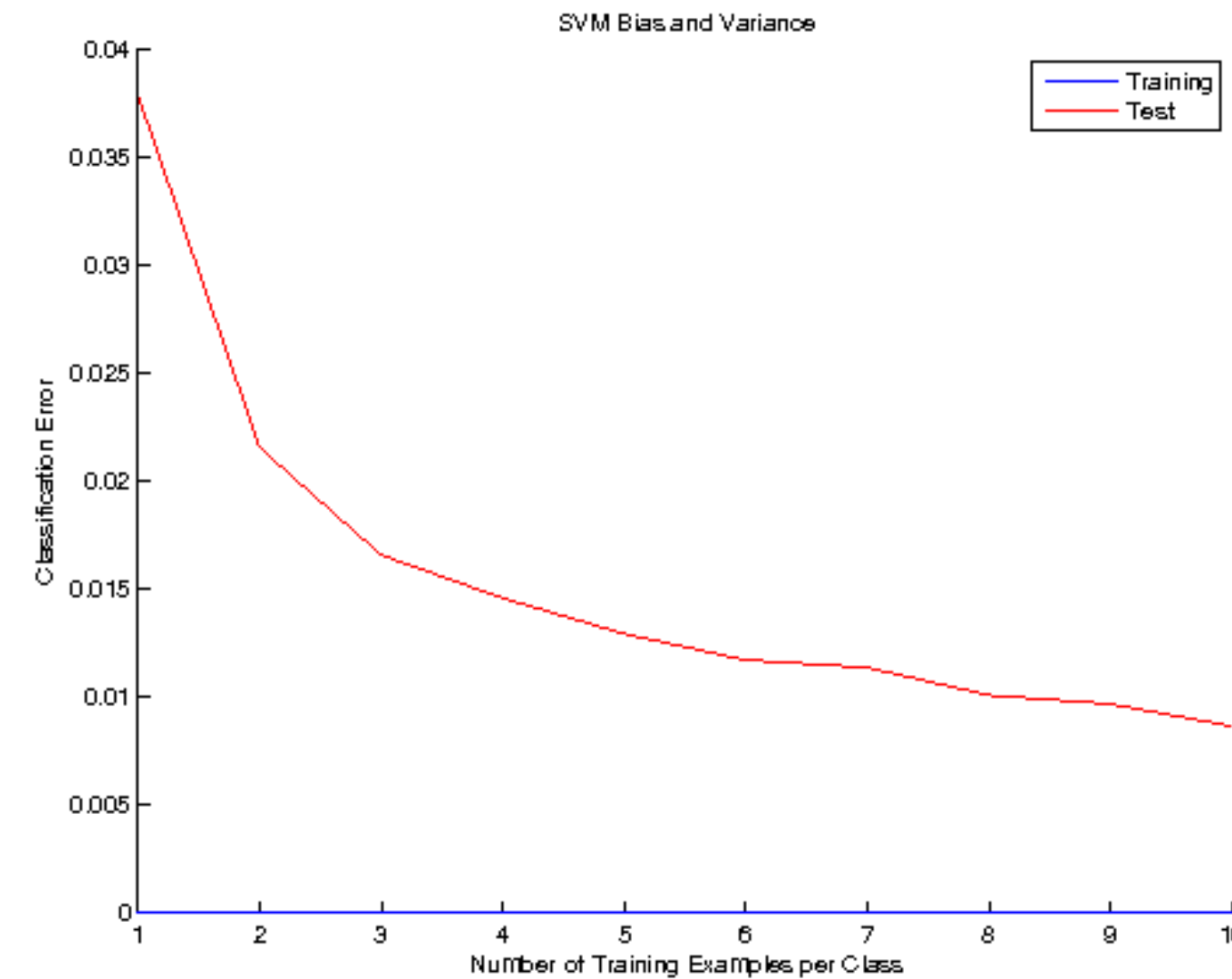
Problem

Given a limited set of data for user-defined gestures, classify new accelerometer data into these gestures.

Challenges

- Need high performance on low (1-3) number of training examples per class
- Segmenting out the gesture
- Preprocessing the data for noise and phase differences

Results



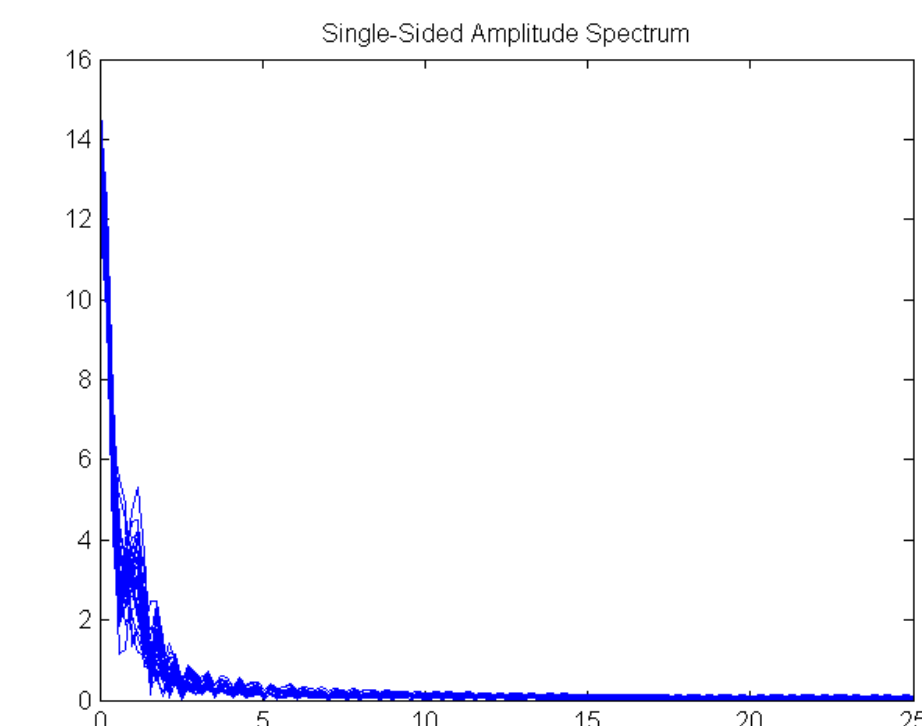
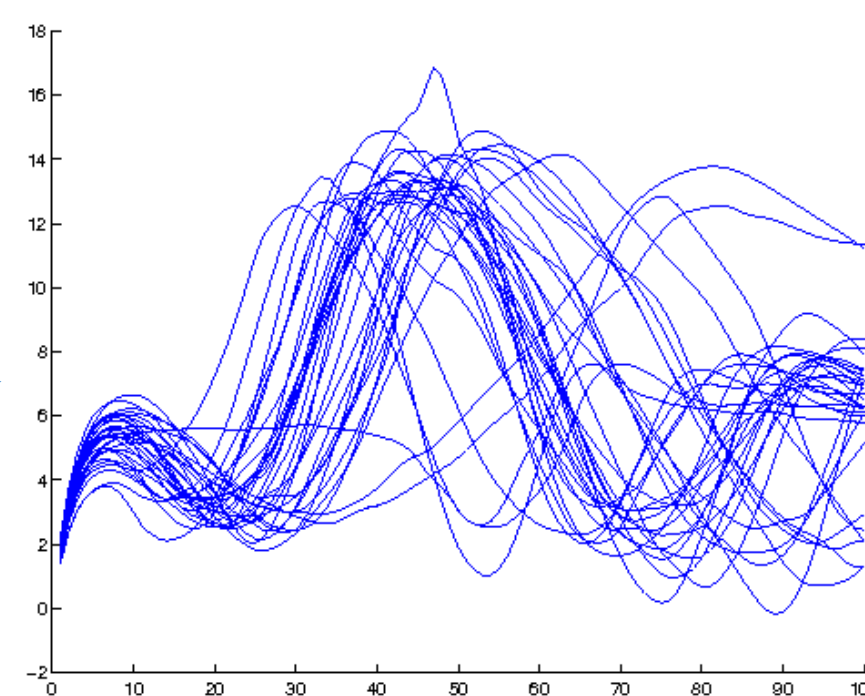
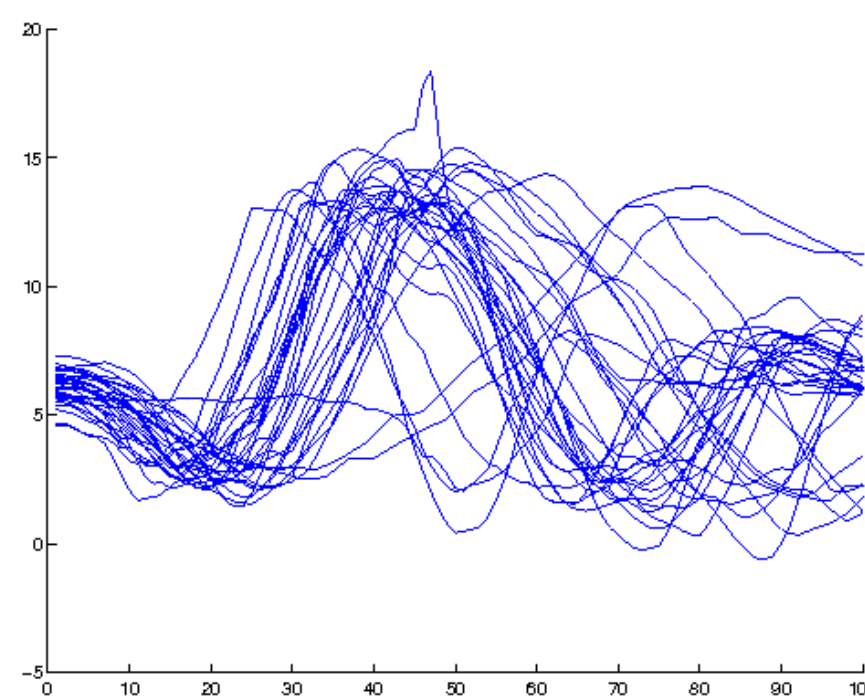
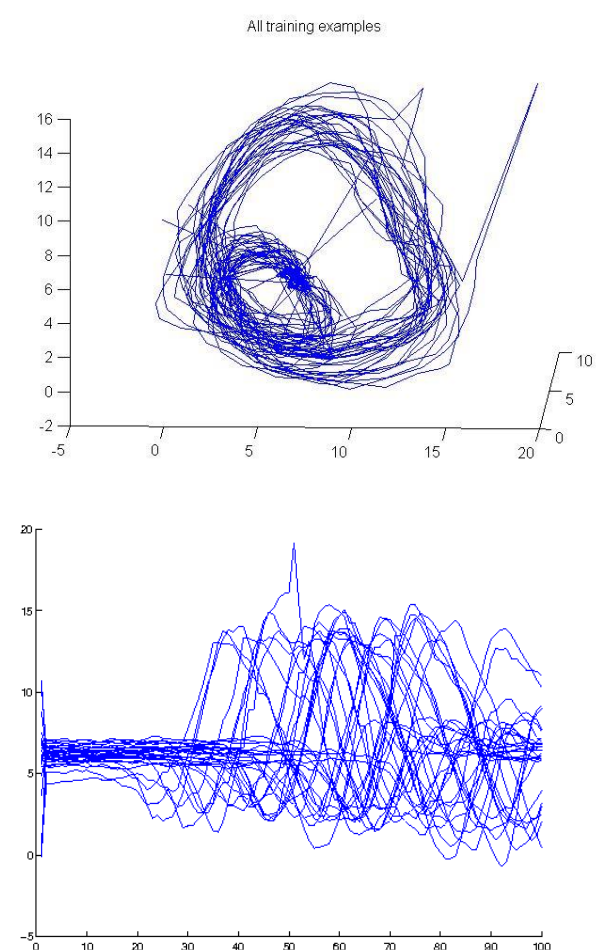
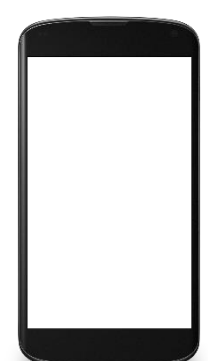
# Ex. Per Class:	1	5	10
SVM	0.9622	0.9871	0.9914
Naïve Bayes	NaN	0.9623	0.9804
Neural Network	0.8530	0.9630	0.9831
K-Nearest Neighbors	0.2000	0.9803	0.9849

Test accuracy shown for 5 gestures ('O', 'X', 'V', 'W', 'Z') and 31 total examples each.

Key Improvements

- **Dynamic Truncation and Linear Interpolation**
- **Fourier Transform coefficients as features**

Approach



'O'

50Hz sample, 2s window

Raw data for gesture 'O': 1x300 xyz vector split by axis

Dynamic Truncation and Interpolation

Low-pass smoothing

FFT

SVM