

# EVENT DETECTION UTILIZING A PATTERN RECOGNITION FRAMEWORK

Timothy Hnat  
Tamim Sookoor

Department of Computer Science  
University of Virginia

April 30, 2007





# PROBLEM STATEMENT

- Pattern Recognition Framework
- Facilitates Event Detection



# PROBLEM STATEMENT

- Pattern Recognition Framework
- Facilitates Event Detection
- Motivation: Elderly monitoring (Falling)
- Motion Detection: Walking, Standing, Sitting, and Falling
- Pattern Recognition Framework learns and reports data for 5 clusters
- Assign meaning to the clusters



# PROBLEM STATEMENT

- Use a feature vector (Mean, Var, FFT, Spike Detector)
- Basis expansion and decomposition
- Determine best features to use
- Cluster the features into  $k$  clusters
- Use clusters to label data



# PROBLEM STATEMENT

- Use a feature vector (Mean, Var, FFT, Spike Detector)
- Basis expansion and decomposition
- Determine best features to use
- Cluster the features into  $k$  clusters
- Use clusters to label data

## EVENT DETECTION

A simple transform from the cluster labels to events must be provided by the user

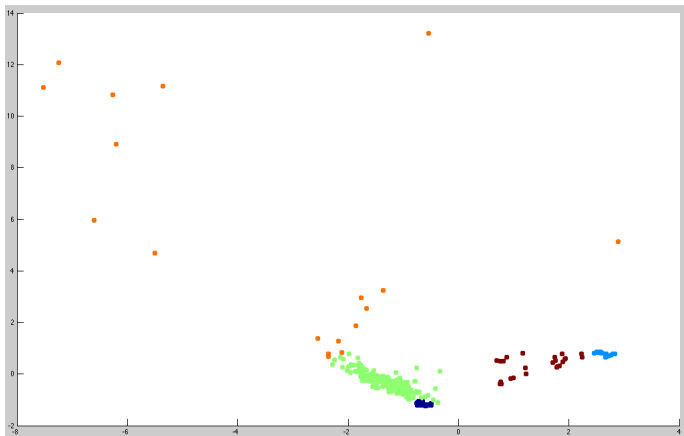


# HOW TO EVALUATE THE ALGORITHM

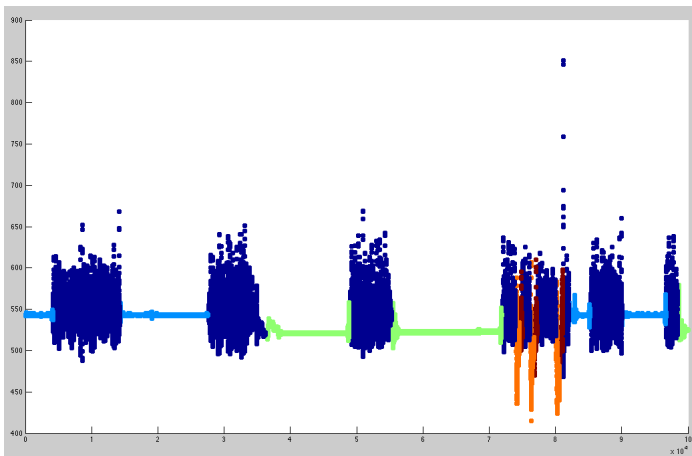
- Correctness is the most important metric
  - False positive and False negatives could be used for more details.
- Future evaluations
  - Energy Consumption
  - Only transmit clusters and state changes
  - Bandwidth Utilization
  - Performance of algorithm
- Technique
  - USL vs Manual method
  - Effects of window size and basis expansion



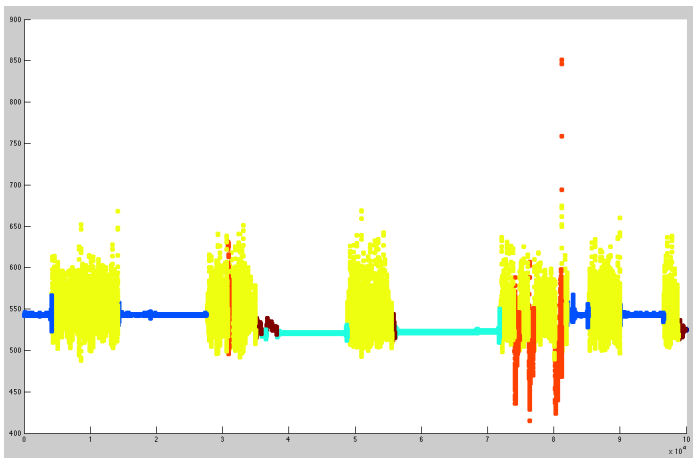
# GOOD RESULT



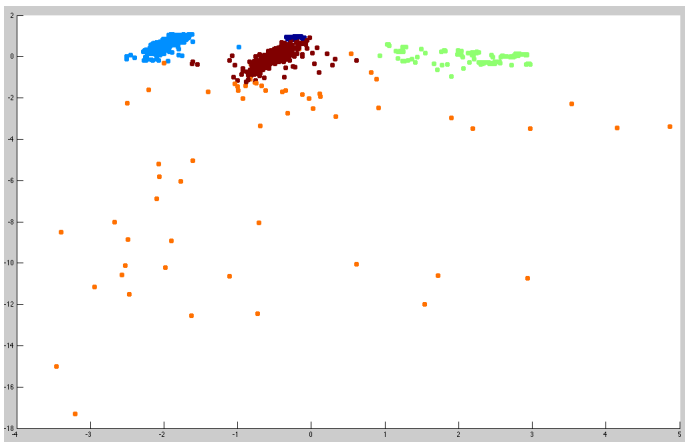
# GOOD RESULT



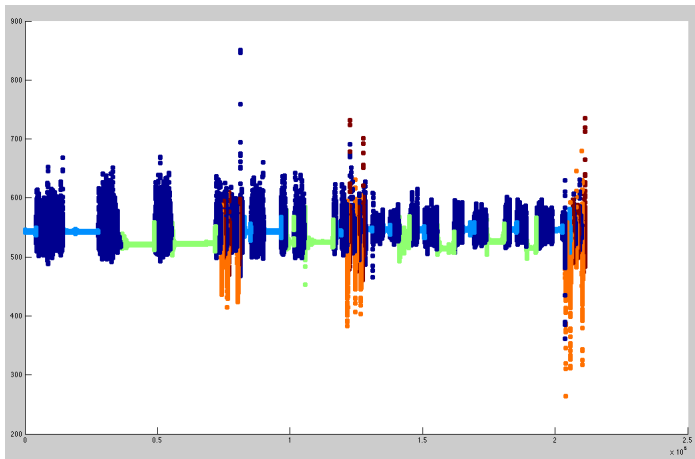
# GOOD RESULT



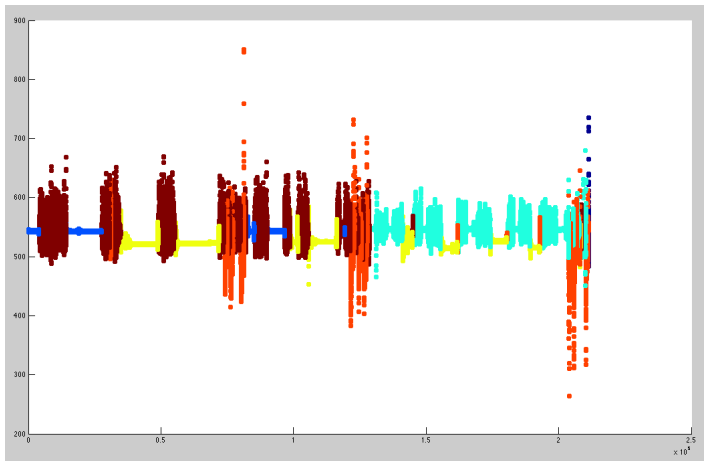
# BAD RESULT



# BAD RESULT

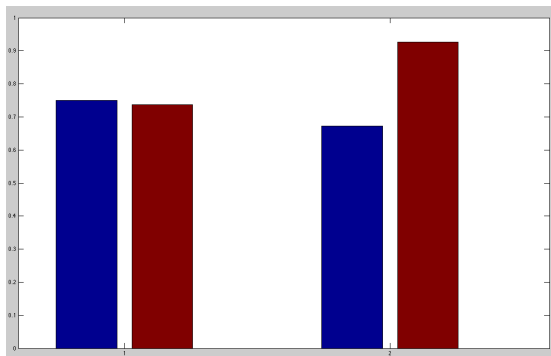


# BAD RESULT

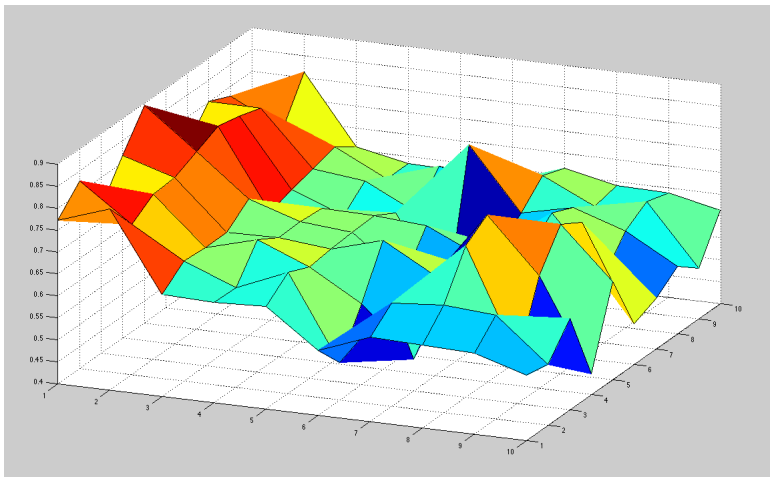


# USL vs MANUAL

Blue denotes the manual mode and Red is the USL



# WINDOW SIZE VS BASIS EXPANSION



# THANK YOU

