

Assignment #3

In this assignment, you will download the listed dataset and practice implementing some of the concepts we have discussed in class. You must submit your completed results, code, and some brief commentary about the results via a Dropbox submission folder on the course D2L website.

1. Explore the dataset and find additional information from the resources listed below.
 - A. *Activity Recognition from a Single Chest-Mounted Accelerometer*: This dataset was collected from a wearable accelerometer mounted on the chest from 15 participants performing 7 activities. More details about the dataset can be found in the following paper: https://link.springer.com/chapter/10.1007/978-3-642-21257-4_36
 - B. The dataset can be downloaded from: <https://archive.ics.uci.edu/ml/datasets/Activity+Recognition+from+Single+Chest-Mounted+Accelerometer>
2. Separate the various activities and visualize the data for the different classes. Next, explore using HMM state modeling for each activity ('Standing Up, Walking and Going up-down stairs') by breaking the activity into different states (for example 3 states, one for 'Standing Up', a second for 'Walking' and a third for 'Going up-down stairs'). Analyze the results of fitting the model for different HMM states by visual inspection (since no ground truths are available for where a sub-activity starts and ends). Generate these qualitative results for state decoding when training on users 1-10, and testing on users 11-15.
3. *Walk/non-Walk Classification*: Train an HMM model to detect the activity 'Walk' using users 1-10 for training. Then, use the model to detect 'walk' activity patterns in the data from users 11-15. The goal here is to label during which parts of the data the user were walking. You can adjust the selection criteria by varying the likelihood threshold. Compute the system performance/accuracy across different thresholds (hint: explore ROC curves)
4. Summarize your findings and observations briefly in a final discussion. Submit both the developed code and your document to the Assignment 3 folder on D2L.