

Project 3

The objective of project 3 is to extract time series features for human activity monitoring.

Dataset

The following [link](#) provides human activity data for 15 subjects. Click on each subject to access the time series data. For this project consider accelerometer data for all the 15 subjects for walking, running, climbing up and climbing down

Task 1

1. Apply natural visibility graph (NVG) and horizontal visibility graph (HVG) to the aforementioned data
2. Compute average degree, network diameter, and average path length
3. For the above computations select sample size of 1024 data points (from 1000 to 2024) for each of the 15 time series
4. Tabulate all the results
5. Generate scatter plots: average degree vs network diameter and color the points according to walking and running (do this for each accelerometer signal and each method (HVG and NVG))
6. Generate scatter plots: average degree vs network diameter and color the points according to climbing up and climbing down (do this for each accelerometer signal and each method (HVG and NVG))

Sample output table

Method	Subject	Accelerometer axis	Average degree	Network diameter	Average path length	Activity
HVG or NVG	1 to 15	X or y or z				Walking or running or climbing up or climbing down

Task 2

1. Compute permutation entropy and complexity for the aforementioned data.

Consider the accelerometer data in all three directions

2. Vary the following parameters

Embedded Dimension	3, 4, 5, 6
Embedded Delay	1, 2, 3
Signal length	1024, 2048, 4096

3. Generate scatter plots: permutation entropy vs complexity and color the points according to walking and running (for signal length =4096, embedded delay = 1, and embedded dimension = 3, 4, 5, 6, and all three accelerometer directions)
4. Generate scatter plots: permutation entropy vs complexity and color the points according to climbing up and climbing down (for signal length =4096, embedded delay = 1, and embedded dimension = 3, 4, 5, 6, all three accelerometer directions)

Sample output table

Subject	Accelerometer axis	Signal length	Dimension	Delay	Permutation entropy	Complexity	Activity
1 to 15	x or y or z	1024 or 2048 or 4096	3 or 4 or 5 or 6	1 or 2 or 3			Walking or running or climbing up or climbing down

Submission Format

1. Submit all the solutions as a python notebook
2. This is a group effort
3. Only one member from each group needs to submit the solution
4. Submit the solution by Dec 16