

Data Science Challenge Description

Here you find a brief description of the dataset for the challenge, namely each column description and how to interpret it.

The first three columns correspond to user, activity type, and session ID.

By session, we mean a defined period in which we know a certain user made a certain activity.

Therefore, a combination of {user}, {activity}, and {activity_number} represents a determined activity session a certain user made.

We provide here a list of all sessions to allow better clarification.

User	Activity	Activity_Number
2	cycling	13
3	sitting	4
3	sitting	5
7	sitting	5
7	walking	9
7	walking	20
7	walking	21
10	cycling	4
10	cycling	5
11	cycling	12
11	cycling	13
11	walking	6
11	walking	7
12	walking	2
12	walking	3
13	cycling	1
15	sitting	11
15	walking	6
16	running	2
20	sitting	1
24	sitting	1
28	running	6
28	running	7
35	walking	10

Table 1 - List of all sessions. There are 24 sessions in total (24 rows).

The rest of the columns concern features extracted for each time window (sliding window analysis). All features were extracted in windows of 5 seconds, with a step size of 1 second.

Table 2 describes each feature.

Column	Description
Window_Start	Timestamp of the window onset
Window_End	Timestamp of the window offset
Mean_{x,y,z}	Mean value obtained for accelerometer {x,y,z} axis sensor
Std_{x,y,z}	Standard deviation value obtained for accelerometer {x,y,z} axis sensor
Skewness_{x,y,z}	Skewness value obtained for accelerometer {x,y,z} axis sensor
Kurtosis_{x,y,z}	Kurtosis value obtained for accelerometer {x,y,z} axis sensor
Magnitude	Square root of $(X.\text{mean}^2 + Y.\text{mean}^2 + Z.\text{mean}^2)$
Energy	Sum of all squared accelerometer {x,y,z} axis sensor values
Entropy_{x,y,z}	The sum of absolute Entropy values from {x,y,z} axis sensor. Entropy function used from https://docs.scipy.org/doc/scipy/reference/generated/scipy.stats.entropy.html
Zero_Crossing_Rate_{x,y,z}	Zero crossing rate for accelerometer {x,y,z} axis sensor
Max_FFT_freq_{x,y,z}	Maximum frequency component found in the Fourier Transform signal concerning the accelerometer {x,y,z} axis sensor
PSD_sum_{x,y,z}	The sum of the Power Spectral Density (PSD) for accelerometer {x,y,z} axis sensor
PSD_ratio_{1,3,5,10}_{x,y,z}	Relative spectral power from {1,3,5,10} Hz onwards concerning the accelerometer {x,y,z} axis sensor. PSD means Power Spectral Density
Heart_Rate	Heart Rate (beats per minute)
Breath_Rate	Breath Rate (breaths per minute)

Table 2 - List of all extracted features. All accelerometer sensor values are in m/s^2 units.