Feature Description

Axis notation (1-4):

The number at the end of each feature name indicates the signal's axis of measurement:

1: X-axis (left and right), where rightward movement is positive.

2: Y-axis (front and back), where forward movement is positive.

3: Z-axis (up and down), where upward movement is positive.

4: Magnitude, available only for accelerometer features. Representing the combined vector magnitude across all three axes.

Accelerometer vs. Gyroscope features:

Variables prefixed with "acc-" are derived from the accelerometer.

Variables prefixed with "gyro-" are derived from the gyroscope.

Time vs. Time-Frequency features:

Time-domain features describe the signal's amplitude as a function of time.

Time-Frequency features describe how signal energy is distributed over both time (x-axis) and frequency (y-axis), visualized in a spectrogram-like representation.

Important for Gait Lasso & Random Forest Models

acctime_ITIsd: Standard deviation of the intertap intervals (ITIs), representing the variability in time between consecutive foot taps.

acctime_ITIcv: Coefficient of variation of intertap intervals, expressing the relative variability in tapping rhythm.

Age.numerical: Participant's age (in years).

acctime_Powerlog: Logarithmic transformation of total signal energy over time (P = W/t). Represents overall movement intensity.

gyrotimefrequency_maxdominantfrequency: Maximum tapping frequency over the 30 seconds time of the task

accTimeFrequency_SDSumenergy: Standard deviation of summed foot-tapping energy over time, reflecting variability in movement energy.

gyrofrequency_slopepsdgyro: Slope of the gyroscope signal's power spectral density (PSD, dB/Hz) in the frequency domain. Calculated from the midpoint of the dominant frequency component to its peak amplitude.

accTimeFrequency_MeanSumenergy: Mean of the instantaneous energy over the 30 seconds of the tapping task, showing the average energy participant spent during 30 second of tapping to perform the task. The lower, the worse.

acctime_Varsignal: Variance of normalized foot-tapping amplitude over time, indicating overall signal variability.

Important for TUG Lasso & RF Models that are not already included in Gait Models

acctime_ITImean: Mean intertap interval (average time between consecutive foot taps).

accTimeFrequency_InterceptSumenergy: Intercept of the regression line fitted to the summed foot-tapping energy over time.

gyrotime_Mediansignal: Median normalized amplitude of foot-tapping signals over time.

acctime_Minsignal: Minimum normalized amplitude of the foot-tapping signal over time.

gyrotimefrequency_cvcsat: Variability of the energy of the gyroscope signal over 30 seconds of tapping, and calculated through taking the coefficient of variation of the summation of energy distributed across different tapping frequency within each time instance.

gyrotime_Powerlog: Log-transformed total energy of the gyroscope signal over time (P = W/t).

gyrotime_cvdegreewithoutbumps: Coefficient of variation of foot lift angles (degree of upward movement). Calculated from the peaks of each foot tap to represent variability in lift height.

acctime_Rangesignal: Range of normalized amplitude over time (maximum signal – minimum signal).

acctime_taps: Total number of foot taps detected for each participant.

accTimeFrequency_SlopeSumenergy: Slope of the regression line fitted to the summed foot-tapping energy over time, describing the trend in frequency-domain energy peaks.

gyrotime_cvdropdown: Coefficient of variation of the downward angular velocity (degrees per second) during foot drop motion. Computed from the negative peaks of each foot tap.