PISON

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Data Scientist Technical Interview Challenge

As the next step in the interviewing process, we would like you to complete the following exercise, to be turned back in no later than one week from midnight upon the day of receipt.

A csv file attached to the email contains Pison device data. Each row is a sample. The columns are as follows:

timestamp (milliseconds with microsecond precision); channel 0 raw, channel 1 raw, channel 0 high-passed, and channel 1 high-passed (all in ADC counts); quaternion x, y, z, and w; gyroscope x, y, and z in degrees per second; accelerometer x, y, and z in meters per second squared; body movement label; and finally, repetition number (where there is one "repetition" for a given prompting window).

The body movement coding is: 0 = standing #1, 1 = standing #2, 2 = walking, 3 = walking fast, 4 = running.

The accelerometer and gyroscope coordinates follow the ENU convention:

The X-axis points East.
The Y-axis points North.
The Z-axis points Up.

The quaternion coordinates follow the convention:

The X-axis points West.
The Y-axis points South.
The Z-axis points Up.

Your task is to build a classifier that can determine what the user is doing with their wrist during each whole body movement. Determine how many different wrist-motion classes there are, and (if possible) use features to identify what motion each class is representing. Produce quantitative estimates of the generalization performance of your classifier. Provide a brief (1-2 page report) describing your process, methods, and results. Please perform this exercise in Python, and produce clean, readable code that could be readily used by other engineers in a cloud-based (i.e., notebook server) environment. Be sure to publish your code to a public GitHub repository and link this repository in your report.

Have fun!