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Artificial Intelligence

Practical Project 2 – Human Activity Recognition

This work uses a dataset, acquired from WISDM Lab, that consists of data collected from 36 users performing six types of human activities ("*ascending*" and "*descending*" stairs, "*sitting*", "*walking*", "*jogging*", and "*standing*") for specific periods of time.

These data were acquired using accelerometers, that detect the orientation of the device measuring the acceleration along the three different dimensions. They were collected using a sample rate of 20 Hz (1 sample every 50 millisecond, i.e., 20 samples per second.

The goal is to analyse a sequence of XYZ measurements for a period and infer the type of activity that the user is doing.

Step 1. Divide the available data into "Learning", "Validation" and "Test" splits, using K-fold cross validation.

Step 2. Create your data instances, by concatenating "K" consecutive measurements from a users.

Step 3. Use a machine learning model to predict the users' activity, based in the data created in Step 2.

Step 4. Obtain the corresponding ROC curves, for each class. Also, provide the accuracy value per class and the overall value.

Step 5. Find the importance of the X, Y and Z features to predict each activity.

Step 6. Repeat the experiments from Step 1-5, but using the subjects "ID" as the dependent variable. The hypothesis is: "*Is it possible to identify a subject based on his activity measurements?"*

Step 7. Both for the “Activity” and “ID” experiments, identify the instances in the test set that are particularly hard to classify. What characterizes such instances?