Project CookBook
Getting and Cleaning Data
Johns Hopkins University
December 2015 by Rafael Hernamperez

The features selected for this dataset come from the accelerometer and gyroscope 3-axial raw signals tAcc-XYZ and tGyro-XYZ. These time domain signals (prefix 't' to denote time) were captured at a constant rate of 50 Hz. Then they were filtered using a median filter and a 3rd order low pass Butterworth filter with a corner frequency of 20 Hz to remove noise. Similarly, the acceleration signal was then separated into body and gravity acceleration signals (tBodyAcc-XYZ and tGravityAcc-XYZ) using another low pass Butterworth filter with a corner frequency of 0.3 Hz.

Subsequently, the body linear acceleration and linear acceleration were derived in time to obtain Jerk signals (tBodyAccJerk-XYZ and tBodyGyroJerk-XYZ). Also the magnitude of these three-dimensional signals were calculated using the Euclidean norm (tBodyAccMag, tGravityAccMag, tBodyAccJerkMag, tBodyGyroMag, tBodyGyroJerkMag).

Finally a Fast Fourier Transform (FFT) was applied to some of these signals producing fBodyAcc-XYZ, fBodyAccJerk-XYZ, fBodyGyro-XYZ, fBodyAccJerkMag, fBodyGyroMag, fBodyGyroJerkMag. (Note the 'f' to indicate frequency domain signals).

These signals were used to estimate variables of the feature vector for each pattern:
'-XYZ' is used to denote 3-axial signals in the X, Y and Z directions.

tBodyAcc-XYZ
tGravityAcc-XYZ
tBodyAccJerk-XYZ
tBodyGyro-XYZ
tBodyGyroJerk-XYZ
tBodyAccMag
tGravityAccMag
tBodyAccJerkMag
tBodyGyroMag
tBodyGyroJerkMag
fBodyAcc-XYZ
fBodyAccJerk-XYZ
fBodyGyro-XYZ
fBodyAccMag
fBodyAccJerkMag
fBodyGyroMag
fBodyGyroJerkMag

The final dataset is composed by 180 observations/rows (30 subjects x 6 activities) and 89 variables/columns, which are selected only the mean and standard deviations for the objective of the present project.

Here is the description of each variable of the dataset:

subject

Integer number. ID of the subject that made the activity. This is a number between 1 and 30, and identifies to each subject of the experiment.

activity

String. Type of activity. Contains the name of the activity made by the subject:
- WALKING
- WALKING_UPSTAIRS
- WALKING_DOWNSTAIRS
- SITTING
- STANDING
- LAYING

activity_id

Integer number. ID of the activity made by the subject. This is a number between 1 and 6, which corresponds with the following activities:

1) WALKING
2) WALKING UPSTAIRS
3) WALKING DOWNSTAIRS
4) SITTING
5) STANDING
6) LAYING

tBodyAcc_mean___X

Float Number. Mean of the time of body linear acceleration signals in X axis.

tBodyAcc_mean___Y

Float Number. Mean of the time of body linear acceleration signals in Y axis.

tBodyAcc_mean___Z

Float Number. Mean of the time of body linear acceleration signals in Z axis.

tGravityAcc_mean___X

Float Number. Mean of the time of gravity acceleration signals in X axis.

tGravityAcc_mean___Y

Float Number. Mean of the time of gravity acceleration signals in Y axis.

tGravityAcc_mean___Z

Float Number. Mean of the time of gravity acceleration signals in Z axis.

tBodyAccJerk_mean___X

Float Number. Mean of the time of body linear acceleration Jerk signals in X axis.

tBodyAccJerk_mean___Y

Float Number. Mean of the time of body linear acceleration Jerk signals in Y axis.

tBodyAccJerk_mean___Z

Float Number. Mean of the time of body linear acceleration Jerk signals in Z axis.

tBodyGyro_mean___X

Float Number. Mean of the time of body gyroscope linear acceleration signals in X axis.

tBodyGyro_mean___Y

Float Number. Mean of the time of body gyroscope linear acceleration signals in Y axis.

tBodyGyro_mean___Z

Float Number. Mean of the time of body gyroscope linear acceleration signals in Z axis.

tBodyGyroJerk_mean___X

Float Number. Mean of the time of body gyroscope Jerk linear acceleration signals in X axis.

tBodyGyroJerk_mean___Y

Float Number. Mean of the time of body gyroscope Jerk linear acceleration signals in Y axis.

tBodyGyroJerk_mean___Z

Float Number. Mean of the time of body gyroscope Jerk linear acceleration signals in Z axis.

tBodyAccMag_mean__

Float Number. Mean of the time of the magnitude of the body acceleration signals.

tGravityAccMag_mean__

Float Number. Mean of the time of the magnitude of the gravity acceleration signals.

tBodyAccJerkMag_mean__

Float Number. Mean of the time of the magnitude of the body acceleration Jerk signals.

tBodyGyroMag_mean__

Float Number. Mean ot the time of the magnitude of the body gyroscope linear acceleration signals.

tBodyGyroJerkMag_mean__

Float Number. Mean of the time of the magnitude of the body gyroscope Jerk linear acceleration signals.

fBodyAcc_mean___X

Float Number. Mean of the frequency of the body acceleration signals in X axis.

fBodyAcc_mean___Y

Float Number. Mean of the frequency of the body acceleration signals in Y axis.

fBodyAcc_mean___Z

Float Number. Mean of the frequency of the body acceleration signals in Z axis.

fBodyAcc_meanFreq___X

Float Number. Frequency of the body acceleration signals in X axis based on the mean of its frequency.

fBodyAcc_meanFreq___Y

Float Number. Frequency of the body acceleration signals in Y axis based on the mean of its frequency.

fBodyAcc_meanFreq___Z

Float Number. Frequency of the body acceleration signals in Z axis based on the mean of its frequency.

fBodyAccJerk_mean___X

Float Number. Mean of the frequency of the body acceleration Jerk signals in X axis.

fBodyAccJerk_mean___Y

Float Number. Mean of the frequency of the body acceleration Jerk signals in Y axis.

fBodyAccJerk_mean___Z

Float Number. Mean of the frequency of the body acceleration Jerk signals in Z axis.

fBodyAccJerk_meanFreq___X

Float Number. Frequency of the body acceleration Jerk signals in X axis based on the mean of its frequency.

fBodyAccJerk_meanFreq___Y

Float Number. Frequency of the body acceleration Jerk signals in Y axis based on the mean of its frequency.

fBodyAccJerk_meanFreq___Z

Float Number. Frequency of the body acceleration signals in Z axis based on the mean of its frequency.

fBodyGyro_mean___X

Float Number. Mean of the frequency of body gyroscope linear acceleration signals in X axis.

fBodyGyro_mean___Y

Float Number. Mean of the frequency of body gyroscope linear acceleration signals in Y axis.

fBodyGyro_mean___Z

Float Number. Mean of the frequency of body gyroscope linear acceleration signals in Z axis.

fBodyGyro_meanFreq___X

Float Number. Frequency of body gyroscope linear acceleration signals in X axis based on the mean of its frequency.

fBodyGyro_meanFreq___Y

Float Number. Frequency of body gyroscope linear acceleration signals in Y axis based on the mean of its frequency.

fBodyGyro_meanFreq___Z

Float Number. Frequency of body gyroscope linear acceleration signals in Z axis based on the mean of its frequency.

fBodyAccMag_mean__

Float Number. Mean of the frequency of the magnitude of the body acceleration signals.

fBodyAccMag_meanFreq__

Float Number. Frequency of the magnitude of the body acceleration signals based on the mean of its frequency.

fBodyBodyAccJerkMag_mean__

Float Number. Mean of the frequency of the magnitude of the body acceleration Jerk signals.

fBodyBodyAccJerkMag_meanFreq__

Float Number. Frequency of the magnitude of the body acceleration Jerk signals based on the mean of its frequency.

fBodyBodyGyroMag_mean__

Float Number. Mean ot the frequency of the magnitude of the body gyroscope linear acceleration signals.

fBodyBodyGyroMag_meanFreq__

Float Number. Frequency of the magnitude of the body gyroscope linear acceleration signals based on the mean of its frequency.

fBodyBodyGyroJerkMag_mean__

Float Number. Mean ot the frequency of the magnitude of the body gyroscope Jerk linear acceleration signals.

fBodyBodyGyroJerkMag_meanFreq__

Float Number. Frequency of the magnitude of the body gyroscope Jerk linear acceleration signals based on the mean of its frequency.

angle_tBodyAccMean_gravity_

Float Number. Angle of the mean of the time of body acceleration with gravity.

angle_tBodyAccJerkMean__gravityMean_

Float Number. Angle of the mean of the time of body acceleration Jerk with mean of gravity.

angle_tBodyGyroMean_gravityMean_

Float Number. Angle of the mean of the time of body acceleration gyroscope with mean of gravity.

angle_tBodyGyroJerkMean_gravityMean_

Float Number. Angle of the mean of the time of body gyroscope Jerk with mean of gravity.

angle_X_gravityMean_

Float Number. Angle of the X axis in the mean of gravity.

angle_Y_gravityMean_

Float Number. Angle of the Y axis in the mean of gravity.

angle_Z_gravityMean_

Float Number. Angle of the Z axis in the mean of gravity.

tBodyAcc_std___X

Float Number. Standard deviation of the time of body linear acceleration signals in X axis.

tBodyAcc_std___Y

Float Number. Standard deviation of the time of body linear acceleration signals in Y axis.

tBodyAcc_std___Z

Float Number. Standard deviation of the time of body linear acceleration signals in Z axis.

tGravityAcc_std___X

Float Number. Standard deviation of the time of gravity acceleration signals in X axis.

tGravityAcc_std___Y

Float Number. Standard deviation of the time of gravity acceleration signals in Y axis.

tGravityAcc_std___Z

Float Number. Standard deviation of the time of gravity acceleration signals in Z axis.

tBodyAccJerk_std___X

Float Number. Standard deviation of the time of body linear acceleration Jerk signals in X axis.

tBodyAccJerk_std___Y

Float Number. Standard deviation of the time of body linear acceleration Jerk signals in Y axis.

tBodyAccJerk_std___Z

Float Number. Standard deviation of the time of body linear acceleration Jerk signals in Z axis.

tBodyGyro_std___X

Float Number. Standard deviation of the time of body gyroscope linear acceleration signals in X axis.

tBodyGyro_std___Y

Float Number. Standard deviation of the time of body gyroscope linear acceleration signals in Y axis.

tBodyGyro_std___Z

Float Number. Standard deviation of the time of body gyroscope linear acceleration signals in Z axis.

tBodyGyroJerk_std___X

Float Number. Standard deviation of the time of body gyroscope Jerk linear acceleration signals in X axis.

tBodyGyroJerk_std___Y

Float Number. Standard deviation of the time of body gyroscope Jerk linear acceleration signals in Y axis.

tBodyGyroJerk_std___Z

Float Number. Standard deviation of the time of body gyroscope Jerk linear acceleration signals in Z axis.

tBodyAccMag_std__

Float Number. Standard deviation of the time of the magnitude of the body acceleration signals.

tGravityAccMag_std__

Float Number. Standard deviation of the time of the magnitude of the gravity accelearation signals.

tBodyAccJerkMag_std__

Float Number. Standard deviation of the time of the magnitude of the body acceleration Jerk signals.

tBodyGyroMag_std__

Float Number. Standard deviation ot the time of the magnitude of the body gyroscope linear acceleration signals.

tBodyGyroJerkMag_std__

Float Number. Standard deviation of the time of the magnitude of the body gyroscope Jerk linear acceleration signals.

fBodyAcc_std___X

Float Number. Standard deviation of the frequency of the body acceleration signals in X axis.

fBodyAcc_std___Y

Float Number. Standard deviation of the frequency of the body acceleration signals in Y axis.

fBodyAcc_std___Z

Float Number. Standard deviation of the frequency of the body acceleration signals in Z axis.

fBodyAccJerk_std___X

Float Number. Standard deviation of the frequency of the body acceleration Jerk signals in X axis.

fBodyAccJerk_std___Y

Float Number. Standard deviation of the frequency of the body acceleration Jerk signals in Y axis.

fBodyAccJerk_std___Z

Float Number. Standard deviation of the frequency of the body acceleration Jerk signals in Z axis.

fBodyGyro_std___X

Float Number. Standard deviation of the frequency of body gyroscope linear acceleration signals in X axis.

fBodyGyro_std___Y

Float Number. Standard deviation of the frequency of body gyroscope linear acceleration signals in Y axis.

fBodyGyro_std___Z

Float Number. Standard deviation of the frequency of body gyroscope linear acceleration signals in Z axis.

fBodyAccMag_std__

Float Number. Standard deviation of the magnitude of the body linera acceleration signals.

fBodyBodyAccJerkMag_std__

Float Number. Standard deviation of the magnitude of the body linear acceleration Jerk signals.

fBodyBodyGyroMag_std__

Float Number. Standard deviation of the magnitude of body gyroscope acceleration signals.

fBodyBodyGyroJerkMag_std__

Float Number. Standard deviation of the magnitude of body gyroscope acceleration Jerk signals.