

Getting and Cleaning Data

Week 4

Project Codebook

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The experiments have been carried out with a group of 30 volunteers within an age bracket of 19-48 years. Each person performed six activities (WALKING, WALKING_UPSTAIRS, WALKING_DOWNSTAIRS, SITTING, STANDING, LAYING) wearing a smartphone (Samsung Galaxy S II) on the waist. Using its embedded accelerometer and gyroscope, we captured 3-axial linear acceleration and 3-axial angular velocity at a constant rate of 50Hz. The experiments have been video-recorded to label the data manually.

The sensor signals (accelerometer and gyroscope) were pre-processed by applying noise filters and then sampled in fixed-width sliding windows of 2.56 sec and 50% overlap (128 readings/window). The sensor acceleration signal, which has gravitational and body motion components, was separated using a Butterworth low-pass filter into body acceleration and gravity. The gravitational force is assumed to have only low frequency components, therefore a filter with 0.3 Hz cutoff frequency was used. From each window, a vector of features was obtained by calculating variables from the time and frequency domain.

According to project directions, variables were narrowed down to mean() and std() related variables only. Descriptions for each variable are in Table 1.

Table 1.

Variable	Description
Activity Label	The type of activity a subject is performing (WALKING, WALKING_UPSTAIRS, WALKING_DOWNSTAIRS, SITTING, STANDING, LAYING)
Subject	The ID of the subject
tBodyAcc-mean()-X	the body acceleration signal in the x direction
tBodyAcc-mean()-Y	the body acceleration signal in the y direction
tBodyAcc-mean()-Z	the body acceleration signal in the z direction
tBodyAcc-std()-X	the body acceleration signal in the x direction
tBodyAcc-std()-Y	the body acceleration signal in the y direction
tBodyAcc-std()-Z	the body acceleration signal in the z direction
tGravityAcc-mean()-X	the gravity acceleration signal in the x direction
tGravityAcc-mean()-Y	the gravity acceleration signal in the y direction
tGravityAcc-mean()-Z	the gravity acceleration signal in the z direction

tGravityAcc-std()-X	the gravity acceleration signal in the x direction
tGravityAcc-std()-Y	the gravity acceleration signal in the y direction
tGravityAcc-std()-Z	the gravity acceleration signal in the z direction
tBodyAccJerk-mean()-X	the Jerk signals from derivation in time of the body linear acceleration in the x direction
tBodyAccJerk-mean()-Y	the Jerk signals from derivation in time of the body linear acceleration in the y direction
tBodyAccJerk-mean()-Z	the Jerk signals from derivation in time of the body linear acceleration in the z direction
tBodyAccJerk-std()-X	the Jerk signals from derivation in time of the body linear acceleration in the x direction
tBodyAccJerk-std()-Y	the Jerk signals from derivation in time of the body linear acceleration in the y direction
tBodyAccJerk-std()-Z	the Jerk signals from derivation in time of the body linear acceleration in the z direction
tBodyGyro-mean()-X	angular velocity in the x direction
tBodyGyro-mean()-Y	angular velocity in the y direction
tBodyGyro-mean()-Z	angular velocity in the z direction
tBodyGyro-std()-X	angular velocity in the x direction
tBodyGyro-std()-Y	angular velocity in the y direction
tBodyGyro-std()-Z	angular velocity in the z direction
tBodyGyroJerk-mean()-X	the Jerk signals from derivation in time of the angular velocity in the x direction
tBodyGyroJerk-mean()-Y	the Jerk signals from derivation in time of the angular velocity in the y direction
tBodyGyroJerk-mean()-Z	the Jerk signals from derivation in time of the angular velocity in the z direction
tBodyGyroJerk-std()-X	the Jerk signals from derivation in time of the angular velocity in the x direction
tBodyGyroJerk-std()-Y	the Jerk signals from derivation in time of the angular velocity in the y direction
tBodyGyroJerk-std()-Z	the Jerk signals from derivation in time of the angular velocity in the z direction
tBodyAccMag-mean()	Magnitude of tBodyAcc-mean() calculated using the Euclidean norm
tBodyAccMag-std()	Magnitude of tBodyAcc-std() calculated using the Euclidean norm
tGravityAccMag-mean()	Magnitude of tGravityAcc-mean() calculated using the Euclidean norm

tGravityAccMag-std()	Magnitude of tGravityAcc-std() calculated using the Euclidean norm
tBodyAccJerkMag-mean()	Magnitude of tBodyAccJerk-mean() calculated using the Euclidean norm
tBodyAccJerkMag-std()	Magnitude of tBodyAccJerk-std() calculated using the Euclidean norm
tBodyGyroMag-mean()	Magnitude of tBodyGyro-mean() calculated using the Euclidean norm
tBodyGyroMag-std()	Magnitude of tBodyGyro-std() calculated using the Euclidean norm
tBodyGyroJerkMag-mean()	Magnitude of tBodyGyroJerk-mean() calculated using the Euclidean norm
tBodyGyroJerkMag-std()	Magnitude of tBodyGyroJerk-std() calculated using the Euclidean norm
fBodyAcc-mean()-X	frequency domain signals from Fast Fourier Transform (FFT) of tBodyAcc-mean()-X
fBodyAcc-mean()-Y	frequency domain signals from Fast Fourier Transform (FFT) of tBodyAcc-mean()-Y
fBodyAcc-mean()-Z	frequency domain signals from Fast Fourier Transform (FFT) of tBodyAcc-mean()-Z
fBodyAcc-std()-X	frequency domain signals from Fast Fourier Transform (FFT) of tBodyAcc-std()-X
fBodyAcc-std()-Y	frequency domain signals from Fast Fourier Transform (FFT) of tBodyAcc-std()-Y
fBodyAcc-std()-Z	frequency domain signals from Fast Fourier Transform (FFT) of tBodyAcc-std()-Z
fBodyAccJerk-mean()-X	frequency domain signals from Fast Fourier Transform (FFT) of tBodyAccJerk-mean()-X
fBodyAccJerk-mean()-Y	frequency domain signals from Fast Fourier Transform (FFT) of tBodyAccJerk-mean()-Y
fBodyAccJerk-mean()-Z	frequency domain signals from Fast Fourier Transform (FFT) of tBodyAccJerk-mean()-Z
fBodyAccJerk-std()-X	frequency domain signals from Fast Fourier Transform (FFT) of tBodyAccJerk-std()-X
fBodyAccJerk-std()-Y	frequency domain signals from Fast Fourier Transform (FFT) of tBodyAccJerk-std()-Y
fBodyAccJerk-std()-Z	frequency domain signals from Fast Fourier Transform (FFT) of tBodyAccJerk-std()-Z
fBodyGyro-mean()-X	frequency domain signals from Fast Fourier Transform (FFT) of tBodyGyro-mean()-X
fBodyGyro-mean()-Y	frequency domain signals from Fast Fourier Transform (FFT) of tBodyGyro-mean()-Y

fBodyGyro-mean()-Z	frequency domain signals from Fast Fourier Transform (FFT) of tBodyGyro-mean()-Z
fBodyGyro-std()-X	frequency domain signals from Fast Fourier Transform (FFT) of tBodyGyro-std()-X
fBodyGyro-std()-Y	frequency domain signals from Fast Fourier Transform (FFT) of tBodyGyro-std()-Y
fBodyGyro-std()-Z	frequency domain signals from Fast Fourier Transform (FFT) of tBodyGyro-std()-Z
fBodyAccMag-mean()	frequency domain signals from Fast Fourier Transform (FFT) of tBodyAccMag-mean()
fBodyAccMag-std()	frequency domain signals from Fast Fourier Transform (FFT) of tBodyAccMag-std()
fBodyBodyAccJerkMag-mean()	frequency domain signals from Fast Fourier Transform (FFT) of tBodyBodyAccJerkMag-mean()
fBodyBodyAccJerkMag-std()	frequency domain signals from Fast Fourier Transform (FFT) of tBodyBodyAccJerkMag-std()
fBodyBodyGyroMag-mean()	frequency domain signals from Fast Fourier Transform (FFT) of tBodyBodyGyroMag-mean()
fBodyBodyGyroMag-std()	frequency domain signals from Fast Fourier Transform (FFT) of tBodyBodyGyroMag-std()
fBodyBodyGyroJerkMag-mean()	frequency domain signals from Fast Fourier Transform (FFT) of tBodyBodyGyroJerkMag-mean()
fBodyBodyGyroJerkMag-std()	frequency domain signals from Fast Fourier Transform (FFT) of tBodyBodyGyroJerkMag-std()