

CodeBook

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Feature Selection

The features selected for this database 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 angular velocity 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 set of variables that were estimated from these signals are:

- mean(): Mean value
- std(): Standard deviation

All of this variables described above are a mean value of grouped line of activity and subject, then all of variables are listed below:

Variable	Description
activity	Activites names
subject	Subjects ID
tBodyAcc.mean...X	mean of all tBodyAcc.mean...X
tBodyAcc.mean...Y	mean of all tBodyAcc.mean...Y
tBodyAcc.mean...Z	mean of all tBodyAcc.mean...Z
tBodyAcc.std...X	mean of all tBodyAcc.std...X
tBodyAcc.std...Y	mean of all tBodyAcc.std...Y
tBodyAcc.std...Z	mean of all tBodyAcc.std...Z
tGravityAcc.mean...X	mean of all tGravityAcc.mean...X
tGravityAcc.mean...Y	mean of all tGravityAcc.mean...Y
tGravityAcc.mean...Z	mean of all tGravityAcc.mean...Z
tGravityAcc.std...X	mean of all tGravityAcc.std...X
tGravityAcc.std...Y	mean of all tGravityAcc.std...Y
tGravityAcc.std...Z	mean of all tGravityAcc.std...Z
tBodyAccJerk.mean...X	mean of all tBodyAccJerk.mean...X
tBodyAccJerk.mean...Y	mean of all tBodyAccJerk.mean...Y
tBodyAccJerk.mean...Z	mean of all tBodyAccJerk.mean...Z
tBodyAccJerk.std...X	mean of all tBodyAccJerk.std...X
tBodyAccJerk.std...Y	mean of all tBodyAccJerk.std...Y
tBodyAccJerk.std...Z	mean of all tBodyAccJerk.std...Z
tBodyGyro.mean...X	mean of all tBodyGyro.mean...X
tBodyGyro.mean...Y	mean of all tBodyGyro.mean...Y
tBodyGyro.mean...Z	mean of all tBodyGyro.mean...Z
tBodyGyro.std...X	mean of all tBodyGyro.std...X
tBodyGyro.std...Y	mean of all tBodyGyro.std...Y
tBodyGyro.std...Z	mean of all tBodyGyro.std...Z
tBodyGyroJerk.mean...X	mean of all tBodyGyroJerk.mean...X
tBodyGyroJerk.mean...Y	mean of all tBodyGyroJerk.mean...Y
tBodyGyroJerk.mean...Z	mean of all tBodyGyroJerk.mean...Z
tBodyGyroJerk.std...X	mean of all tBodyGyroJerk.std...X
tBodyGyroJerk.std...Y	mean of all tBodyGyroJerk.std...Y
tBodyGyroJerk.std...Z	mean of all tBodyGyroJerk.std...Z
tBodyAccMag.mean..	mean of all tBodyAccMag.mean..
tBodyAccMag.std..	mean of all tBodyAccMag.std..
tGravityAccMag.mean..	mean of all tGravityAccMag.mean..
tGravityAccMag.std..	mean of all tGravityAccMag.std..
tBodyAccJerkMag.mean..	mean of all tBodyAccJerkMag.mean..
tBodyAccJerkMag.std..	mean of all tBodyAccJerkMag.std..
tBodyGyroMag.mean..	mean of all tBodyGyroMag.mean..
tBodyGyroMag.std..	mean of all tBodyGyroMag.std..
tBodyGyroJerkMag.mean..	mean of all tBodyGyroJerkMag.mean..
tBodyGyroJerkMag.std..	mean of all tBodyGyroJerkMag.std..
fBodyAcc.mean...X	mean of all fBodyAcc.mean...X
fBodyAcc.mean...Y	mean of all fBodyAcc.mean...Y
fBodyAcc.mean...Z	mean of all fBodyAcc.mean...Z
fBodyAcc.std...X	mean of all fBodyAcc.std...X
fBodyAcc.std...Y	mean of all fBodyAcc.std...Y
fBodyAcc.std...Z	mean of all fBodyAcc.std...Z
fBodyAccJerk.mean...X	mean of all fBodyAccJerk.mean...X
fBodyAccJerk.mean...Y	mean of all fBodyAccJerk.mean...Y
fBodyAccJerk.mean...Z	mean of all fBodyAccJerk.mean...Z
fBodyAccJerk.std...X	mean of all fBodyAccJerk.std...X

Variable	Description
fBodyAccJerk.std... Y	mean of all fBodyAccJerk.std... Y
fBodyAccJerk.std... Z	mean of all fBodyAccJerk.std... Z
fBodyGyro.mean... X	mean of all fBodyGyro.mean... X
fBodyGyro.mean... Y	mean of all fBodyGyro.mean... Y
fBodyGyro.mean... Z	mean of all fBodyGyro.mean... Z
fBodyGyro.std... X	mean of all fBodyGyro.std... X
fBodyGyro.std... Y	mean of all fBodyGyro.std... Y
fBodyGyro.std... Z	mean of all fBodyGyro.std... Z
fBodyAccMag.mean..	mean of all fBodyAccMag.mean..
fBodyAccMag.std..	mean of all fBodyAccMag.std..
fBodyBodyAccJerkMag.mean..	mean of all fBodyBodyAccJerkMag.mean..
fBodyBodyAccJerkMag.std..	mean of all fBodyBodyAccJerkMag.std..
fBodyBodyGyroMag.mean..	mean of all fBodyBodyGyroMag.mean..
fBodyBodyGyroMag.std..	mean of all fBodyBodyGyroMag.std..
fBodyBodyGyroJerkMag.mean..	mean of all fBodyBodyGyroJerkMag.mean..
fBodyBodyGyroJerkMag.std..	mean of all fBodyBodyGyroJerkMag.std..