

Codebook for Learning Coursera Project

Data Cleaning and Manipulation

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).

Then 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.

The set of variables that were estimated from these signals are:

mean(): Mean value

std(): Standard deviation

Finally for each measurement average by each subject and activity was calculated.

Variable	Position	Along each axis of XYZ	Measure s	Description
SUBJECT_ID	1	No		Identifier or volunteer participation in experiment
ACTIVITY	2	No		Name of one of activity in experiment: (WALKING, WALKING_UPSTAIRS, WALKING_DOWNSTAIRS, SITTING, STANDING, LAYING)
tBodyAcc	3-8	Yes	mean() std()	Average of one of measurement in experiment. Refer to description above

tGravityAcc	9-14	Yes	mean() std()	Average of one of measurement in experiment. Refer to description above
tBodyAccJerk	15-20	Yes	mean() std()	Average of one of measurement in experiment. Refer to description above
tBodyGyro	21-26	Yes	mean() std()	Average of one of measurement in experiment. Refer to description above
tBodyGyroJerk	27-32	Yes	mean() std()	Average of one of measurement in experiment. Refer to description above
tBodyAccMag	33-34	No	mean() std()	Average of one of measurement in experiment. Refer to description above
tGravityAccMag	35-36	No	mean() std()	Average of one of measurement in experiment. Refer to description above
tBodyAccJerkMag	37-38	No	mean() std()	Average of one of measurement in experiment. Refer to description above
tBodyGyroMag	39-40	No	mean() std()	Average of one of measurement in experiment. Refer to description above
tBodyGyroJerkMag	41-42	No	mean() std()	Average of one of measurement in experiment. Refer to description above
fBodyAcc	43-48	Yes	mean() std()	Average of one of measurement in experiment. Refer to description above
fBodyAccJerk	49-54	Yes	mean() std()	Average of one of measurement in experiment. Refer to description above
fBodyGyro	55-60	Yes	mean() std()	Average of one of measurement in experiment. Refer to description above
fBodyAccMag	61-62	No	mean() std()	Average of one of measurement in experiment. Refer to description above
fBodyAccJerkMag	63-64	No	mean() std()	Average of one of measurement in experiment. Refer to description above
fBodyGyroMag	65-66	No	mean() std()	Average of one of measurement in experiment. Refer to description above
fBodyGyroJerkMag	67-68	No	mean() std()	Average of one of measurement in experiment. Refer to description above