CodeBook

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##Collection of the raw data The data was collected from the Human Activity Recognition Using Smartphones Dataset Version 1.0. This dataset was obtained from the course website, and represent data collected from the accelerometers from the Samsung Galaxy S smartphone. A full description is available at the site where the data was obtained:

http://archive.ics.uci.edu/ml/datasets/Human+Activity+Recognition+Using+Smartphones

##Creating the tidy datafile

The script run_analysis.R is to performing the analysis of the dataset.

###Guide to create the tidy data file

to create the tidy data file

1. Merges the training and the test sets to create one data set.
2. Extracts only the measurements on the mean and standard deviation for each measurement.
3. Uses descriptive activity names to name the activities in the data set
4. Appropriately labels the data set with descriptive variable names.
5. From the data set in step 4, creates a second, independent tidy data set with the average of each variable for each activity and each subject.

##Description of the variables in the tidyDataset.txt file

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.

1.tBodyAcc-XYZ 2.tGravityAcc-XYZ 3.tBodyAccJerk-XYZ 4.tBodyGyro-XYZ 5.tBodyGyroJerk-XYZ 6.tBodyAccMag 7.tGravityAccMag 8.tBodyAccJerkMag 9.tBodyGyroMag 10.tBodyGyroJerkMag 11.fBodyAcc-XYZ 12.fBodyAccJerk-XYZ 13.fBodyGyro-XYZ 14.fBodyAccMag 15.fBodyAccJerkMag 16.fBodyGyroMag 17.fBodyGyroJerkMag

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

1. mean(): Mean value
2. std(): Standard deviation

And for each group of subject-Activy-patternSignal is estimated the average.

The complete list of variables of each feature vector is available next:

$ subjectID : int 1 . . . 30

$ Activity : chr "LAYING" "SITTING" "STANDING" "WALKING" "WALKING_UPSTAIRS" "WALKING_DOWNSTAIRS"

$ fBodyAcc.mean.X : num NaN NaN 0.207 0.2074 0.0456 . . .

$ fBodyAcc.mean.Y : num NaN NaN 0.528 0.234 0.469 . . .

$ fBodyAcc.mean.Z : num NaN NaN 0.524 0.319 0.259 . . .

$ fBodyAcc.meanFreq.X : num NaN NaN 0.31 0.316 0.204 . . .

$ fBodyAcc.meanFreq.Y : num NaN NaN 0.575 0.328 0.276 . . .

$ fBodyAcc.meanFreq.Z : num NaN NaN 0.39 0.349 0.152 . . .

$ fBodyAcc.std.X : num NaN NaN 0.128 0.288 0.276 . . .

$ fBodyAcc.std.Y : num NaN NaN 0.191 0.245 0.466 . . .

$ fBodyAcc.std.Z : num NaN NaN 0.294 0.181 0.177 . . .

$ fBodyAccJerk.mean.X : num NaN -0.2576 0.1265 0.2637 0.0538 . . .

$ fBodyAccJerk.mean.Y : num NaN 0.5824 0.5257 0.1478 0.0554 . . .

$ fBodyAccJerk.mean.Z : num NaN 0.756 0.367 0.275 0.214 . . .

$ fBodyAccJerk.meanFreq.X : num NaN 0.123 0.313 0.113 NaN . . .

$ fBodyAccJerk.meanFreq.Y : num NaN 0.201 0.419 0.239 NaN . . .

$ fBodyAccJerk.meanFreq.Z : num NaN 0.0546 0.5338 0.1894 NaN . . .

$ fBodyAccJerk.std.X : num NaN -0.4635 0.0834 0.2393 0.2171 . . .

$ fBodyAccJerk.std.Y : num NaN -0.2546 0.0179 0.1413 NaN . . .

$ fBodyAccJerk.std.Z : num NaN 0.1813 -0.3468 0.0923 NaN . . .

$ fBodyAccMag.mean() : num NaN 0.2781 NaN 0.0594 NaN . . .

$ fBodyAccMag.meanFreq() : num NaN 0.216 NaN 0.0933 -0.0615 . . .

$ fBodyAccMag.std() : num NaN 0.29323 NaN 0.06666 0.00207 . . .

$ fBodyBodyAccJerkMag.mean() : num NaN 0.23642 NaN 0.245397 -0.000929 . . .

$ fBodyBodyAccJerkMag.meanFreq() : num NaN 0.018 NaN 0.152 0.449 . . .

$ fBodyBodyAccJerkMag.std() : num NaN 0.0933 NaN 0.2101 0.2937 . . .

$ fBodyBodyGyroJerkMag.mean() : num 0.5438 0.5464 NaN 0.0952 0.2799 . . .

$ fBodyBodyGyroJerkMag.meanFreq(): num 0.408 NaN NaN 0.212 0.422 . . .

$ fBodyBodyGyroJerkMag.std() : num 0.2379 NaN NaN 0.2439 0.0623 . . .

$ fBodyBodyGyroMag.mean() : num -0.275 0.218 NaN 0.208 0.158 . . .

$ fBodyBodyGyroMag.meanFreq() : num 0.438 0.148 NaN 0.109 0.169 . . .

$ fBodyBodyGyroMag.std() : num 0.428473 0.089257 NaN 0.245971 0.000784 . . .

$ fBodyGyro.mean.X : num NaN 0.0924 0.3979 0.1577 NaN . . .

$ fBodyGyro.mean.Y : num NaN 0.4537 0.3642 0.0827 NaN . . .

$ fBodyGyro.mean.Z : num NaN 0.191 0.365 0.176 NaN ...

$ fBodyGyro.meanFreq.X : num NaN 0.459 0.459 0.223 NaN ...

$ fBodyGyro.meanFreq.Y : num NaN 0.35 0.737 0.178 NaN ...

$ fBodyGyro.meanFreq.Z : num NaN 0.165 NaN 0.155 NaN ...

$ fBodyGyro.std.X : num NaN 0.207 0.752 0.18 NaN ...

$ fBodyGyro.std.Y : num NaN 0.107 0.519 0.165 NaN ...

$ fBodyGyro.std.Z : num NaN 0.217 0.242 0.218 NaN ...

$ tBodyAcc.mean.X : num 0.438 NaN NaN 0.236 0.335 ...

$ tBodyAcc.mean.Y : num 0.4417 NaN NaN 0.2431 0.0275 ...

$ tBodyAcc.mean.Z : num 0.58328 NaN NaN NaN 0.00549 ...

$ tBodyAcc.std.X : num 0.7069 NaN NaN NaN 0.0958 ...

$ tBodyAcc.std.Y : num 0.552 NaN NaN NaN 0.196 ...

$ tBodyAcc.std.Z : num 0.498 NaN NaN NaN 0.224 ...

$ tBodyAccJerk.mean.X : num -0.282 0.231 NaN NaN 0.342 ...

$ tBodyAccJerk.mean.Y : num -0.525 0.204 NaN NaN 0.136 ...

$ tBodyAccJerk.mean.Z : num -0.5339 0.0893 NaN NaN NaN ...

$ tBodyAccJerk.std.X : num -0.27 0.073 NaN NaN NaN ...

$ tBodyAccJerk.std.Y : num 0.293 0.262 NaN NaN NaN ...

$ tBodyAccJerk.std.Z : num 0.248 0.459 NaN NaN NaN ...

$ tBodyAccJerkMag.mean() : num NaN NaN 0.69 0.139 NaN ...

$ tBodyAccJerkMag.std() : num NaN NaN 0.74 0.187 NaN ...

$ tBodyAccMag.mean() : num -0.124 NaN 0.314 -0.0873 NaN ...

$ tBodyAccMag.std() : num -0.0787 NaN 0.2674 0.1185 NaN ...

$ tBodyGyro.mean.X : num 0.23 0.508 NaN NaN NaN ...

$ tBodyGyro.mean.Y : num 0.356 0.34 NaN NaN NaN ...

$ tBodyGyro.mean.Z : num 0.425 0.477 NaN NaN NaN ...

$ tBodyGyro.std.X : num NaN -0.478 NaN -0.152 NaN ...

$ tBodyGyro.std.Y : num -0.201 NaN NaN 0.174 NaN ...

$ tBodyGyro.std.Z : num -0.102 NaN 0.158 0.244 NaN ...

$ tBodyGyroJerk.mean.X : num -0.186 NaN 0.415 0.263 NaN ...

$ tBodyGyroJerk.mean.Y : num -0.373 NaN 0.405 0.415 NaN ...

$ tBodyGyroJerk.mean.Z : num -0.3644 NaN 0.0878 0.3354 NaN ...

$ tBodyGyroJerk.std.X : num 0.201 NaN 0.02 0.22 NaN ...

$ tBodyGyroJerk.std.Y : num 0.133 NaN 0.146 0.218 NaN ...

$ tBodyGyroJerk.std.Z : num 0.5315 NaN 0.1364 -0.0209 NaN ...

$ tBodyGyroJerkMag.mean() : num NaN NaN 0.5607 0.1 0.0824 ...

$ tBodyGyroJerkMag.std() : num NaN NaN 0.429 0.173 -0.105 . . .

$ tBodyGyroMag.mean() : num NaN NaN 0.131 0.194 0.545 . . .

$ tBodyGyroMag.std() : num NaN NaN 0.662 0.133 0.579 . . .

$ tGravityAcc.mean.X : num 0.434 NaN NaN NaN 0.213 . . .

$ tGravityAcc.mean.Y : num 0.0664 NaN NaN NaN 0.2377 . . .

$ tGravityAcc.mean.Z : num 0.405 NaN NaN NaN 0.183 . . .

$ tGravityAcc.std.X : num -0.1436 NaN NaN NaN 0.0704 . . .

$ tGravityAcc.std.Y : num -0.6912 -0.27 NaN NaN 0.0305 . . .

$ tGravityAcc.std.Z : num -0.351 0.189 NaN NaN 0.317 . . .

$ tGravityAccMag.mean() : num 0.0991 NaN 0.1205 0.2048 NaN . . .

$ tGravityAccMag.std() : num NaN NaN 0.351 0.225 NaN ..