**CODE BOOK**

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**A. Summary Method**

From the original 561 variables of the Features file belonging to the UCI HAR Dataset (Human Activity Recognition Using Smartphones), 85 variables names were extracted that had the mean and standard deviation as measurements. It is described below the variable names used, its abbreviations and its units. The variable names are left as the original names from the Feature file as they are easily understood by the class audience as they are familiar with them. Some names are already abbreviated but clear in their interpretation. They were not spelled out completely as it'd make them cumbersome as column names. Thus the balance is to leave them as they were. However, they were modified using as guides the Identifiers in Google's R Style Guide (https://google-styleguide.googlecode.com/svn/trunk /Rguide.xml), leaving out punctuation marks and capitalizing the first letter of each word.

**B. Variables**

**Variable Abbr. Description**

**(Units)**

subject One of a group of 30 volunteers within an age bracket of 19-48 years old

activity One of six activities performed by the subject: WALKING, WALKING\_UPSTAIRS, WALKING\_DOWNSTAIRS, SITTING, STANDING, LAYING

Acc (g) Accelerometer time domain reading with 3-axial raw signals represented by tAcc-XYZ captured at a constant rate of 50 Hz

angle (degrees) Angle between to vectors. It is used with vectors (gravityMean, tBodyAccMean, tBodyAccJerkMean, tBodyGyroMean, tBodyGyroJerkMean) obtained by averaging the signals in a signal window sample

Body (g) Body acceleration signal separated from the acceleration signal to produce tBodyAcc-XYZ

f (Hertz) Frequency domain signal. Fast Fourier Transform (FFT) was applied to some of the signals described here to produce fBodyAcc-XYZ, fBodyAccJerk-XYZ, fBodyGyro-XYZ, fBodyAccJerkMag, fBodyGyroMag, fBodyGyroJerkMag

Gravity (g) Gravity acceleration signal separated from the acceleration signal to produce tGravityAcc-XYZ

Gyro (radians/second) Gyroscope time domain reading with 3-axial raw signals represented by tGyro XYZ captured at a constant rate of 50 Hz

Jerk (g) Jerk signals (tBodyAccJerk-XYZ and tBodyGyroJerk-XYZ) from body linear acceleration and angular velocity derived in time

Mag (g) Magnitude of the Jerk three-dimensional signals were calculated using the Euclidean norm (tBodyAccMag, tGravityAccMag, tBodyAccJerkMag, tBodyGyroMag, tBodyGyroJerkMag)

Mean (g) Mean variable estimated from these signals

MeanFreq (Hertz) Weighted average of the frequency components to obtain a mean frequency

Std (g)Standard Deviation variable estimated from these signals

t (g) Time domain signal captured at a constant rate of 50 Hz

XYZ (degrees) XYZ is used to denote 3-axial signals in the X, Y and Z directions

**Variable Names (all units in 'g' unless otherwise noted)**

1 subject

1 activity

1 tBodyAccMeanX

2 tBodyAccMeanY

3 tBodyAccMeanZ

4 tBodyAccStdX

5 tBodyAccStdY

6 tBodyAccStdZ

41 tGravityAccMeanX

42 tGravityAccMeanY

43 tGravityAccMeanZ

44 tGravityAccStdX

45 tGravityAccStdY

46 tGravityAccStdZ

81 tBodyAccJerkMeanX

82 tBodyAccJerkMeanY

83 tBodyAccJerkMeanZ

84 tBodyAccJerkStdX

85 tBodyAccJerkStdY

86 tBodyAccJerkStdZ

121 tBodyGyroMeanX

122 tBodyGyroMeanY

123 tBodyGyroMeanZ

124 tBodyGyroStdX

125 tBodyGyroStdY

126 tBodyGyroStdZ

161 tBodyGyroJerkMeanX

162 tBodyGyroJerkMeanY

163 tBodyGyroJerkMeanZ

164 tBodyGyroJerkStdX

165 tBodyGyroJerkStdY

166 tBodyGyroJerkStdZ

201 tBodyAccMagMean

202 tBodyAccMagStd

214 tGravityAccMagMean

215 tGravityAccMagStd

227 tBodyAccJerkMagMean

228 tBodyAccJerkMagStd

240 tBodyGyroMagMean

241 tBodyGyroMagStd

253 tBodyGyroJerkMagMean

254 tBodyGyroJerkMagStd

266 fBodyAccMeanX

267 fBodyAccMeanY

268 fBodyAccMeanZ

269 fBodyAccStdX

270 fBodyAccStdY

271 fBodyAccStdZ

294 fBodyAccMeanFreqX

295 fBodyAccMeanFreqY

296 fBodyAccMeanFreqZ

345 fBodyAccJerkMeanX

346 fBodyAccJerkMeanY

347 fBodyAccJerkMeanZ

348 fBodyAccJerkStdX

349 fBodyAccJerkStdY

350 fBodyAccJerkStdZ

373 fBodyAccJerkMeanFreqX

374 fBodyAccJerkMeanFreqY

375 fBodyAccJerkMeanFreqZ

424 fBodyGyroMeanX

425 fBodyGyroMeanY

426 fBodyGyroMeanZ

427 fBodyGyroStdX

428 fBodyGyroStdY

429 fBodyGyroStdZ

452 fBodyGyroMeanFreqX

453 fBodyGyroMeanFreqY

454 fBodyGyroMeanFreqZ

503 fBodyAccMagMean

504 fBodyAccMagStd

513 fBodyAccMagMeanFreq

516 fBodyBodyAccJerkMagMean

517 fBodyBodyAccJerkMagStd

526 fBodyBodyAccJerkMagMeanFreq

529 fBodyBodyGyroMagMean

530 fBodyBodyGyroMagStd

539 fBodyBodyGyroMagMeanFreq

542 fBodyBodyGyroJerkMagMean

543 fBodyBodyGyroJerkMagStd

552 fBodyBodyGyroJerkMagMeanFreq

555 angleTBodyAccMeanGravity

556 angleTBodyAccJerkMeanGravityMean

557 angleTBodyGyroMeanGravityMean

558 angleTBodyGyroJerkMeanGravityMean

559 angleXGravityMean

560 angleYGravityMean

561 angleZGravityMean

**C. Study Design**

The basis of this work came from the data collected from the datasets of the Human Activity Recognition accelerometers from the Samsung Galaxy S smartphone. A full description is available here:   
  
<http://archive.ics.uci.edu/ml/datasets/Human+Activity+Recognition+Using+Smartphones>   
  
The data was obtained from this site:

<https://d396qusza40orc.cloudfront.net/getdata%2Fprojectfiles%2FUCI%20HAR%20Dataset.zip>   
  
 In this particular analysis, a R script, run\_analysis.R, was created to do the following:

1. Merges the training and the test sets to create one data set
   1. The background for understanding the project came from the ReadMe, Features, Activity Labels files
   2. Downloaded and read the subject test, X test and y test in R. No use was made of the Inertial Signals file
   3. Attached the column files of y test and subject test using 'cbind' into X test file to label the rows with the subject's ID and its activity
   4. Attached the column files of y train and subject train using 'cbind' into X train file to label the rows with the subject's ID and its activity
   5. Used Rbind function to attach the test and train files
   6. Ordered the file by subject and then by activity using 'order' function
2. Extracts only the measurements on the mean and standard deviation for each measurement
   1. Identified and extracted all column variables that have the mean and standard deviation
   2. Placed in separate file
3. Uses descriptive activity names to name the activities in the data set
   1. Replaced the activity numbers with the corresponding activity name of the Feature file
4. Appropriately labels the data set with descriptive variable names
   1. Formatted variable names with naming standards utilized in the R community
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
   1. Used the 'aggregate' function to calculate the mean value for each activity and subject
   2. Write the result to a .txt file and push it to Github