# Code Book

## Experimental Design

Detailed information about the experimental design for the raw data from which tidyWearables\_averages.txt is derived can be found in the README text file here: <https://d396qusza40orc.cloudfront.net/getdata%2Fprojectfiles%2FUCI%20HAR%20Dataset.zip>.

The data used in the production of tidyWearables\_averages.txt was gathered from an experiment in which 30 volunteers aged 19 – 48 were separated into 2 groups (test group and train group) and performed 6 different activities (including WALKING, WALKING\_UPSTAIRS, WALKING\_DOWNSTAIRS, SITTING, STANDING and LAYING) while wearing a Samsung Galaxy smartphone. During each activity a total of 561 linear and angular acceleration measurements were taken

## Data processing

The following steps were taken to produce tidyWearables\_averages.txt

1. Read in all data associated with the experiment and store in appropriate plyr/dplyr form. This included.
   1. X\_test.txt – test group observations.
   2. X\_train.txt – train group observations.
   3. y\_test.txt – test group activities.
   4. y\_train.txt – train group activities.
   5. activity\_labels.txt – vector that associates activity numbers with descriptions.
   6. features.txt – variable names.
   7. subject\_test.txt – subject identifiers for test group.
   8. subject\_train.txt – subject identifiers for train group.
2. Append test group and train group activities row-wise.
3. Append test group and train group activities row-wise.
4. Append test group and train group observations row-wise.
5. Append (2), (3) and (4) together column-wise (in that order).
6. Conduct a join with activity labels to replace activity number with activity labels
7. Create a character vector of column names from the features.txt file and append “subject” and “activity” to the left of the vector.
8. Remove all illegal characters from the column names. This includes “(“, “ )” and “-“.
9. Append (8) and (6) in that order.
10. Remove all columns from the resulting dataset whose names do not contain the strings “mean” or “std”.
11. Rename all columns with standard, descriptive notation. (See Below).
12. Arrange and group all data by subject and activity.
13. Summarize all resulting data using summarize\_each function and specifying mean.
14. Print resulting data to a file entitled tidyWearables.txt

The final data represents the mean of all observations for each subject-activity pair for all mean and standard deviation variables collected in the initial data.

## Variable Key

\* subject = study subject (participant) number

\* activity = one of six activities performed: WALKING, WALKING\_UPSTAIRS, WALKING\_DOWNSTAIRS, SITTING, STANDING, LAYING

\* t = measurement made in time domain

\* f/freq = measurement made in frequency domain (result of Fourier transform)

\* Mean = average

\* StDev = Standard deviation

\* Body = Measurement associated with the subject's body

\* Gravity = Measurement associated with gravity field

\* Acceleration = linear acceleration in X,Y,Z directions or total

\* Jerk = Dynamic acceleration component (derivative)

\* Gyro = measurement is angular acceleration

\* Mag = Magnitude

\* angle = measurement of angular displacement (only present in measurement containing a body/gravity pair:

## Variables (88)

\* subject

\* activity

\* tMeanBodyAccelrationX

\* tMeanBodyAccelrationY

\* tMeanBodyAccelrationZ

\* tStDevBodyAccelerationX

\* tStDevBodyAccelerationY

\* tStDevBodyAccelerationZ

\* tMeanGravityAccelerationX

\* tMeanGravityAccelerationY

\* tMeanGravityAccelerationZ

\* tStDevGravityAccelerationX

\* tStDevGravityAccelerationY

\* tStDevGravityAccelerationz

\* tMeanBodyJerkAccelerationX

\* tMeanBodyJerkAccelerationY

\* tMeanBodyJerkAccelerationZ

\* tStDevBodyJerkAccelerationX

\* tStDevBodyJerkAccelerationY

\* tStDevBodyJerkAccelerationZ

\* tMeanBodyGyroX

\* tMeanBodyGyroY

\* tMeanBodyGyroZ

\* tStDevBodyGyroX

\* tStDevBodyGyroY

\* tStDevBodyGyroZ

\* tMeanBodyJerkGyroX

\* tMeanBodyJerkGyroY

\* tMeanBodyJerkGyroZ

\* tStDevBodyJerkGyroX

\* tStDevBodyJerkGyroY

\* tStDevBodyJerkGyroZ

\* tMeanAccelerationMagBody

\* tStDevAccelerationMagBody

\* tMeanGravityAcceleration

\* tStDevGravityAcceleration

\* tMeanBodyJerkAcceleration

\* tStDevBodyAccelerationJerkMag

\* tMeanBodyGyroMag

\* tStDevBodyGyroMag

\* tMeanBodyJerkGyroMag

\* tStDevBodyJerkGyroMag

\* fMeanBodyAccelrationX

\* fMeanBodyAccelrationY

\* fMeanBodyAccelrationZ

\* fStDevBodyAccelerationX

\* fStDevBodyAccelerationY

\* fStDevBodyAccelerationZ

\* fMeanGravityAccelerationXFreq

\* fMeanGravityAccelerationYFreq

\* fMeanGravityAccelerationZFreq

\* fStDevGravityAccelerationX

\* fStDevGravityAccelerationY

\* fStDevGravityAccelerationz

\* fMeanBodyJerkAccelerationX

\* fMeanBodyJerkAccelerationY

\* fMeanBodyJerkAccelerationZ

\* fStDevBodyJerkAccelerationXFreq

\* fStDevBodyJerkAccelerationYFreq

\* fStDevBodyJerkAccelerationZFreq

\* fMeanBodyGyroX

\* fMeanBodyGyroY

\* fMeanBodyGyroZ

\* fStDevBodyGyroX

\* fStDevBodyGyroY

\* fStDevBodyGyroZ

\* fMeanBodyJerkGyroXFreq

\* fMeanBodyJerkGyroYFreq

\* fMeanBodyJerkGyroZFreq

\* fMeanBodyAccelerationMag

\* fStDevBodyAccelerationMag

\* fMeanBodytAccelerationMagFreq

\* fMeanBodyAccelerationJerkMag

\* fStDevBodyAccelerationJerkMag

\* fMeanBodyAccelerationJerkMagFreq

\* fMeanBodyGyroMag

\* fStDevBodyGyroMag

\* fMeanBodyGyroMagFreq

\* fMeanBodyGyroJerkMag

\* fStDevBodyGyroJerkMag

\* fMeanBodyGyroJerkMagFreq

\* angletMeanBodyAccelerationGravity

\* angletMeanBodyAccelerationJerkGravity

\* angletMeanBodyGyroGravity

\* angletMeanBodyGyroJerkGravity

\* anglemeanGravityX

\* anglemeanGravityY

\* anglemeanGravityZ