**Codebook for tidy\_data.txt**

**Background**

An experiment was conducted where a group of 30 volunteers each performed six activities (walking, walking upstairs, walking downstairs, sitting, standing, laying) wearing a smartphone (Samsung Galaxy S II) on the waist. The data generated by the embedded accelerometer and gyroscope in the smartphones were recorded.

More information about the study can be found here:<http://archive.ics.uci.edu/ml/datasets/Human+Activity+Recognition+Using+Smartphones>

**Raw Data**

The raw data relevant to this project is contained in 7 text files which can be downloaded [here](https://d396qusza40orc.cloudfront.net/getdata%2Fprojectfiles%2FUCI%20HAR%20Dataset.zip).

**Data Manipulation**

All data manipulation was done (and can be replicated) by running the R script run\_analysis.R. In short:

1. The raw data was combined into a single dataset with 10299 rows and 561 columns.
2. From this combined dataset, only the columns with column names containing the strings "mean()" or "std()" were extracted.
3. The activity numbers in the activity field were changed to descriptions.
4. The variable names were changed to make them easier to read.
5. The data was grouped to generate averages over subject and activity.
6. The grouped data was exported as the final tidy dataset with 68 columns (each representing a variable) and 180 rows (each representing an observation: 30 subjects performing 6 activities each).

**Variables**

**Variable Names**

All variable names (except "Subject" and "Activity") are a combination of:

* The domain (t or f): the t-domain denotes measurements made over time, while f-domain represents Fast Fourier Transformed variables derived from the t-domain variables.
* "Body" or "Gravity": some of the acceleration signals do not actually measure body-acceleration but gravity-acceleration.
* The axis of the measurement (X, Y or Z)
* The function: mean (Mean) or standard deviation (StdDev)
* A combination of "Acc" (for acceleration), "Gyro" (for angular velocity), "Jerk" (for jerk signals) and "Mag" (for magnitude).

"t.Body.Acc.Jerk.X.Mean" will therefore denote a measurement in the t-domain, showing body-acceleration jerk magnitude in the X-plane.

The calculated variables (all except "Subject" and "Activity") all represent the **average** of the measurement that they are denoting.

There are 68 variables in the dataset:

**1. Subject.** Integer. Denotes the person (subject) that performed the activities.

**2. Activity.** String. Describes the activity performed.

**3. t.Body.Acc.X.Mean** The average of the means of body-acceleration in the X-plane.

**4. t.Body.Acc.Y.Mean** The average of the means of body-acceleration in the Y-plane.

**5. t.Body.Acc.Z.Mean** The average of the means of body-acceleration in the Z-plane.

**6. t.Body.Acc.X.StdDev** The average of the standard deviations of body-acceleration in the X-plane.

**7. t.Body.Acc.Y.StdDev** The average of the standard deviations of body-acceleration in the Y-plane.

**8. t.Body.Acc.Z.StdDev** The average of the standard deviations of body-acceleration in the Z-plane.

**9. t.Gravity.Acc.X.Mean** The average of the means of gravity-acceleration in the X-plane.

**10. t.Gravity.Acc.Y.Mean** The average of the means of gravity-acceleration in the Y-plane.

**11. t.Gravity.Acc.Z.Mean** The average of the means of gravity-acceleration in the Z-plane.

**12. t.Gravity.Acc.X.StdDev** The average of the standard deviations of gravity-acceleration in the X-plane.

**13. t.Gravity.Acc.Y.StdDev** The average of the standard deviations of gravity-acceleration in the Y-plane.

**14. t.Gravity.Acc.Z.StdDev** The average of the standard deviations of gravity-acceleration in the Z-plane.

**15. t.Body.Acc.Jerk.X.Mean** The average of the means of body-acceleration jerk in the X-plane.

**16. t.Body.Acc.Jerk.Y.Mean** The average of the means of body-acceleration jerk in the Y-plane.

**17. t.Body.Acc.Jerk.Z.Mean** The average of the means of body-acceleration jerk in the Z-plane.

**18. t.Body.Acc.Jerk.X.StdDev** The average of the standard deviations of body-acceleration jerk in the X-plane.

**19. t.Body.Acc.Jerk.Y.StdDev** The average of the standard deviations of body-acceleration jerk in the Y-plane.

**20. t.Body.Acc.Jerk.Z.StdDev** The average of the standard deviations of body-acceleration jerk in the Z-plane.

**21. t.Body.Gyro.X.Mean** The average of the means of angular velocity in the X-plane.

**22. t.Body.Gyro.Y.Mean** The average of the means of angular velocity in the Y-plane.

**23. t.Body.Gyro.Z.Mean** The average of the means of angular velocity in the Z-plane.

**24. t.Body.Gyro.X.StdDev** The average of the standard deviations of angular velocity in the X-plane.

**25. t.Body.Gyro.Y.StdDev** The average of the standard deviations of angular velocity in the Y-plane.

**26. t.Body.Gyro.Z.StdDev** The average of the standard deviations of angular velocity in the Z-plane.

**27. t.Body.Gyro.Jerk.X.Mean** The average of the means of angular velocity jerk in the X-plane.

**28. t.Body.Gyro.Jerk.Y.Mean** The average of the means of angular velocity jerk in the Y-plane.

**29. t.Body.Gyro.Jerk.Z.Mean** The average of the means of angular velocity jerk in the Z-plane.

**30. t.Body.Gyro.Jerk.X.StdDev** The average of the standard deviations of angular velocity jerk in the X-plane.

**31. t.Body.Gyro.Jerk.Y.StdDev** The average of the standard deviations of angular velocity jerk in the Y-plane.

**32. t.Body.Gyro.Jerk.Z.StdDev** The average of the standard deviations of angular velocity jerk in the Z-plane.

**33. t.Body.Acc.Mag.Mean** The average of the means of body-acceleration magnitude.

**34. t.Body.Acc.Mag.StdDev** The average of the standard deviations of body-acceleration magnitude.

**35. t.Gravity.Acc.Mag.Mean** The average of the means of gravity-acceleration magnitude.

**36. t.Gravity.Acc.Mag.StdDev** The average of the standard deviations of gravity-acceleration magnitude.

**37. t.Body.Acc.Jerk.Mag.Mean** The average of the means of body-acceleration jerk magnitude.

**38. t.Body.Acc.Jerk.Mag.StdDev** The average of the standard deviations of body-acceleration jerk magnitude.

**39. t.Body.Gyro.Mag.Mean** The average of the means of angular velocity magnitude.

**40. t.Body.Gyro.Mag.StdDev** The average of the standard deviations of angular velocity magnitude.

**41. t.Body.Gyro.Jerk.Mag.Mean** The average of the means of angular velocity jerk magnitude.

**42. t.Body.Gyro.Jerk.Mag.StdDev** The average of the standard deviations of angular velocity jerk magnitude.

**43. f.Body.Acc.X.Mean** The average of the means of the Fast Fourier Transformation of body-acceleration in the X-plane.

**44. f.Body.Acc.Y.Mean** The average of the means of the Fast Fourier Transformation of body-acceleration in the Y-plane.

**45. f.Body.Acc.Z.Mean** The average of the means of the Fast Fourier Transformation of body-acceleration in the Z-plane.

**46. f.Body.Acc.X.StdDev** The average of the standard deviations of the Fast Fourier Transformation of body-acceleration in the X-plane.

**47. f.Body.Acc.Y.StdDev** The average of the standard deviations of the Fast Fourier Transformation of body-acceleration in the Y-plane.

**48. f.Body.Acc.Z.StdDev** The average of the standard deviations of the Fast Fourier Transformation of body-acceleration in the Z-plane.

**49. f.Body.Acc.Jerk.X.Mean** The average of the means of the Fast Fourier Transformation of body-acceleration jerk in the X-plane.

**50. f.Body.Acc.Jerk.Y.Mean** The average of the means of the Fast Fourier Transformation of body-acceleration jerk in the Y-plane.

**51. f.Body.Acc.Jerk.Z.Mean** The average of the means of the Fast Fourier Transformation of body-acceleration jerk in the Z-plane.

**52. f.Body.Acc.Jerk.X.StdDev** The average of the standard deviations of the Fast Fourier Transformation of body-acceleration jerk in the X-plane.

**53. f.Body.Acc.Jerk.Y.StdDev** The average of the standard deviations of the Fast Fourier Transformation of body-acceleration jerk in the Y-plane.

**54. f.Body.Acc.Jerk.Z.StdDev** The average of the standard deviations of the Fast Fourier Transformation of body-acceleration jerk in the Z-plane.

**55. f.Body.Gyro.X.Mean** The average of the means of the Fast Fourier Transformation of angular velocity in the X-plane.

**56. f.Body.Gyro.Y.Mean** The average of the means of the Fast Fourier Transformation of angular velocity in the Y-plane.

**57. f.Body.Gyro.Z.Mean** The average of the means of the Fast Fourier Transformation of angular velocity in the Z-plane.

**58. f.Body.Gyro.X.StdDev** The average of the standard deviations of the Fast Fourier Transformation of angular velocity in the X-plane.

**59. f.Body.Gyro.Y.StdDev** The average of the standard deviations of the Fast Fourier Transformation of angular velocity in the Y-plane.

**60. f.Body.Gyro.Z.StdDev** The average of the standard deviations of the Fast Fourier Transformation of angular velocity in the Z-plane.

**61. f.Body.Acc.Mag.Mean** The average of the means of the Fast Fourier Transformation of body-acceleration magnitude.

**62. f.Body.Acc.Mag.StdDev** The average of the standard deviations of the Fast Fourier Transformation of body-acceleration magnitude.

**63. f.Body.Acc.Jerk.Mag.Mean** The average of the means of the Fast Fourier Transformation of body-acceleration jerk magnitude.

**64. f.Body.Acc.Jerk.Mag.StdDev** The average of the standard deviations of the Fast Fourier Transformation of body-acceleration jerk magnitude.

**65. f.Body.Gyro.Mag.Mean** The average of the means of the Fast Fourier Transformation of angular velocity magnitude.

**66. f.Body.Gyro.Mag.StdDev** The average of the standard deviations of the Fast Fourier Transformation of angular velocity magnitude.

**67. f.Body.Gyro.Jerk.Mag.Mean** The average of the means of the Fast Fourier Transformation of angular velocity jerk magnitude.

**68. f.Body.Gyro.Jerk.Mag.StdDev** The average of the standard deviations of the Fast Fourier Transformation of angular velocity jerk magnitude.