

# Codebook

12/09/2020

## R Markdown - Codebook for Getting and Cleaning Data Course Project

A code book that describes the VARIABLES, the DATA, and any transformations or work that you performed to clean up the data called CodeBook.md.

### INPUT FILES:

1. Program start DOWNLOAD file from “<https://d396qusza40orc.cloudfront.net/getdata%2Fprojectfiles%2FUCI%20HAR%20Dataset.zip>”
2. After download, files will be UNZIP to “./UCI HAR Dataset/”
3. Read files from “./Data/UCI HAR Dataset/train/” or “./Data/UCI HAR Dataset/test/” or “./Data/UCI HAR Dataset/” and start execute program features
4. Meaning of files:
  1. Names Variables: features.txt
  2. Data: x\_train.txt, x\_test.txt
  3. Subject: subject\_train.txt, subject\_test.txt
  4. Activity: y\_train.txt, y\_test.txt
  5. Activity Labels: activity\_labels.txt

### STEPS:

1. Concatenate ROWs of train plus test: Data (x\_train.txt and x\_test.txt, Subject (subject\_train.txt and subject\_test.txt), activity ( y\_train.txt and y\_test.txt)
2. Rename column name of ACTIVITY and SUBJECT
3. Merge COLUMNS Data, Activity and Subject
4. Select only names of columns with mean() or std()
5. Rename columns name with descriptive variable names
6. Create a new dataset group by SUBJECT and ACTIVITY and calculate average of each variable
7. Last, create a txt file with results

### VARIABLES:

1. ACTtrain, ACTtest, SUBtrain, SUBtest, FEAttrain, FEAttest, dataFEANames: read files from txt
2. dataCOMBINE: Results of combine SUBJECT and ACTIVITY
3. Data: Result of processing before step 6
4. Data2: Results of tidy data set (subset of Data)

```
## Download data set
# Check if directory exists
if(!file.exists("Data")){dir.create("Data")}
```

```

# Check if zip file exists
if(!file.exists("Dataset.zip")){
  url <- "https://d396qusza40orc.cloudfront.net/getdata%2Fprojectfiles%2FUCI%20HAR%20Dataset.zip"
  zfile <- paste("./Data/", "Dataset.zip", sep="")
  download.file(url, destfile=zfile, method="curl")
}

# Check if file unzipped
if(!file.exists("Dataset.zip")){
  unzip(zfile, exdir="./Data")
}

## Read files - ACTIVITY - TRAIN 7352 X TEST 2947
ACTtrain <- read.table("./Data/UCI HAR Dataset/train/y_train.txt", header = FALSE)
ACTtest <- read.table("./Data/UCI HAR Dataset/test/y_test.txt", header = FALSE)

## Read Files - SUBJECT - TRAIN 7352 X TEST 2947
SUBtrain <- read.table("./Data/UCI HAR Dataset/train/subject_train.txt", header = FALSE)
SUBtest <- read.table("./Data/UCI HAR Dataset/test/subject_test.txt", header = FALSE)

## Read Files - FEATURES - TRAIN 7352 X TEST 2947
FEAtrain <- read.table("./Data/UCI HAR Dataset/train/X_train.txt", header = FALSE)
FEAtest <- read.table("./Data/UCI HAR Dataset/test/X_test.txt", header = FALSE)

## Show Variables
str(ACTtrain)

```

```

## 'data.frame':    7352 obs. of  1 variable:
## $ V1: int  5 5 5 5 5 5 5 5 5 5 ...

```

```
str(ACTtest)
```

```

## 'data.frame':    2947 obs. of  1 variable:
## $ V1: int  5 5 5 5 5 5 5 5 5 5 ...

```

```
str(SUBtrain)
```

```

## 'data.frame':    7352 obs. of  1 variable:
## $ V1: int  1 1 1 1 1 1 1 1 1 1 ...

```

```
str(SUBtest)
```

```

## 'data.frame':    2947 obs. of  1 variable:
## $ V1: int  2 2 2 2 2 2 2 2 2 2 ...

```

```
str(FEAtrain)
```

```

## 'data.frame':    7352 obs. of  561 variables:
## $ V1 : num  0.289 0.278 0.28 0.279 0.277 ...
## $ V2 : num -0.0203 -0.0164 -0.0195 -0.0262 -0.0166 ...

```

```

## $ V3 : num -0.133 -0.124 -0.113 -0.123 -0.115 ...
## $ V4 : num -0.995 -0.998 -0.995 -0.996 -0.998 ...
## $ V5 : num -0.983 -0.975 -0.967 -0.983 -0.981 ...
## $ V6 : num -0.914 -0.96 -0.979 -0.991 -0.99 ...
## $ V7 : num -0.995 -0.999 -0.997 -0.997 -0.998 ...
## $ V8 : num -0.983 -0.975 -0.964 -0.983 -0.98 ...
## $ V9 : num -0.924 -0.958 -0.977 -0.989 -0.99 ...
## $ V10 : num -0.935 -0.943 -0.939 -0.939 -0.942 ...
## $ V11 : num -0.567 -0.558 -0.558 -0.576 -0.569 ...
## $ V12 : num -0.744 -0.818 -0.818 -0.83 -0.825 ...
## $ V13 : num 0.853 0.849 0.844 0.844 0.849 ...
## $ V14 : num 0.686 0.686 0.682 0.682 0.683 ...
## $ V15 : num 0.814 0.823 0.839 0.838 0.838 ...
## $ V16 : num -0.966 -0.982 -0.983 -0.986 -0.993 ...
## $ V17 : num -1 -1 -1 -1 -1 ...
## $ V18 : num -1 -1 -1 -1 -1 ...
## $ V19 : num -0.995 -0.998 -0.999 -1 -1 ...
## $ V20 : num -0.994 -0.999 -0.997 -0.997 -0.998 ...
## $ V21 : num -0.988 -0.978 -0.965 -0.984 -0.981 ...
## $ V22 : num -0.943 -0.948 -0.975 -0.986 -0.991 ...
## $ V23 : num -0.408 -0.715 -0.592 -0.627 -0.787 ...
## $ V24 : num -0.679 -0.501 -0.486 -0.851 -0.559 ...
## $ V25 : num -0.602 -0.571 -0.571 -0.912 -0.761 ...
## $ V26 : num 0.9293 0.6116 0.273 0.0614 0.3133 ...
## $ V27 : num -0.853 -0.3295 -0.0863 0.0748 -0.1312 ...
## $ V28 : num 0.36 0.284 0.337 0.198 0.191 ...
## $ V29 : num -0.0585 0.2846 -0.1647 -0.2643 0.0869 ...
## $ V30 : num 0.2569 0.1157 0.0172 0.0725 0.2576 ...
## $ V31 : num -0.2248 -0.091 -0.0745 -0.1553 -0.2725 ...
## $ V32 : num 0.264 0.294 0.342 0.323 0.435 ...
## $ V33 : num -0.0952 -0.2812 -0.3326 -0.1708 -0.3154 ...
## $ V34 : num 0.279 0.086 0.239 0.295 0.44 ...
## $ V35 : num -0.4651 -0.0222 -0.1362 -0.3061 -0.2691 ...
## $ V36 : num 0.4919 -0.0167 0.1739 0.4821 0.1794 ...
## $ V37 : num -0.191 -0.221 -0.299 -0.47 -0.089 ...
## $ V38 : num 0.3763 -0.0134 -0.1247 -0.3057 -0.1558 ...
## $ V39 : num 0.4351 -0.0727 -0.1811 -0.3627 -0.1898 ...
## $ V40 : num 0.661 0.579 0.609 0.507 0.599 ...
## $ V41 : num 0.963 0.967 0.967 0.968 0.968 ...
## $ V42 : num -0.141 -0.142 -0.142 -0.144 -0.149 ...
## $ V43 : num 0.1154 0.1094 0.1019 0.0999 0.0945 ...
## $ V44 : num -0.985 -0.997 -1 -0.997 -0.998 ...
## $ V45 : num -0.982 -0.989 -0.993 -0.981 -0.988 ...
## $ V46 : num -0.878 -0.932 -0.993 -0.978 -0.979 ...
## $ V47 : num -0.985 -0.998 -1 -0.996 -0.998 ...
## $ V48 : num -0.984 -0.99 -0.993 -0.981 -0.989 ...
## $ V49 : num -0.895 -0.933 -0.993 -0.978 -0.979 ...
## $ V50 : num 0.892 0.892 0.892 0.894 0.894 ...
## $ V51 : num -0.161 -0.161 -0.164 -0.164 -0.167 ...
## $ V52 : num 0.1247 0.1226 0.0946 0.0934 0.0917 ...
## $ V53 : num 0.977 0.985 0.987 0.987 0.987 ...
## $ V54 : num -0.123 -0.115 -0.115 -0.121 -0.122 ...
## $ V55 : num 0.0565 0.1028 0.1028 0.0958 0.0941 ...
## $ V56 : num -0.375 -0.383 -0.402 -0.4 -0.4 ...

```

```

## $ V57 : num 0.899 0.908 0.909 0.911 0.912 ...
## $ V58 : num -0.971 -0.971 -0.97 -0.969 -0.967 ...
## $ V59 : num -0.976 -0.979 -0.982 -0.982 -0.984 ...
## $ V60 : num -0.984 -0.999 -1 -0.996 -0.998 ...
## $ V61 : num -0.989 -0.99 -0.992 -0.981 -0.991 ...
## $ V62 : num -0.918 -0.942 -0.993 -0.98 -0.98 ...
## $ V63 : num -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 ...
## $ V64 : num -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 ...
## $ V65 : num 0.114 -0.21 -0.927 -0.596 -0.617 ...
## $ V66 : num -0.59042 -0.41006 0.00223 -0.06493 -0.25727 ...
## $ V67 : num 0.5911 0.4139 0.0275 0.0754 0.2689 ...
## $ V68 : num -0.5918 -0.4176 -0.0567 -0.0858 -0.2807 ...
## $ V69 : num 0.5925 0.4213 0.0855 0.0962 0.2926 ...
## $ V70 : num -0.745 -0.196 -0.329 -0.295 -0.167 ...
## $ V71 : num 0.7209 0.1253 0.2705 0.2283 0.0899 ...
## $ V72 : num -0.7124 -0.1056 -0.2545 -0.2063 -0.0663 ...
## $ V73 : num 0.7113 0.1091 0.2576 0.2048 0.0671 ...
## $ V74 : num -0.995 -0.834 -0.705 -0.385 -0.237 ...
## $ V75 : num 0.996 0.834 0.714 0.386 0.239 ...
## $ V76 : num -0.996 -0.834 -0.723 -0.387 -0.241 ...
## $ V77 : num 0.992 0.83 0.729 0.385 0.241 ...
## $ V78 : num 0.57 -0.831 -0.181 -0.991 -0.408 ...
## $ V79 : num 0.439 -0.866 0.338 -0.969 -0.185 ...
## $ V80 : num 0.987 0.974 0.643 0.984 0.965 ...
## $ V81 : num 0.078 0.074 0.0736 0.0773 0.0734 ...
## $ V82 : num 0.005 0.00577 0.0031 0.02006 0.01912 ...
## $ V83 : num -0.06783 0.02938 -0.00905 -0.00986 0.01678 ...
## $ V84 : num -0.994 -0.996 -0.991 -0.993 -0.996 ...
## $ V85 : num -0.988 -0.981 -0.981 -0.988 -0.988 ...
## $ V86 : num -0.994 -0.992 -0.99 -0.993 -0.992 ...
## $ V87 : num -0.994 -0.996 -0.991 -0.994 -0.997 ...
## $ V88 : num -0.986 -0.979 -0.979 -0.986 -0.987 ...
## $ V89 : num -0.993 -0.991 -0.987 -0.991 -0.991 ...
## $ V90 : num -0.985 -0.995 -0.987 -0.987 -0.997 ...
## $ V91 : num -0.992 -0.979 -0.979 -0.992 -0.992 ...
## $ V92 : num -0.993 -0.992 -0.992 -0.99 -0.99 ...
## $ V93 : num 0.99 0.993 0.988 0.988 0.994 ...
## $ V94 : num 0.992 0.992 0.992 0.993 0.993 ...
## $ V95 : num 0.991 0.989 0.989 0.993 0.986 ...
## $ V96 : num -0.994 -0.991 -0.988 -0.993 -0.994 ...
## $ V97 : num -1 -1 -1 -1 -1 ...
## $ V98 : num -1 -1 -1 -1 -1 ...
## $ V99 : num -1 -1 -1 -1 -1 ...
## [list output truncated]

```

```
str(FEAtest)
```

```

## 'data.frame': 2947 obs. of 561 variables:
## $ V1 : num 0.257 0.286 0.275 0.27 0.275 ...
## $ V2 : num -0.0233 -0.0132 -0.0261 -0.0326 -0.0278 ...
## $ V3 : num -0.0147 -0.1191 -0.1182 -0.1175 -0.1295 ...
## $ V4 : num -0.938 -0.975 -0.994 -0.995 -0.994 ...
## $ V5 : num -0.92 -0.967 -0.97 -0.973 -0.967 ...
## $ V6 : num -0.668 -0.945 -0.963 -0.967 -0.978 ...

```

```

## $ V7 : num -0.953 -0.987 -0.994 -0.995 -0.994 ...
## $ V8 : num -0.925 -0.968 -0.971 -0.974 -0.966 ...
## $ V9 : num -0.674 -0.946 -0.963 -0.969 -0.977 ...
## $ V10 : num -0.894 -0.894 -0.939 -0.939 -0.939 ...
## $ V11 : num -0.555 -0.555 -0.569 -0.569 -0.561 ...
## $ V12 : num -0.466 -0.806 -0.799 -0.799 -0.826 ...
## $ V13 : num 0.717 0.768 0.848 0.848 0.849 ...
## $ V14 : num 0.636 0.684 0.668 0.668 0.671 ...
## $ V15 : num 0.789 0.797 0.822 0.822 0.83 ...
## $ V16 : num -0.878 -0.969 -0.977 -0.974 -0.975 ...
## $ V17 : num -0.998 -1 -1 -1 -1 ...
## $ V18 : num -0.998 -1 -1 -0.999 -0.999 ...
## $ V19 : num -0.934 -0.998 -0.999 -0.999 -0.999 ...
## $ V20 : num -0.976 -0.994 -0.993 -0.995 -0.993 ...
## $ V21 : num -0.95 -0.974 -0.974 -0.979 -0.967 ...
## $ V22 : num -0.83 -0.951 -0.965 -0.97 -0.976 ...
## $ V23 : num -0.168 -0.302 -0.618 -0.75 -0.591 ...
## $ V24 : num -0.379 -0.348 -0.695 -0.899 -0.74 ...
## $ V25 : num 0.246 -0.405 -0.537 -0.554 -0.799 ...
## $ V26 : num 0.521 0.507 0.242 0.175 0.116 ...
## $ V27 : num -0.4878 -0.1565 -0.115 -0.0513 -0.0289 ...
## $ V28 : num 0.4823 0.0407 0.0327 0.0342 -0.0328 ...
## $ V29 : num -0.0455 0.273 0.1924 0.1536 0.2943 ...
## $ V30 : num 0.21196 0.19757 -0.01194 0.03077 0.00063 ...
## $ V31 : num -0.1349 -0.1946 -0.0634 -0.1293 -0.0453 ...
## $ V32 : num 0.131 0.411 0.471 0.446 0.168 ...
## $ V33 : num -0.0142 -0.3405 -0.5074 -0.4195 -0.0682 ...
## $ V34 : num -0.106 0.0776 0.1885 0.2715 0.0744 ...
## $ V35 : num 0.0735 -0.084 -0.2316 -0.2258 0.0271 ...
## $ V36 : num -0.1715 0.0353 0.6321 0.4164 -0.1459 ...
## $ V37 : num 0.0401 -0.0101 -0.5507 -0.2864 -0.0502 ...
## $ V38 : num 0.077 -0.105 0.3057 -0.0638 0.2352 ...
## $ V39 : num -0.491 -0.429 -0.324 -0.167 0.29 ...
## $ V40 : num -0.709 0.399 0.28 0.545 0.458 ...
## $ V41 : num 0.936 0.927 0.93 0.929 0.927 ...
## $ V42 : num -0.283 -0.289 -0.288 -0.293 -0.303 ...
## $ V43 : num 0.115 0.153 0.146 0.143 0.138 ...
## $ V44 : num -0.925 -0.989 -0.996 -0.993 -0.996 ...
## $ V45 : num -0.937 -0.984 -0.988 -0.97 -0.971 ...
## $ V46 : num -0.564 -0.965 -0.982 -0.992 -0.968 ...
## $ V47 : num -0.93 -0.989 -0.996 -0.993 -0.996 ...
## $ V48 : num -0.938 -0.983 -0.989 -0.971 -0.971 ...
## $ V49 : num -0.606 -0.965 -0.98 -0.993 -0.969 ...
## $ V50 : num 0.906 0.856 0.856 0.856 0.854 ...
## $ V51 : num -0.279 -0.305 -0.305 -0.305 -0.313 ...
## $ V52 : num 0.153 0.153 0.139 0.136 0.134 ...
## $ V53 : num 0.944 0.944 0.949 0.947 0.946 ...
## $ V54 : num -0.262 -0.262 -0.262 -0.273 -0.279 ...
## $ V55 : num -0.0762 0.149 0.145 0.1421 0.1309 ...
## $ V56 : num -0.0178 0.0577 0.0406 0.0461 0.0554 ...
## $ V57 : num 0.829 0.806 0.812 0.809 0.804 ...
## $ V58 : num -0.865 -0.858 -0.86 -0.854 -0.843 ...
## $ V59 : num -0.968 -0.957 -0.961 -0.963 -0.965 ...
## $ V60 : num -0.95 -0.988 -0.996 -0.992 -0.996 ...

```

```
## $ V61 : num -0.946 -0.982 -0.99 -0.973 -0.972 ...
## $ V62 : num -0.76 -0.971 -0.979 -0.996 -0.969 ...
## $ V63 : num -0.425 -0.729 -0.823 -0.823 -0.83 ...
## $ V64 : num -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 ...
## $ V65 : num 0.219 -0.465 -0.53 -0.7 -0.302 ...
## $ V66 : num -0.43 -0.51 -0.295 -0.343 -0.482 ...
## $ V67 : num 0.431 0.525 0.305 0.359 0.539 ...
## $ V68 : num -0.432 -0.54 -0.315 -0.375 -0.596 ...
## $ V69 : num 0.433 0.554 0.326 0.392 0.655 ...
## $ V70 : num -0.795 -0.746 -0.232 -0.233 -0.493 ...
## $ V71 : num 0.781 0.733 0.169 0.176 0.463 ...
## $ V72 : num -0.78 -0.737 -0.155 -0.169 -0.465 ...
## $ V73 : num 0.785 0.749 0.164 0.185 0.483 ...
## $ V74 : num -0.984 -0.845 -0.429 -0.297 -0.536 ...
## $ V75 : num 0.987 0.869 0.44 0.304 0.544 ...
## $ V76 : num -0.989 -0.893 -0.451 -0.311 -0.553 ...
## $ V77 : num 0.988 0.913 0.458 0.315 0.559 ...
## $ V78 : num 0.981 0.945 0.548 0.986 0.998 ...
## $ V79 : num -0.996 -0.911 -0.335 0.653 0.916 ...
## $ V80 : num -0.96 -0.739 0.59 0.747 0.929 ...
## $ V81 : num 0.072 0.0702 0.0694 0.0749 0.0784 ...
## $ V82 : num 0.04575 -0.01788 -0.00491 0.03227 0.02228 ...
## $ V83 : num -0.10604 -0.00172 -0.01367 0.01214 0.00275 ...
## $ V84 : num -0.907 -0.949 -0.991 -0.991 -0.992 ...
## $ V85 : num -0.938 -0.973 -0.971 -0.973 -0.979 ...
## $ V86 : num -0.936 -0.978 -0.973 -0.976 -0.987 ...
## $ V87 : num -0.916 -0.969 -0.991 -0.99 -0.991 ...
## $ V88 : num -0.937 -0.974 -0.973 -0.973 -0.977 ...
## $ V89 : num -0.949 -0.979 -0.975 -0.978 -0.985 ...
## $ V90 : num -0.903 -0.915 -0.992 -0.992 -0.994 ...
## $ V91 : num -0.95 -0.981 -0.975 -0.975 -0.986 ...
## $ V92 : num -0.891 -0.978 -0.962 -0.962 -0.986 ...
## $ V93 : num 0.898 0.898 0.994 0.994 0.994 ...
## $ V94 : num 0.95 0.968 0.976 0.976 0.98 ...
## $ V95 : num 0.946 0.966 0.966 0.97 0.985 ...
## $ V96 : num -0.931 -0.974 -0.982 -0.983 -0.987 ...
## $ V97 : num -0.995 -0.998 -1 -1 -1 ...
## $ V98 : num -0.997 -0.999 -0.999 -0.999 -1 ...
## $ V99 : num -0.997 -0.999 -0.999 -0.999 -1 ...
## [list output truncated]
```

```
## -----
## 1.Merges the training and the test sets to create one data set.
## Step 1 - CONCATENATE ROWS - Total 10299
dataACT <- rbind(ACTtrain, ACTtest)
dataSUB <- rbind(SUBtrain, SUBtest)
dataFEA <- rbind(FEAtrain, FEAtest)

## Show variables
nrow(dataACT)
```

```
## [1] 10299
```

```
nrow(dataSUB)
```

```
## [1] 10299
```

```
nrow(dataFEA)
```

```
## [1] 10299
```

```
## Step 2 - DEFINE NAMES
names(dataACT) <- c("ACTIVITY")
names(dataSUB) <- c("SUBJECT")
dataFEANames <- read.table("./Data/UCI HAR Dataset/features.txt", header = FALSE)
names(dataFEA) <- dataFEANames$V2
```

```
## Step 3 - MERGE COLUMNS -> Row 10.299 Col= 563
dataCOMBINE <- cbind(dataSUB, dataACT)
Data <- cbind(dataFEA, dataCOMBINE)
```

```
##Show variables
ncol(Data)
```

```
## [1] 563
```

```
nrow(Data)
```

```
## [1] 10299
```

```
## -----
## 2.Extracts only the measurements on the mean and standard deviation for each measurement.
## Step 1 - Find NAMES of features with mean() or std()
subdataFEANames <- dataFEANames$V2[grep("mean\\(\\)|std\\(\\)", dataFEANames$V2)]
```

```
## Step 2 - Filter data using Step1 -> Row 10.299 x Col 68
FilterNames <- c(as.character(subdataFEANames),"SUBJECT", "ACTIVITY")
Data <- subset(Data,select=FilterNames)
```

```
##Show variables
ncol(Data)
```

```
## [1] 68
```

```
nrow(Data)
```

```
## [1] 10299
```

```
##Show data before
head(Data$ACTIVITY,1)
```

```
## [1] 5
```

```
## -----
## 3. Uses descriptive activity names to name the activities in the data set
ACTLabels <- read.table("./Data/UCI HAR Dataset/activity_labels.txt", header = FALSE)
Data$ACTIVITY <- ACTLabels[Data$ACTIVITY,2]
```

```
## Show data after
head(Data$ACTIVITY,1)
```

```
## [1] "STANDING"
```

```
## Show Before
names(Data)
```

```
## [1] "tBodyAcc-mean()-X"      "tBodyAcc-mean()-Y"
## [3] "tBodyAcc-mean()-Z"      "tBodyAcc-std()-X"
## [5] "tBodyAcc-std()-Y"       "tBodyAcc-std()-Z"
## [7] "tGravityAcc-mean()-X"   "tGravityAcc-mean()-Y"
## [9] "tGravityAcc-mean()-Z"   "tGravityAcc-std()-X"
## [11] "tGravityAcc-std()-Y"    "tGravityAcc-std()-Z"
## [13] "tBodyAccJerk-mean()-X"  "tBodyAccJerk-mean()-Y"
## [15] "tBodyAccJerk-mean()-Z"  "tBodyAccJerk-std()-X"
## [17] "tBodyAccJerk-std()-Y"   "tBodyAccJerk-std()-Z"
## [19] "tBodyGyro-mean()-X"     "tBodyGyro-mean()-Y"
## [21] "tBodyGyro-mean()-Z"     "tBodyGyro-std()-X"
## [23] "tBodyGyro-std()-Y"      "tBodyGyro-std()-Z"
## [25] "tBodyGyroJerk-mean()-X" "tBodyGyroJerk-mean()-Y"
## [27] "tBodyGyroJerk-mean()-Z" "tBodyGyroJerk-std()-X"
## [29] "tBodyGyroJerk-std()-Y"  "tBodyGyroJerk-std()-Z"
## [31] "tBodyAccMag-mean()"     "tBodyAccMag-std()"
## [33] "tGravityAccMag-mean()"  "tGravityAccMag-std()"
## [35] "tBodyAccJerkMag-mean()" "tBodyAccJerkMag-std()"
## [37] "tBodyGyroMag-mean()"    "tBodyGyroMag-std()"
## [39] "tBodyGyroJerkMag-mean()" "tBodyGyroJerkMag-std()"
## [41] "fBodyAcc-mean()-X"      "fBodyAcc-mean()-Y"
## [43] "fBodyAcc-mean()-Z"      "fBodyAcc-std()-X"
## [45] "fBodyAcc-std()-Y"       "fBodyAcc-std()-Z"
## [47] "fBodyAccJerk-mean()-X"  "fBodyAccJerk-mean()-Y"
## [49] "fBodyAccJerk-mean()-Z"  "fBodyAccJerk-std()-X"
## [51] "fBodyAccJerk-std()-Y"   "fBodyAccJerk-std()-Z"
## [53] "fBodyGyro-mean()-X"     "fBodyGyro-mean()-Y"
## [55] "fBodyGyro-mean()-Z"     "fBodyGyro-std()-X"
## [57] "fBodyGyro-std()-Y"      "fBodyGyro-std()-Z"
## [59] "fBodyAccMag-mean()"     "fBodyAccMag-std()"
## [61] "fBodyBodyAccJerkMag-mean()" "fBodyBodyAccJerkMag-std()"
## [63] "fBodyBodyGyroMag-mean()" "fBodyBodyGyroMag-std()"
## [65] "fBodyBodyGyroJerkMag-mean()" "fBodyBodyGyroJerkMag-std()"
## [67] "SUBJECT"                "ACTIVITY"
```

```
## -----
## 4. Appropriately labels the data set with descriptive variable names.
names(Data)<-gsub("^t", "Time", names(Data))
names(Data)<-gsub("^f", "Frequency", names(Data))
```



```

names(Data)<-gsub("Acc", "Accelerometer", names(Data))
names(Data)<-gsub("Gyro", "Gyroscope", names(Data))
names(Data)<-gsub("BodyBody", "Body", names(Data))
names(Data)<-gsub("Mag", "Magnitude", names(Data))
names(Data)<-gsub("tBody", "TimeBody", names(Data))
names(Data)<-gsub("-mean()", "Mean", names(Data), ignore.case = TRUE)
names(Data)<-gsub("-std()", "STD", names(Data), ignore.case = TRUE)
names(Data)<-gsub("-freq()", "Frequency", names(Data), ignore.case = TRUE)
names(Data)<-gsub('\\\\-|\\\\(|\\\\)', '', names(Data))

```

*##Show After*

```
names(Data)
```

```

## [1] "TimeBodyAccelerometerMeanX"
## [2] "TimeBodyAccelerometerMeanY"
## [3] "TimeBodyAccelerometerMeanZ"
## [4] "TimeBodyAccelerometerSTDX"
## [5] "TimeBodyAccelerometerSTDY"
## [6] "TimeBodyAccelerometerSTDZ"
## [7] "TimeGravityAccelerometerMeanX"
## [8] "TimeGravityAccelerometerMeanY"
## [9] "TimeGravityAccelerometerMeanZ"
## [10] "TimeGravityAccelerometerSTDX"
## [11] "TimeGravityAccelerometerSTDY"
## [12] "TimeGravityAccelerometerSTDZ"
## [13] "TimeBodyAccelerometerJerkMeanX"
## [14] "TimeBodyAccelerometerJerkMeanY"
## [15] "TimeBodyAccelerometerJerkMeanZ"
## [16] "TimeBodyAccelerometerJerkSTDX"
## [17] "TimeBodyAccelerometerJerkSTDY"
## [18] "TimeBodyAccelerometerJerkSTDZ"
## [19] "TimeBodyGyroscopeMeanX"
## [20] "TimeBodyGyroscopeMeanY"
## [21] "TimeBodyGyroscopeMeanZ"
## [22] "TimeBodyGyroscopeSTDX"
## [23] "TimeBodyGyroscopeSTDY"
## [24] "TimeBodyGyroscopeSTDZ"
## [25] "TimeBodyGyroscopeJerkMeanX"
## [26] "TimeBodyGyroscopeJerkMeanY"
## [27] "TimeBodyGyroscopeJerkMeanZ"
## [28] "TimeBodyGyroscopeJerkSTDX"
## [29] "TimeBodyGyroscopeJerkSTDY"
## [30] "TimeBodyGyroscopeJerkSTDZ"
## [31] "TimeBodyAccelerometerMagnitudeMean"
## [32] "TimeBodyAccelerometerMagnitudeSTD"
## [33] "TimeGravityAccelerometerMagnitudeMean"
## [34] "TimeGravityAccelerometerMagnitudeSTD"
## [35] "TimeBodyAccelerometerJerkMagnitudeMean"
## [36] "TimeBodyAccelerometerJerkMagnitudeSTD"
## [37] "TimeBodyGyroscopeMagnitudeMean"
## [38] "TimeBodyGyroscopeMagnitudeSTD"
## [39] "TimeBodyGyroscopeJerkMagnitudeMean"
## [40] "TimeBodyGyroscopeJerkMagnitudeSTD"

```

```
## [41] "FrequencyBodyAccelerometerMeanX"
## [42] "FrequencyBodyAccelerometerMeanY"
## [43] "FrequencyBodyAccelerometerMeanZ"
## [44] "FrequencyBodyAccelerometerSTDX"
## [45] "FrequencyBodyAccelerometerSTDY"
## [46] "FrequencyBodyAccelerometerSTDZ"
## [47] "FrequencyBodyAccelerometerJerkMeanX"
## [48] "FrequencyBodyAccelerometerJerkMeanY"
## [49] "FrequencyBodyAccelerometerJerkMeanZ"
## [50] "FrequencyBodyAccelerometerJerkSTDX"
## [51] "FrequencyBodyAccelerometerJerkSTDY"
## [52] "FrequencyBodyAccelerometerJerkSTDZ"
## [53] "FrequencyBodyGyroscopeMeanX"
## [54] "FrequencyBodyGyroscopeMeanY"
## [55] "FrequencyBodyGyroscopeMeanZ"
## [56] "FrequencyBodyGyroscopeSTDX"
## [57] "FrequencyBodyGyroscopeSTDY"
## [58] "FrequencyBodyGyroscopeSTDZ"
## [59] "FrequencyBodyAccelerometerMagnitudeMean"
## [60] "FrequencyBodyAccelerometerMagnitudeSTD"
## [61] "FrequencyBodyAccelerometerJerkMagnitudeMean"
## [62] "FrequencyBodyAccelerometerJerkMagnitudeSTD"
## [63] "FrequencyBodyGyroscopeMagnitudeMean"
## [64] "FrequencyBodyGyroscopeMagnitudeSTD"
## [65] "FrequencyBodyGyroscopeJerkMagnitudeMean"
## [66] "FrequencyBodyGyroscopeJerkMagnitudeSTD"
## [67] "SUBJECT"
## [68] "ACTIVITY"
```

```
## -----
## 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.
## Row = 180 x Col = 68
library(plyr)
Data2 <- aggregate(.~ SUBJECT + ACTIVITY, Data, mean)
Data2 <- Data2[order(Data2$SUBJECT, Data2$ACTIVITY),]
write.table(Data2, file = "tidydata.txt",row.name=FALSE)

##Show Results
nrow(Data2)
```

```
## [1] 180
```

```
ncol(Data2)
```

```
## [1] 68
```

```
head(Data2,3)
```

```
##      SUBJECT ACTIVITY TimeBodyAccelerometerMeanX TimeBodyAccelerometerMeanY
## 1          1  LAYING              0.2215982             -0.040513953
## 31         1  SITTING              0.2612376             -0.001308288
```

```

## 61      1 STANDING      0.2789176      -0.016137590
##      TimeBodyAccelerometerMeanZ TimeBodyAccelerometerSTDX
## 1      -0.1132036      -0.9280565
## 31     -0.1045442      -0.9772290
## 61     -0.1106018      -0.9957599
##      TimeBodyAccelerometerSTDY TimeBodyAccelerometerSTDZ
## 1      -0.8368274      -0.8260614
## 31     -0.9226186      -0.9395863
## 61     -0.9731901      -0.9797759
##      TimeGravityAccelerometerMeanX TimeGravityAccelerometerMeanY
## 1      -0.2488818      0.7055498
## 31      0.8315099      0.2044116
## 61      0.9429520      -0.2729838
##      TimeGravityAccelerometerMeanZ TimeGravityAccelerometerSTDX
## 1      0.44581772      -0.8968300
## 31      0.33204370      -0.9684571
## 61      0.01349058      -0.9937630
##      TimeGravityAccelerometerSTDY TimeGravityAccelerometerSTDZ
## 1      -0.9077200      -0.8523663
## 31     -0.9355171      -0.9490409
## 61     -0.9812260      -0.9763241
##      TimeBodyAccelerometerJerkMeanX TimeBodyAccelerometerJerkMeanY
## 1      0.08108653      0.0038382040
## 31      0.07748252      -0.0006191028
## 61      0.07537665      0.0079757309
##      TimeBodyAccelerometerJerkMeanZ TimeBodyAccelerometerJerkSTDX
## 1      0.010834236      -0.9584821
## 31     -0.003367792      -0.9864307
## 61     -0.003685250      -0.9946045
##      TimeBodyAccelerometerJerkSTDY TimeBodyAccelerometerJerkSTDZ
## 1      -0.9241493      -0.9548551
## 31     -0.9813720      -0.9879108
## 61     -0.9856487      -0.9922512
##      TimeBodyGyroscopeMeanX TimeBodyGyroscopeMeanY TimeBodyGyroscopeMeanZ
## 1      -0.01655309      -0.06448612      0.14868944
## 31     -0.04535006      -0.09192415      0.06293138
## 61     -0.02398773      -0.05939722      0.07480075
##      TimeBodyGyroscopeSTDX TimeBodyGyroscopeSTDY TimeBodyGyroscopeSTDZ
## 1      -0.8735439      -0.9510904      -0.9082847
## 31     -0.9772113      -0.9664739      -0.9414259
## 61     -0.9871919      -0.9877344      -0.9806456
##      TimeBodyGyroscopeJerkMeanX TimeBodyGyroscopeJerkMeanY
## 1      -0.10727095      -0.04151729
## 31     -0.09367938      -0.04021181
## 61     -0.09960921      -0.04406279
##      TimeBodyGyroscopeJerkMeanZ TimeBodyGyroscopeJerkSTDX
## 1      -0.07405012      -0.9186085
## 31     -0.04670263      -0.9917316
## 61     -0.04895055      -0.9929451
##      TimeBodyGyroscopeJerkSTDY TimeBodyGyroscopeJerkSTDZ
## 1      -0.9679072      -0.9577902
## 31     -0.9895181      -0.9879358
## 61     -0.9951379      -0.9921085
##      TimeBodyAccelerometerMagnitudeMean TimeBodyAccelerometerMagnitudeSTD

```

## 1	-0.8419292	-0.7951449
## 31	-0.9485368	-0.9270784
## 61	-0.9842782	-0.9819429
## TimeGravityAccelerometerMagnitudeMean TimeGravityAccelerometerMagnitudeSTD		
## 1	-0.8419292	-0.7951449
## 31	-0.9485368	-0.9270784
## 61	-0.9842782	-0.9819429
## TimeBodyAccelerometerJerkMagnitudeMean TimeBodyAccelerometerJerkMagnitudeSTD		
## 1	-0.9543963	-0.9282456
## 31	-0.9873642	-0.9841200
## 61	-0.9923678	-0.9930962
## TimeBodyGyroscopeMagnitudeMean TimeBodyGyroscopeMagnitudeSTD		
## 1	-0.8747595	-0.8190102
## 31	-0.9308925	-0.9345318
## 61	-0.9764938	-0.9786900
## TimeBodyGyroscopeJerkMagnitudeMean TimeBodyGyroscopeJerkMagnitudeSTD		
## 1	-0.9634610	-0.9358410
## 31	-0.9919763	-0.9883087
## 61	-0.9949668	-0.9947332
## FrequencyBodyAccelerometerMeanX FrequencyBodyAccelerometerMeanY		
## 1	-0.9390991	-0.8670652
## 31	-0.9796412	-0.9440846
## 61	-0.9952499	-0.9770708
## FrequencyBodyAccelerometerMeanZ FrequencyBodyAccelerometerSTDX		
## 1	-0.8826669	-0.9244374
## 31	-0.9591849	-0.9764123
## 61	-0.9852971	-0.9960283
## FrequencyBodyAccelerometerSTDY FrequencyBodyAccelerometerSTDZ		
## 1	-0.8336256	-0.8128916
## 31	-0.9172750	-0.9344696
## 61	-0.9722931	-0.9779373
## FrequencyBodyAccelerometerJerkMeanX FrequencyBodyAccelerometerJerkMeanY		
## 1	-0.9570739	-0.9224626
## 31	-0.9865970	-0.9815795
## 61	-0.9946308	-0.9854187
## FrequencyBodyAccelerometerJerkMeanZ FrequencyBodyAccelerometerJerkSTDX		
## 1	-0.9480609	-0.9641607
## 31	-0.9860531	-0.9874930
## 61	-0.9907522	-0.9950738
## FrequencyBodyAccelerometerJerkSTDY FrequencyBodyAccelerometerJerkSTDZ		
## 1	-0.9322179	-0.9605870
## 31	-0.9825139	-0.9883392
## 61	-0.9870182	-0.9923498
## FrequencyBodyGyroscopeMeanX FrequencyBodyGyroscopeMeanY		
## 1	-0.8502492	-0.9521915
## 31	-0.9761615	-0.9758386
## 61	-0.9863868	-0.9889845
## FrequencyBodyGyroscopeMeanZ FrequencyBodyGyroscopeSTDX		
## 1	-0.9093027	-0.8822965
## 31	-0.9513155	-0.9779042
## 61	-0.9807731	-0.9874971
## FrequencyBodyGyroscopeSTDY FrequencyBodyGyroscopeSTDZ		
## 1	-0.9512320	-0.9165825
## 31	-0.9623450	-0.9439178

## 61	-0.9871077	-0.9823453
##	FrequencyBodyAccelerometerMagnitudeMean	
## 1	-0.8617676	
## 31	-0.9477829	
## 61	-0.9853564	
##	FrequencyBodyAccelerometerMagnitudeSTD	
## 1	-0.7983009	
## 31	-0.9284448	
## 61	-0.9823138	
##	FrequencyBodyAccelerometerJerkMagnitudeMean	
## 1	-0.9333004	
## 31	-0.9852621	
## 61	-0.9925425	
##	FrequencyBodyAccelerometerJerkMagnitudeSTD	
## 1	-0.9218040	
## 31	-0.9816062	
## 61	-0.9925360	
##	FrequencyBodyGyroscopeMagnitudeMean	FrequencyBodyGyroscopeMagnitudeSTD
## 1	-0.8621902	-0.8243194
## 31	-0.9584356	-0.9321984
## 61	-0.9846176	-0.9784661
##	FrequencyBodyGyroscopeJerkMagnitudeMean	
## 1	-0.9423669	
## 31	-0.9897975	
## 61	-0.9948154	
##	FrequencyBodyGyroscopeJerkMagnitudeSTD	
## 1	-0.9326607	
## 31	-0.9870496	
## 61	-0.9946711	