CodeBook

Moises

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Information about the data

Brief description of the data obtained in the attached document.

The experiments have been carried out with a group of 30 volunteers within an age bracket of 19-48 years. Each person performed six activities (WALKING, WALKING_UPSTAIRS, WALKING_DOWNSTAIRS, SITTING, STANDING, LAYING) wearing a smartphone (Samsung Galaxy S II) on the waist. Using its embedded accelerometer and gyroscope, we captured 3-axial linear acceleration and 3-axial angular velocity at a constant rate of 50Hz. The experiments have been video-recorded to label the data manually. The obtained dataset has been randomly partitioned into two sets, where 70% of the volunteers was selected for generating the training data and 30% the test data.

The sensor signals (accelerometer and gyroscope) were pre-processed by applying noise filters and then sampled in fixed-width sliding windows of 2.56 sec and 50% overlap (128 readings/window). The sensor acceleration signal, which has gravitational and body motion components, was separated using a Butterworth low-pass filter into body acceleration and gravity. The gravitational force is assumed to have only low frequency components, therefore a filter with 0.3 Hz cutoff frequency was used. From each window, a vector of features was obtained by calculating variables from the time and frequency domain. See 'features_info.txt' for more details.

For each record it is provided:

- Triaxial acceleration from the accelerometer (total acceleration) and the estimated body acceleration.
- Triaxial Angular velocity from the gyroscope.
- A 561-feature vector with time and frequency domain variables.
- Its activity label.
- An identifier of the subject who carried out the experiment.

The dataset includes the following files:

- 'README.txt'
- 'features_info.txt': Shows information about the variables used on the feature vector.
- 'features.txt': List of all features.
- 'activity_labels.txt': Links the class labels with their activity name.
- 'train/X_train.txt': Training set.
- 'train/y_train.txt': Training labels.
- 'test/X_test.txt': Test set.

- ‘test/y_test.txt’: Test labels.

The following files are available for the train and test data. Their descriptions are equivalent.

- ‘train/subject_train.txt’: Each row identifies the subject who performed the activity for each window sample. Its range is from 1 to 30.
- ‘train/Inertial Signals/total_acc_x_train.txt’: The acceleration signal from the smartphone accelerometer X axis in standard gravity units ‘g’. Every row shows a 128 element vector. The same description applies for the ‘total_acc_x_train.txt’ and ‘total_acc_z_train.txt’ files for the Y and Z axis.
- ‘train/Inertial Signals/body_acc_x_train.txt’: The body acceleration signal obtained by subtracting the gravity from the total acceleration.
- ‘train/Inertial Signals/body_gyro_x_train.txt’: The angular velocity vector measured by the gyroscope for each window sample. The units are radians/second.

Notes:

- Features are normalized and bounded within [-1,1].
- Each feature vector is a row on the text file.

For more information about this dataset contact: activityrecognition@smartlab.ws (mailto:activityrecognition@smartlab.ws)

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.

tBodyAcc-XYZ

tGravityAcc-XYZ

tBodyAccJerk-XYZ

tBodyGyro-XYZ

tBodyGyroJerk-XYZ

tBodyAccMag

tGravityAccMag

tBodyAccJerkMag

tBodyGyroMag

tBodyGyroJerkMag

fBodyAcc-XYZ

fBodyAccJerk-XYZ

fBodyGyro-XYZ

fBodyAccMag

fBodyAccJerkMag

fBodyGyroMag

fBodyGyroJerkMag

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

mean(): Mean value

std(): Standard deviation

mad(): Median absolute deviation

max(): Largest value in array

min(): Smallest value in array

sma(): Signal magnitude area

energy(): Energy measure. Sum of the squares divided by the number of values.

iqr(): Interquartile range

entropy(): Signal entropy

arCoeff(): Autorregresion coefficients with Burg order equal to 4

correlation(): correlation coefficient between two signals

maxInds(): index of the frequency component with largest magnitude

meanFreq(): Weighted average of the frequency components to obtain a mean frequency

skewness(): skewness of the frequency domain signal

kurtosis(): kurtosis of the frequency domain signal

bandsEnergy(): Energy of a frequency interval within the 64 bins of the FFT of each window.

angle(): Angle between to vectors.

Additional vectors obtained by averaging the signals in a signal window sample. These are used on the angle() variable:

gravityMean

tBodyAccMean

tBodyAccJerkMean

tBodyGyroMean

tBodyGyroJerkMean

Getting the data

The data has been downloaded from the link below

Data (https://d396qusza40orc.cloudfront.net
/getdata%2Fprojectfiles%2FUCI%20HAR%20Dataset.zip)

Loading the raw data

```
activity_labels <- read.table("activity_labels.txt")

features <- read.table("features.txt")



xtrain <- read.table("X_train.txt")

ytrain <- read.table("y_train.txt")

subjecttrain <- read.table("subject_train.txt")



xtest <- read.table("X_test.txt")

ytest <- read.table("y_test.txt")

subjecttest <- read.table("subject_test.txt")
```

Variable list

```
head(features,561)
```

```
##      V1                                 V2
## 1     1                 tBodyAcc-mean()-X
## 2     2                 tBodyAcc-mean()-Y
## 3     3                 tBodyAcc-mean()-Z
## 4     4                  tBodyAcc-std()-X
## 5     5                  tBodyAcc-std()-Y
## 6     6                  tBodyAcc-std()-Z
## 7     7                  tBodyAcc-mad()-X
## 8     8                  tBodyAcc-mad()-Y
## 9     9                  tBodyAcc-mad()-Z
## 10   10                  tBodyAcc-max()-X
## 11   11                  tBodyAcc-max()-Y
## 12   12                  tBodyAcc-max()-Z
## 13   13                  tBodyAcc-min()-X
## 14   14                  tBodyAcc-min()-Y
## 15   15                  tBodyAcc-min()-Z
## 16   16                    tBodyAcc-sma()
## 17   17                tBodyAcc-energy()-X
## 18   18                tBodyAcc-energy()-Y
## 19   19                tBodyAcc-energy()-Z
## 20   20                   tBodyAcc-iqr()-X
## 21   21                   tBodyAcc-iqr()-Y
## 22   22                   tBodyAcc-iqr()-Z
## 23   23               tBodyAcc-entropy()-X
## 24   24               tBodyAcc-entropy()-Y
## 25   25               tBodyAcc-entropy()-Z
## 26   26             tBodyAcc-arCoeff()-X,1
## 27   27             tBodyAcc-arCoeff()-X,2
## 28   28             tBodyAcc-arCoeff()-X,3
## 29   29             tBodyAcc-arCoeff()-X,4
## 30   30             tBodyAcc-arCoeff()-Y,1
## 31   31             tBodyAcc-arCoeff()-Y,2
## 32   32             tBodyAcc-arCoeff()-Y,3
## 33   33             tBodyAcc-arCoeff()-Y,4
## 34   34             tBodyAcc-arCoeff()-Z,1
## 35   35             tBodyAcc-arCoeff()-Z,2
## 36   36             tBodyAcc-arCoeff()-Z,3
## 37   37             tBodyAcc-arCoeff()-Z,4
## 38   38          tBodyAcc-correlation()-X,Y
## 39   39          tBodyAcc-correlation()-X,Z
## 40   40          tBodyAcc-correlation()-Y,Z
## 41   41                tGravityAcc-mean()-X
## 42   42                tGravityAcc-mean()-Y
## 43   43                tGravityAcc-mean()-Z
## 44   44                 tGravityAcc-std()-X
## 45   45                 tGravityAcc-std()-Y
## 46   46                 tGravityAcc-std()-Z
## 47   47                 tGravityAcc-mad()-X
## 48   48                 tGravityAcc-mad()-Y
```

```
## 49   49                tGravityAcc-mad()-Z
## 50   50                tGravityAcc-max()-X
## 51   51                tGravityAcc-max()-Y
## 52   52                tGravityAcc-max()-Z
## 53   53                tGravityAcc-min()-X
## 54   54                tGravityAcc-min()-Y
## 55   55                tGravityAcc-min()-Z
## 56   56                  tGravityAcc-sma()
## 57   57              tGravityAcc-energy()-X
## 58   58              tGravityAcc-energy()-Y
## 59   59              tGravityAcc-energy()-Z
## 60   60                 tGravityAcc-iqr()-X
## 61   61                 tGravityAcc-iqr()-Y
## 62   62                 tGravityAcc-iqr()-Z
## 63   63             tGravityAcc-entropy()-X
## 64   64             tGravityAcc-entropy()-Y
## 65   65             tGravityAcc-entropy()-Z
## 66   66           tGravityAcc-arCoeff()-X,1
## 67   67           tGravityAcc-arCoeff()-X,2
## 68   68           tGravityAcc-arCoeff()-X,3
## 69   69           tGravityAcc-arCoeff()-X,4
## 70   70           tGravityAcc-arCoeff()-Y,1
## 71   71           tGravityAcc-arCoeff()-Y,2
## 72   72           tGravityAcc-arCoeff()-Y,3
## 73   73           tGravityAcc-arCoeff()-Y,4
## 74   74           tGravityAcc-arCoeff()-Z,1
## 75   75           tGravityAcc-arCoeff()-Z,2
## 76   76           tGravityAcc-arCoeff()-Z,3
## 77   77           tGravityAcc-arCoeff()-Z,4
## 78   78       tGravityAcc-correlation()-X,Y
## 79   79       tGravityAcc-correlation()-X,Z
## 80   80       tGravityAcc-correlation()-Y,Z
## 81   81               tBodyAccJerk-mean()-X
## 82   82               tBodyAccJerk-mean()-Y
## 83   83               tBodyAccJerk-mean()-Z
## 84   84                tBodyAccJerk-std()-X
## 85   85                tBodyAccJerk-std()-Y
## 86   86                tBodyAccJerk-std()-Z
## 87   87                tBodyAccJerk-mad()-X
## 88   88                tBodyAccJerk-mad()-Y
## 89   89                tBodyAccJerk-mad()-Z
## 90   90                tBodyAccJerk-max()-X
## 91   91                tBodyAccJerk-max()-Y
## 92   92                tBodyAccJerk-max()-Z
## 93   93                tBodyAccJerk-min()-X
## 94   94                tBodyAccJerk-min()-Y
## 95   95                tBodyAccJerk-min()-Z
## 96   96                  tBodyAccJerk-sma()
## 97   97             tBodyAccJerk-energy()-X
## 98   98             tBodyAccJerk-energy()-Y
```

```
## 99   99              tBodyAccJerk-energy()-Z
## 100 100                 tBodyAccJerk-iqr()-X
## 101 101                 tBodyAccJerk-iqr()-Y
## 102 102                 tBodyAccJerk-iqr()-Z
## 103 103              tBodyAccJerk-entropy()-X
## 104 104              tBodyAccJerk-entropy()-Y
## 105 105              tBodyAccJerk-entropy()-Z
## 106 106           tBodyAccJerk-arCoeff()-X,1
## 107 107           tBodyAccJerk-arCoeff()-X,2
## 108 108           tBodyAccJerk-arCoeff()-X,3
## 109 109           tBodyAccJerk-arCoeff()-X,4
## 110 110           tBodyAccJerk-arCoeff()-Y,1
## 111 111           tBodyAccJerk-arCoeff()-Y,2
## 112 112           tBodyAccJerk-arCoeff()-Y,3
## 113 113           tBodyAccJerk-arCoeff()-Y,4
## 114 114           tBodyAccJerk-arCoeff()-Z,1
## 115 115           tBodyAccJerk-arCoeff()-Z,2
## 116 116           tBodyAccJerk-arCoeff()-Z,3
## 117 117           tBodyAccJerk-arCoeff()-Z,4
## 118 118       tBodyAccJerk-correlation()-X,Y
## 119 119       tBodyAccJerk-correlation()-X,Z
## 120 120       tBodyAccJerk-correlation()-Y,Z
## 121 121                   tBodyGyro-mean()-X
## 122 122                   tBodyGyro-mean()-Y
## 123 123                   tBodyGyro-mean()-Z
## 124 124                    tBodyGyro-std()-X
## 125 125                    tBodyGyro-std()-Y
## 126 126                    tBodyGyro-std()-Z
## 127 127                    tBodyGyro-mad()-X
## 128 128                    tBodyGyro-mad()-Y
## 129 129                    tBodyGyro-mad()-Z
## 130 130                    tBodyGyro-max()-X
## 131 131                    tBodyGyro-max()-Y
## 132 132                    tBodyGyro-max()-Z
## 133 133                    tBodyGyro-min()-X
## 134 134                    tBodyGyro-min()-Y
## 135 135                    tBodyGyro-min()-Z
## 136 136                      tBodyGyro-sma()
## 137 137                 tBodyGyro-energy()-X
## 138 138                 tBodyGyro-energy()-Y
## 139 139                 tBodyGyro-energy()-Z
## 140 140                    tBodyGyro-iqr()-X
## 141 141                    tBodyGyro-iqr()-Y
## 142 142                    tBodyGyro-iqr()-Z
## 143 143                tBodyGyro-entropy()-X
## 144 144                tBodyGyro-entropy()-Y
## 145 145                tBodyGyro-entropy()-Z
## 146 146              tBodyGyro-arCoeff()-X,1
## 147 147              tBodyGyro-arCoeff()-X,2
## 148 148              tBodyGyro-arCoeff()-X,3
```

```
## 149 149              tBodyGyro-arCoeff()-X,4
## 150 150              tBodyGyro-arCoeff()-Y,1
## 151 151              tBodyGyro-arCoeff()-Y,2
## 152 152              tBodyGyro-arCoeff()-Y,3
## 153 153              tBodyGyro-arCoeff()-Y,4
## 154 154              tBodyGyro-arCoeff()-Z,1
## 155 155              tBodyGyro-arCoeff()-Z,2
## 156 156              tBodyGyro-arCoeff()-Z,3
## 157 157              tBodyGyro-arCoeff()-Z,4
## 158 158          tBodyGyro-correlation()-X,Y
## 159 159          tBodyGyro-correlation()-X,Z
## 160 160          tBodyGyro-correlation()-Y,Z
## 161 161               tBodyGyroJerk-mean()-X
## 162 162               tBodyGyroJerk-mean()-Y
## 163 163               tBodyGyroJerk-mean()-Z
## 164 164                tBodyGyroJerk-std()-X
## 165 165                tBodyGyroJerk-std()-Y
## 166 166                tBodyGyroJerk-std()-Z
## 167 167                tBodyGyroJerk-mad()-X
## 168 168                tBodyGyroJerk-mad()-Y
## 169 169                tBodyGyroJerk-mad()-Z
## 170 170                tBodyGyroJerk-max()-X
## 171 171                tBodyGyroJerk-max()-Y
## 172 172                tBodyGyroJerk-max()-Z
## 173 173                tBodyGyroJerk-min()-X
## 174 174                tBodyGyroJerk-min()-Y
## 175 175                tBodyGyroJerk-min()-Z
## 176 176                  tBodyGyroJerk-sma()
## 177 177             tBodyGyroJerk-energy()-X
## 178 178             tBodyGyroJerk-energy()-Y
## 179 179             tBodyGyroJerk-energy()-Z
## 180 180                tBodyGyroJerk-iqr()-X
## 181 181                tBodyGyroJerk-iqr()-Y
## 182 182                tBodyGyroJerk-iqr()-Z
## 183 183            tBodyGyroJerk-entropy()-X
## 184 184            tBodyGyroJerk-entropy()-Y
## 185 185            tBodyGyroJerk-entropy()-Z
## 186 186          tBodyGyroJerk-arCoeff()-X,1
## 187 187          tBodyGyroJerk-arCoeff()-X,2
## 188 188          tBodyGyroJerk-arCoeff()-X,3
## 189 189          tBodyGyroJerk-arCoeff()-X,4
## 190 190          tBodyGyroJerk-arCoeff()-Y,1
## 191 191          tBodyGyroJerk-arCoeff()-Y,2
## 192 192          tBodyGyroJerk-arCoeff()-Y,3
## 193 193          tBodyGyroJerk-arCoeff()-Y,4
## 194 194          tBodyGyroJerk-arCoeff()-Z,1
## 195 195          tBodyGyroJerk-arCoeff()-Z,2
## 196 196          tBodyGyroJerk-arCoeff()-Z,3
## 197 197          tBodyGyroJerk-arCoeff()-Z,4
## 198 198      tBodyGyroJerk-correlation()-X,Y
```

```
## 199 199      tBodyGyroJerk-correlation()-X,Z
## 200 200      tBodyGyroJerk-correlation()-Y,Z
## 201 201                  tBodyAccMag-mean()
## 202 202                   tBodyAccMag-std()
## 203 203                   tBodyAccMag-mad()
## 204 204                   tBodyAccMag-max()
## 205 205                   tBodyAccMag-min()
## 206 206                   tBodyAccMag-sma()
## 207 207                tBodyAccMag-energy()
## 208 208                   tBodyAccMag-iqr()
## 209 209                tBodyAccMag-entropy()
## 210 210               tBodyAccMag-arCoeff()1
## 211 211               tBodyAccMag-arCoeff()2
## 212 212               tBodyAccMag-arCoeff()3
## 213 213               tBodyAccMag-arCoeff()4
## 214 214                tGravityAccMag-mean()
## 215 215                 tGravityAccMag-std()
## 216 216                 tGravityAccMag-mad()
## 217 217                 tGravityAccMag-max()
## 218 218                 tGravityAccMag-min()
## 219 219                 tGravityAccMag-sma()
## 220 220              tGravityAccMag-energy()
## 221 221                 tGravityAccMag-iqr()
## 222 222              tGravityAccMag-entropy()
## 223 223             tGravityAccMag-arCoeff()1
## 224 224             tGravityAccMag-arCoeff()2
## 225 225             tGravityAccMag-arCoeff()3
## 226 226             tGravityAccMag-arCoeff()4
## 227 227                tBodyAccJerkMag-mean()
## 228 228                 tBodyAccJerkMag-std()
## 229 229                 tBodyAccJerkMag-mad()
## 230 230                 tBodyAccJerkMag-max()
## 231 231                 tBodyAccJerkMag-min()
## 232 232                 tBodyAccJerkMag-sma()
## 233 233              tBodyAccJerkMag-energy()
## 234 234                 tBodyAccJerkMag-iqr()
## 235 235              tBodyAccJerkMag-entropy()
## 236 236             tBodyAccJerkMag-arCoeff()1
## 237 237             tBodyAccJerkMag-arCoeff()2
## 238 238             tBodyAccJerkMag-arCoeff()3
## 239 239             tBodyAccJerkMag-arCoeff()4
## 240 240                   tBodyGyroMag-mean()
## 241 241                    tBodyGyroMag-std()
## 242 242                    tBodyGyroMag-mad()
## 243 243                    tBodyGyroMag-max()
## 244 244                    tBodyGyroMag-min()
## 245 245                    tBodyGyroMag-sma()
## 246 246                 tBodyGyroMag-energy()
## 247 247                    tBodyGyroMag-iqr()
## 248 248                 tBodyGyroMag-entropy()
```

```
## 249 249              tBodyGyroMag-arCoeff()1
## 250 250              tBodyGyroMag-arCoeff()2
## 251 251              tBodyGyroMag-arCoeff()3
## 252 252              tBodyGyroMag-arCoeff()4
## 253 253              tBodyGyroJerkMag-mean()
## 254 254               tBodyGyroJerkMag-std()
## 255 255               tBodyGyroJerkMag-mad()
## 256 256               tBodyGyroJerkMag-max()
## 257 257               tBodyGyroJerkMag-min()
## 258 258               tBodyGyroJerkMag-sma()
## 259 259            tBodyGyroJerkMag-energy()
## 260 260               tBodyGyroJerkMag-iqr()
## 261 261            tBodyGyroJerkMag-entropy()
## 262 262           tBodyGyroJerkMag-arCoeff()1
## 263 263           tBodyGyroJerkMag-arCoeff()2
## 264 264           tBodyGyroJerkMag-arCoeff()3
## 265 265           tBodyGyroJerkMag-arCoeff()4
## 266 266                     fBodyAcc-mean()-X
## 267 267                     fBodyAcc-mean()-Y
## 268 268                     fBodyAcc-mean()-Z
## 269 269                      fBodyAcc-std()-X
## 270 270                      fBodyAcc-std()-Y
## 271 271                      fBodyAcc-std()-Z
## 272 272                      fBodyAcc-mad()-X
## 273 273                      fBodyAcc-mad()-Y
## 274 274                      fBodyAcc-mad()-Z
## 275 275                      fBodyAcc-max()-X
## 276 276                      fBodyAcc-max()-Y
## 277 277                      fBodyAcc-max()-Z
## 278 278                      fBodyAcc-min()-X
## 279 279                      fBodyAcc-min()-Y
## 280 280                      fBodyAcc-min()-Z
## 281 281                        fBodyAcc-sma()
## 282 282                   fBodyAcc-energy()-X
## 283 283                   fBodyAcc-energy()-Y
## 284 284                   fBodyAcc-energy()-Z
## 285 285                      fBodyAcc-iqr()-X
## 286 286                      fBodyAcc-iqr()-Y
## 287 287                      fBodyAcc-iqr()-Z
## 288 288                  fBodyAcc-entropy()-X
## 289 289                  fBodyAcc-entropy()-Y
## 290 290                  fBodyAcc-entropy()-Z
## 291 291                    fBodyAcc-maxInds-X
## 292 292                    fBodyAcc-maxInds-Y
## 293 293                    fBodyAcc-maxInds-Z
## 294 294                 fBodyAcc-meanFreq()-X
## 295 295                 fBodyAcc-meanFreq()-Y
## 296 296                 fBodyAcc-meanFreq()-Z
## 297 297                 fBodyAcc-skewness()-X
## 298 298                 fBodyAcc-kurtosis()-X
```

```
## 299 299               fBodyAcc-skewness()-Y
## 300 300               fBodyAcc-kurtosis()-Y
## 301 301               fBodyAcc-skewness()-Z
## 302 302               fBodyAcc-kurtosis()-Z
## 303 303          fBodyAcc-bandsEnergy()-1,8
## 304 304         fBodyAcc-bandsEnergy()-9,16
## 305 305        fBodyAcc-bandsEnergy()-17,24
## 306 306        fBodyAcc-bandsEnergy()-25,32
## 307 307        fBodyAcc-bandsEnergy()-33,40
## 308 308        fBodyAcc-bandsEnergy()-41,48
## 309 309        fBodyAcc-bandsEnergy()-49,56
## 310 310        fBodyAcc-bandsEnergy()-57,64
## 311 311         fBodyAcc-bandsEnergy()-1,16
## 312 312        fBodyAcc-bandsEnergy()-17,32
## 313 313        fBodyAcc-bandsEnergy()-33,48
## 314 314        fBodyAcc-bandsEnergy()-49,64
## 315 315         fBodyAcc-bandsEnergy()-1,24
## 316 316        fBodyAcc-bandsEnergy()-25,48
## 317 317          fBodyAcc-bandsEnergy()-1,8
## 318 318         fBodyAcc-bandsEnergy()-9,16
## 319 319        fBodyAcc-bandsEnergy()-17,24
## 320 320        fBodyAcc-bandsEnergy()-25,32
## 321 321        fBodyAcc-bandsEnergy()-33,40
## 322 322        fBodyAcc-bandsEnergy()-41,48
## 323 323        fBodyAcc-bandsEnergy()-49,56
## 324 324        fBodyAcc-bandsEnergy()-57,64
## 325 325         fBodyAcc-bandsEnergy()-1,16
## 326 326        fBodyAcc-bandsEnergy()-17,32
## 327 327        fBodyAcc-bandsEnergy()-33,48
## 328 328        fBodyAcc-bandsEnergy()-49,64
## 329 329         fBodyAcc-bandsEnergy()-1,24
## 330 330        fBodyAcc-bandsEnergy()-25,48
## 331 331          fBodyAcc-bandsEnergy()-1,8
## 332 332         fBodyAcc-bandsEnergy()-9,16
## 333 333        fBodyAcc-bandsEnergy()-17,24
## 334 334        fBodyAcc-bandsEnergy()-25,32
## 335 335        fBodyAcc-bandsEnergy()-33,40
## 336 336        fBodyAcc-bandsEnergy()-41,48
## 337 337        fBodyAcc-bandsEnergy()-49,56
## 338 338        fBodyAcc-bandsEnergy()-57,64
## 339 339         fBodyAcc-bandsEnergy()-1,16
## 340 340        fBodyAcc-bandsEnergy()-17,32
## 341 341        fBodyAcc-bandsEnergy()-33,48
## 342 342        fBodyAcc-bandsEnergy()-49,64
## 343 343         fBodyAcc-bandsEnergy()-1,24
## 344 344        fBodyAcc-bandsEnergy()-25,48
## 345 345               fBodyAccJerk-mean()-X
## 346 346               fBodyAccJerk-mean()-Y
## 347 347               fBodyAccJerk-mean()-Z
## 348 348                fBodyAccJerk-std()-X
```

```
## 349 349                fBodyAccJerk-std()-Y
## 350 350                fBodyAccJerk-std()-Z
## 351 351                fBodyAccJerk-mad()-X
## 352 352                fBodyAccJerk-mad()-Y
## 353 353                fBodyAccJerk-mad()-Z
## 354 354                fBodyAccJerk-max()-X
## 355 355                fBodyAccJerk-max()-Y
## 356 356                fBodyAccJerk-max()-Z
## 357 357                fBodyAccJerk-min()-X
## 358 358                fBodyAccJerk-min()-Y
## 359 359                fBodyAccJerk-min()-Z
## 360 360                  fBodyAccJerk-sma()
## 361 361             fBodyAccJerk-energy()-X
## 362 362             fBodyAccJerk-energy()-Y
## 363 363             fBodyAccJerk-energy()-Z
## 364 364                fBodyAccJerk-iqr()-X
## 365 365                fBodyAccJerk-iqr()-Y
## 366 366                fBodyAccJerk-iqr()-Z
## 367 367            fBodyAccJerk-entropy()-X
## 368 368            fBodyAccJerk-entropy()-Y
## 369 369            fBodyAccJerk-entropy()-Z
## 370 370              fBodyAccJerk-maxInds-X
## 371 371              fBodyAccJerk-maxInds-Y
## 372 372              fBodyAccJerk-maxInds-Z
## 373 373           fBodyAccJerk-meanFreq()-X
## 374 374           fBodyAccJerk-meanFreq()-Y
## 375 375           fBodyAccJerk-meanFreq()-Z
## 376 376           fBodyAccJerk-skewness()-X
## 377 377           fBodyAccJerk-kurtosis()-X
## 378 378           fBodyAccJerk-skewness()-Y
## 379 379           fBodyAccJerk-kurtosis()-Y
## 380 380           fBodyAccJerk-skewness()-Z
## 381 381           fBodyAccJerk-kurtosis()-Z
## 382 382      fBodyAccJerk-bandsEnergy()-1,8
## 383 383     fBodyAccJerk-bandsEnergy()-9,16
## 384 384    fBodyAccJerk-bandsEnergy()-17,24
## 385 385    fBodyAccJerk-bandsEnergy()-25,32
## 386 386    fBodyAccJerk-bandsEnergy()-33,40
## 387 387    fBodyAccJerk-bandsEnergy()-41,48
## 388 388    fBodyAccJerk-bandsEnergy()-49,56
## 389 389    fBodyAccJerk-bandsEnergy()-57,64
## 390 390     fBodyAccJerk-bandsEnergy()-1,16
## 391 391    fBodyAccJerk-bandsEnergy()-17,32
## 392 392    fBodyAccJerk-bandsEnergy()-33,48
## 393 393    fBodyAccJerk-bandsEnergy()-49,64
## 394 394     fBodyAccJerk-bandsEnergy()-1,24
## 395 395    fBodyAccJerk-bandsEnergy()-25,48
## 396 396      fBodyAccJerk-bandsEnergy()-1,8
## 397 397     fBodyAccJerk-bandsEnergy()-9,16
## 398 398    fBodyAccJerk-bandsEnergy()-17,24
```

```
## 399 399     fBodyAccJerk-bandsEnergy()-25,32
## 400 400     fBodyAccJerk-bandsEnergy()-33,40
## 401 401     fBodyAccJerk-bandsEnergy()-41,48
## 402 402     fBodyAccJerk-bandsEnergy()-49,56
## 403 403     fBodyAccJerk-bandsEnergy()-57,64
## 404 404      fBodyAccJerk-bandsEnergy()-1,16
## 405 405     fBodyAccJerk-bandsEnergy()-17,32
## 406 406     fBodyAccJerk-bandsEnergy()-33,48
## 407 407     fBodyAccJerk-bandsEnergy()-49,64
## 408 408      fBodyAccJerk-bandsEnergy()-1,24
## 409 409     fBodyAccJerk-bandsEnergy()-25,48
## 410 410       fBodyAccJerk-bandsEnergy()-1,8
## 411 411      fBodyAccJerk-bandsEnergy()-9,16
## 412 412     fBodyAccJerk-bandsEnergy()-17,24
## 413 413     fBodyAccJerk-bandsEnergy()-25,32
## 414 414     fBodyAccJerk-bandsEnergy()-33,40
## 415 415     fBodyAccJerk-bandsEnergy()-41,48
## 416 416     fBodyAccJerk-bandsEnergy()-49,56
## 417 417     fBodyAccJerk-bandsEnergy()-57,64
## 418 418      fBodyAccJerk-bandsEnergy()-1,16
## 419 419     fBodyAccJerk-bandsEnergy()-17,32
## 420 420     fBodyAccJerk-bandsEnergy()-33,48
## 421 421     fBodyAccJerk-bandsEnergy()-49,64
## 422 422      fBodyAccJerk-bandsEnergy()-1,24
## 423 423     fBodyAccJerk-bandsEnergy()-25,48
## 424 424                  fBodyGyro-mean()-X
## 425 425                  fBodyGyro-mean()-Y
## 426 426                  fBodyGyro-mean()-Z
## 427 427                   fBodyGyro-std()-X
## 428 428                   fBodyGyro-std()-Y
## 429 429                   fBodyGyro-std()-Z
## 430 430                   fBodyGyro-mad()-X
## 431 431                   fBodyGyro-mad()-Y
## 432 432                   fBodyGyro-mad()-Z
## 433 433                   fBodyGyro-max()-X
## 434 434                   fBodyGyro-max()-Y
## 435 435                   fBodyGyro-max()-Z
## 436 436                   fBodyGyro-min()-X
## 437 437                   fBodyGyro-min()-Y
## 438 438                   fBodyGyro-min()-Z
## 439 439                     fBodyGyro-sma()
## 440 440                fBodyGyro-energy()-X
## 441 441                fBodyGyro-energy()-Y
## 442 442                fBodyGyro-energy()-Z
## 443 443                   fBodyGyro-iqr()-X
## 444 444                   fBodyGyro-iqr()-Y
## 445 445                   fBodyGyro-iqr()-Z
## 446 446               fBodyGyro-entropy()-X
## 447 447               fBodyGyro-entropy()-Y
## 448 448               fBodyGyro-entropy()-Z
```

```
## 449 449                fBodyGyro-maxInds-X
## 450 450                fBodyGyro-maxInds-Y
## 451 451                fBodyGyro-maxInds-Z
## 452 452             fBodyGyro-meanFreq()-X
## 453 453             fBodyGyro-meanFreq()-Y
## 454 454             fBodyGyro-meanFreq()-Z
## 455 455             fBodyGyro-skewness()-X
## 456 456             fBodyGyro-kurtosis()-X
## 457 457             fBodyGyro-skewness()-Y
## 458 458             fBodyGyro-kurtosis()-Y
## 459 459             fBodyGyro-skewness()-Z
## 460 460             fBodyGyro-kurtosis()-Z
## 461 461          fBodyGyro-bandsEnergy()-1,8
## 462 462         fBodyGyro-bandsEnergy()-9,16
## 463 463        fBodyGyro-bandsEnergy()-17,24
## 464 464        fBodyGyro-bandsEnergy()-25,32
## 465 465        fBodyGyro-bandsEnergy()-33,40
## 466 466        fBodyGyro-bandsEnergy()-41,48
## 467 467        fBodyGyro-bandsEnergy()-49,56
## 468 468        fBodyGyro-bandsEnergy()-57,64
## 469 469         fBodyGyro-bandsEnergy()-1,16
## 470 470        fBodyGyro-bandsEnergy()-17,32
## 471 471        fBodyGyro-bandsEnergy()-33,48
## 472 472        fBodyGyro-bandsEnergy()-49,64
## 473 473         fBodyGyro-bandsEnergy()-1,24
## 474 474        fBodyGyro-bandsEnergy()-25,48
## 475 475          fBodyGyro-bandsEnergy()-1,8
## 476 476         fBodyGyro-bandsEnergy()-9,16
## 477 477        fBodyGyro-bandsEnergy()-17,24
## 478 478        fBodyGyro-bandsEnergy()-25,32
## 479 479        fBodyGyro-bandsEnergy()-33,40
## 480 480        fBodyGyro-bandsEnergy()-41,48
## 481 481        fBodyGyro-bandsEnergy()-49,56
## 482 482        fBodyGyro-bandsEnergy()-57,64
## 483 483         fBodyGyro-bandsEnergy()-1,16
## 484 484        fBodyGyro-bandsEnergy()-17,32
## 485 485        fBodyGyro-bandsEnergy()-33,48
## 486 486        fBodyGyro-bandsEnergy()-49,64
## 487 487         fBodyGyro-bandsEnergy()-1,24
## 488 488        fBodyGyro-bandsEnergy()-25,48
## 489 489          fBodyGyro-bandsEnergy()-1,8
## 490 490         fBodyGyro-bandsEnergy()-9,16
## 491 491        fBodyGyro-bandsEnergy()-17,24
## 492 492        fBodyGyro-bandsEnergy()-25,32
## 493 493        fBodyGyro-bandsEnergy()-33,40
## 494 494        fBodyGyro-bandsEnergy()-41,48
## 495 495        fBodyGyro-bandsEnergy()-49,56
## 496 496        fBodyGyro-bandsEnergy()-57,64
## 497 497         fBodyGyro-bandsEnergy()-1,16
## 498 498        fBodyGyro-bandsEnergy()-17,32
```

```
## 499 499        fBodyGyro-bandsEnergy()-33,48
## 500 500        fBodyGyro-bandsEnergy()-49,64
## 501 501         fBodyGyro-bandsEnergy()-1,24
## 502 502        fBodyGyro-bandsEnergy()-25,48
## 503 503                  fBodyAccMag-mean()
## 504 504                   fBodyAccMag-std()
## 505 505                   fBodyAccMag-mad()
## 506 506                   fBodyAccMag-max()
## 507 507                   fBodyAccMag-min()
## 508 508                   fBodyAccMag-sma()
## 509 509                fBodyAccMag-energy()
## 510 510                   fBodyAccMag-iqr()
## 511 511                fBodyAccMag-entropy()
## 512 512                  fBodyAccMag-maxInds
## 513 513                fBodyAccMag-meanFreq()
## 514 514                fBodyAccMag-skewness()
## 515 515                fBodyAccMag-kurtosis()
## 516 516           fBodyBodyAccJerkMag-mean()
## 517 517            fBodyBodyAccJerkMag-std()
## 518 518            fBodyBodyAccJerkMag-mad()
## 519 519            fBodyBodyAccJerkMag-max()
## 520 520            fBodyBodyAccJerkMag-min()
## 521 521            fBodyBodyAccJerkMag-sma()
## 522 522         fBodyBodyAccJerkMag-energy()
## 523 523            fBodyBodyAccJerkMag-iqr()
## 524 524        fBodyBodyAccJerkMag-entropy()
## 525 525          fBodyBodyAccJerkMag-maxInds
## 526 526       fBodyBodyAccJerkMag-meanFreq()
## 527 527       fBodyBodyAccJerkMag-skewness()
## 528 528       fBodyBodyAccJerkMag-kurtosis()
## 529 529              fBodyBodyGyroMag-mean()
## 530 530               fBodyBodyGyroMag-std()
## 531 531               fBodyBodyGyroMag-mad()
## 532 532               fBodyBodyGyroMag-max()
## 533 533               fBodyBodyGyroMag-min()
## 534 534               fBodyBodyGyroMag-sma()
## 535 535            fBodyBodyGyroMag-energy()
## 536 536               fBodyBodyGyroMag-iqr()
## 537 537           fBodyBodyGyroMag-entropy()
## 538 538             fBodyBodyGyroMag-maxInds
## 539 539          fBodyBodyGyroMag-meanFreq()
## 540 540          fBodyBodyGyroMag-skewness()
## 541 541          fBodyBodyGyroMag-kurtosis()
## 542 542          fBodyBodyGyroJerkMag-mean()
## 543 543           fBodyBodyGyroJerkMag-std()
## 544 544           fBodyBodyGyroJerkMag-mad()
## 545 545           fBodyBodyGyroJerkMag-max()
## 546 546           fBodyBodyGyroJerkMag-min()
## 547 547           fBodyBodyGyroJerkMag-sma()
## 548 548        fBodyBodyGyroJerkMag-energy()
```

```
## 549 549           fBodyBodyGyroJerkMag-iqr()
## 550 550       fBodyBodyGyroJerkMag-entropy()
## 551 551         fBodyBodyGyroJerkMag-maxInds
## 552 552      fBodyBodyGyroJerkMag-meanFreq()
## 553 553      fBodyBodyGyroJerkMag-skewness()
## 554 554      fBodyBodyGyroJerkMag-kurtosis()
## 555 555          angle(tBodyAccMean,gravity)
## 556 556 angle(tBodyAccJerkMean),gravityMean)
## 557 557     angle(tBodyGyroMean,gravityMean)
## 558 558 angle(tBodyGyroJerkMean,gravityMean)
## 559 559                 angle(X,gravityMean)
## 560 560                 angle(Y,gravityMean)
## 561 561                 angle(Z,gravityMean)
```

Processing the data

The flow of the process are given by:

```
- Merging the training and the test set to create one data set;

- Extracting only the measurements on the mean and standard deviation for ea
ch measurement;

- Creating descriptive activity names to name the activities in the data set
;

- Labeling the data set with descriptive variable names;

- Creating  a second, independent tidy data set with the average of each var
iable

  for each activity and each subject.
```

More details about the data processing, check the run_analisys.R file.

Tidy dataset variable names

```
tidyD <- read.table("tidyData.txt", header = TRUE)

names(tidyD)
```

```
##  [1] "subject"                  "activity"
##  [3] "tbodyaccmeanx"            "tbodyaccmeany"
##  [5] "tbodyaccmeanz"            "tbodyaccstdx"
##  [7] "tbodyaccstdy"             "tbodyaccstdz"
##  [9] "tgravityaccmeanx"         "tgravityaccmeany"
## [11] "tgravityaccmeanz"         "tgravityaccstdx"
## [13] "tgravityaccstdy"          "tgravityaccstdz"
## [15] "tbodyaccjerkmeanx"        "tbodyaccjerkmeany"
## [17] "tbodyaccjerkmeanz"        "tbodyaccjerkstdx"
## [19] "tbodyaccjerkstdy"         "tbodyaccjerkstdz"
## [21] "tbodygyromeanx"           "tbodygyromeany"
## [23] "tbodygyromeanz"           "tbodygyrostdx"
## [25] "tbodygyrostdy"            "tbodygyrostdz"
## [27] "tbodygyrojerkmeanx"       "tbodygyrojerkmeany"
## [29] "tbodygyrojerkmeanz"       "tbodygyrojerkstdx"
## [31] "tbodygyrojerkstdy"        "tbodygyrojerkstdz"
## [33] "tbodyaccmagmean"          "tbodyaccmagstd"
## [35] "tgravityaccmagmean"       "tgravityaccmagstd"
## [37] "tbodyaccjerkmagmean"      "tbodyaccjerkmagstd"
## [39] "tbodygyromagmean"         "tbodygyromagstd"
## [41] "tbodygyrojerkmagmean"     "tbodygyrojerkmagstd"
## [43] "fbodyaccmeanx"            "fbodyaccmeany"
## [45] "fbodyaccmeanz"            "fbodyaccstdx"
## [47] "fbodyaccstdy"             "fbodyaccstdz"
## [49] "fbodyaccjerkmeanx"        "fbodyaccjerkmeany"
## [51] "fbodyaccjerkmeanz"        "fbodyaccjerkstdx"
## [53] "fbodyaccjerkstdy"         "fbodyaccjerkstdz"
## [55] "fbodygyromeanx"           "fbodygyromeany"
## [57] "fbodygyromeanz"           "fbodygyrostdx"
## [59] "fbodygyrostdy"            "fbodygyrostdz"
## [61] "fbodyaccmagmean"          "fbodyaccmagstd"
## [63] "fbodybodyaccjerkmagmean"  "fbodybodyaccjerkmagstd"
## [65] "fbodybodygyromagmean"     "fbodybodygyromagstd"
## [67] "fbodybodygyrojerkmagmean" "fbodybodygyrojerkmagstd"
```

Tidy dadaset structure

```
str(tidyD)
```

```
## 'data.frame':    180 obs. of  68 variables:
##  $ subject                : int  1 1 1 1 1 1 2 2 2 2 ...
##  $ activity               : Factor w/ 6 levels "laying","sitting",..: 1
2 3 4 5 6 1 2 3 4 ...
##  $ tbodyaccmeanx          : num  0.222 0.261 0.279 0.277 0.289 ...
##  $ tbodyaccmeany          : num  -0.04051 -0.00131 -0.01614 -0.01738 -0.
00992 ...
##  $ tbodyaccmeanz          : num  -0.113 -0.105 -0.111 -0.111 -0.108 ...
##  $ tbodyaccstdx           : num  -0.928 -0.977 -0.996 -0.284 0.03 ...
##  $ tbodyaccstdy           : num  -0.8368 -0.9226 -0.9732 0.1145 -0.0319
...
##  $ tbodyaccstdz           : num  -0.826 -0.94 -0.98 -0.26 -0.23 ...
##  $ tgravityaccmeanx       : num  -0.249 0.832 0.943 0.935 0.932 ...
##  $ tgravityaccmeany       : num  0.706 0.204 -0.273 -0.282 -0.267 ...
##  $ tgravityaccmeanz       : num  0.4458 0.332 0.0135 -0.0681 -0.0621 ...
##  $ tgravityaccstdx        : num  -0.897 -0.968 -0.994 -0.977 -0.951 ...
##  $ tgravityaccstdy        : num  -0.908 -0.936 -0.981 -0.971 -0.937 ...
##  $ tgravityaccstdz        : num  -0.852 -0.949 -0.976 -0.948 -0.896 ...
##  $ tbodyaccjerkmeanx      : num  0.0811 0.0775 0.0754 0.074 0.0542 ...
##  $ tbodyaccjerkmeany      : num  0.003838 -0.000619 0.007976 0.028272 0.
02965 ...
##  $ tbodyaccjerkmeanz      : num  0.01083 -0.00337 -0.00369 -0.00417 -0.0
1097 ...
##  $ tbodyaccjerkstdx       : num  -0.9585 -0.9864 -0.9946 -0.1136 -0.0123
...
##  $ tbodyaccjerkstdy       : num  -0.924 -0.981 -0.986 0.067 -0.102 ...
##  $ tbodyaccjerkstdz       : num  -0.955 -0.988 -0.992 -0.503 -0.346 ...
##  $ tbodygyromeanx         : num  -0.0166 -0.0454 -0.024 -0.0418 -0.0351
...
##  $ tbodygyromeany         : num  -0.0645 -0.0919 -0.0594 -0.0695 -0.0909
...
##  $ tbodygyromeanz         : num  0.1487 0.0629 0.0748 0.0849 0.0901 ...
##  $ tbodygyrostdx          : num  -0.874 -0.977 -0.987 -0.474 -0.458 ...
##  $ tbodygyrostdy          : num  -0.9511 -0.9665 -0.9877 -0.0546 -0.1263
...
##  $ tbodygyrostdz          : num  -0.908 -0.941 -0.981 -0.344 -0.125 ...
##  $ tbodygyrojerkmeanx     : num  -0.1073 -0.0937 -0.0996 -0.09 -0.074 ..
.
##  $ tbodygyrojerkmeany     : num  -0.0415 -0.0402 -0.0441 -0.0398 -0.044
...
##  $ tbodygyrojerkmeanz     : num  -0.0741 -0.0467 -0.049 -0.0461 -0.027 .
..
##  $ tbodygyrojerkstdx      : num  -0.919 -0.992 -0.993 -0.207 -0.487 ...
##  $ tbodygyrojerkstdy      : num  -0.968 -0.99 -0.995 -0.304 -0.239 ...
##  $ tbodygyrojerkstdz      : num  -0.958 -0.988 -0.992 -0.404 -0.269 ...
##  $ tbodyaccmagmean        : num  -0.8419 -0.9485 -0.9843 -0.137 0.0272 .
..
##  $ tbodyaccmagstd         : num  -0.7951 -0.9271 -0.9819 -0.2197 0.0199
...
```

```
##  $ tgravityaccmagmean      : num  -0.8419 -0.9485 -0.9843 -0.137 0.0272 .
..
##  $ tgravityaccmagstd       : num  -0.7951 -0.9271 -0.9819 -0.2197 0.0199
...
##  $ tbodyaccjerkmagmean     : num  -0.9544 -0.9874 -0.9924 -0.1414 -0.0894
...
##  $ tbodyaccjerkmagstd      : num  -0.9282 -0.9841 -0.9931 -0.0745 -0.0258
...
##  $ tbodygyromagmean        : num  -0.8748 -0.9309 -0.9765 -0.161 -0.0757
...
##  $ tbodygyromagstd         : num  -0.819 -0.935 -0.979 -0.187 -0.226 ...
##  $ tbodygyrojerkmagmean    : num  -0.963 -0.992 -0.995 -0.299 -0.295 ...
##  $ tbodygyrojerkmagstd     : num  -0.936 -0.988 -0.995 -0.325 -0.307 ...
##  $ fbodyaccmeanx           : num  -0.9391 -0.9796 -0.9952 -0.2028 0.0382
...
##  $ fbodyaccmeany           : num  -0.86707 -0.94408 -0.97707 0.08971 0.00
155 ...
##  $ fbodyaccmeanz           : num  -0.883 -0.959 -0.985 -0.332 -0.226 ...
##  $ fbodyaccstdx            : num  -0.9244 -0.9764 -0.996 -0.3191 0.0243 .
..
##  $ fbodyaccstdy            : num  -0.834 -0.917 -0.972 0.056 -0.113 ...
##  $ fbodyaccstdz            : num  -0.813 -0.934 -0.978 -0.28 -0.298 ...
##  $ fbodyaccjerkmeanx       : num  -0.9571 -0.9866 -0.9946 -0.1705 -0.0277
...
##  $ fbodyaccjerkmeany       : num  -0.9225 -0.9816 -0.9854 -0.0352 -0.1287
...
##  $ fbodyaccjerkmeanz       : num  -0.948 -0.986 -0.991 -0.469 -0.288 ...
##  $ fbodyaccjerkstdx        : num  -0.9642 -0.9875 -0.9951 -0.1336 -0.0863
...
##  $ fbodyaccjerkstdy        : num  -0.932 -0.983 -0.987 0.107 -0.135 ...
##  $ fbodyaccjerkstdz        : num  -0.961 -0.988 -0.992 -0.535 -0.402 ...
##  $ fbodygyromeanx          : num  -0.85 -0.976 -0.986 -0.339 -0.352 ...
##  $ fbodygyromeany          : num  -0.9522 -0.9758 -0.989 -0.1031 -0.0557
...
##  $ fbodygyromeanz          : num  -0.9093 -0.9513 -0.9808 -0.2559 -0.0319
...
##  $ fbodygyrostdx           : num  -0.882 -0.978 -0.987 -0.517 -0.495 ...
##  $ fbodygyrostdy           : num  -0.9512 -0.9623 -0.9871 -0.0335 -0.1814
...
##  $ fbodygyrostdz           : num  -0.917 -0.944 -0.982 -0.437 -0.238 ...
##  $ fbodyaccmagmean         : num  -0.8618 -0.9478 -0.9854 -0.1286 0.0966
...
##  $ fbodyaccmagstd          : num  -0.798 -0.928 -0.982 -0.398 -0.187 ...
##  $ fbodybodyaccjerkmagmean : num  -0.9333 -0.9853 -0.9925 -0.0571 0.0262
...
##  $ fbodybodyaccjerkmagstd  : num  -0.922 -0.982 -0.993 -0.103 -0.104 ...
##  $ fbodybodygyromagmean    : num  -0.862 -0.958 -0.985 -0.199 -0.186 ...
##  $ fbodybodygyromagstd     : num  -0.824 -0.932 -0.978 -0.321 -0.398 ...
##  $ fbodybodygyrojerkmagmean: num  -0.942 -0.99 -0.995 -0.319 -0.282 ...
##  $ fbodybodygyrojerkmagstd : num  -0.933 -0.987 -0.995 -0.382 -0.392 ...
```

Show a few rows of the tidy dataset

```
head(tidyD)
```

```
##   subject          activity tbodyaccmeanx tbodyaccmeany tbodyaccmeanz
## 1       1            laying     0.2215982  -0.040513953    -0.1132036
## 2       1           sitting     0.2612376  -0.001308288    -0.1045442
## 3       1          standing     0.2789176  -0.016137590    -0.1106018
## 4       1           walking     0.2773308  -0.017383819    -0.1111481
## 5       1 walkingdownstairs     0.2891883  -0.009918505    -0.1075662
## 6       1   walkingupstairs     0.2554617  -0.023953149    -0.0973020
##   tbodyaccstdx tbodyaccstdy tbodyaccstdz tgravityaccmeanx tgravityaccmean
y
## 1  -0.92805647 -0.836827406  -0.82606140       -0.2488818        0.705549
8
## 2  -0.97722901 -0.922618642  -0.93958629        0.8315099        0.204411
6
## 3  -0.99575990 -0.973190056  -0.97977588        0.9429520       -0.272983
8
## 4  -0.28374026  0.114461337  -0.26002790        0.9352232       -0.282165
0
## 5   0.03003534 -0.031935943  -0.23043421        0.9318744       -0.266610
3
## 6  -0.35470803 -0.002320265  -0.01947924        0.8933511       -0.362153
4
##   tgravityaccmeanz tgravityaccstdx tgravityaccstdy tgravityaccstdz
## 1       0.44581772      -0.8968300      -0.9077200      -0.8523663
## 2       0.33204370      -0.9684571      -0.9355171      -0.9490409
## 3       0.01349058      -0.9937630      -0.9812260      -0.9763241
## 4      -0.06810286      -0.9766096      -0.9713060      -0.9477172
## 5      -0.06211996      -0.9505598      -0.9370187      -0.8959397
## 6      -0.07540294      -0.9563670      -0.9528492      -0.9123794
##   tbodyaccjerkmeanx tbodyaccjerkmeany tbodyaccjerkmeanz tbodyaccjerkstdx
## 1        0.08108653      0.0038382040       0.010834236      -0.95848211
## 2        0.07748252     -0.0006191028      -0.003367792      -0.98643071
## 3        0.07537665      0.0079757309      -0.003685250      -0.99460454
## 4        0.07404163      0.0282721096      -0.004168406      -0.11361560
## 5        0.05415532      0.0296504490      -0.010971973      -0.01228386
## 6        0.10137273      0.0194863076      -0.045562545      -0.44684389
##   tbodyaccjerkstdy tbodyaccjerkstdz tbodygyromeanx tbodygyromeany
## 1       -0.9241493       -0.9548551    -0.01655309    -0.06448612
## 2       -0.9813720       -0.9879108    -0.04535006    -0.09192415
## 3       -0.9856487       -0.9922512    -0.02398773    -0.05939722
## 4        0.0670025       -0.5026998    -0.04183096    -0.06953005
## 5       -0.1016014       -0.3457350    -0.03507819    -0.09093713
## 6       -0.3782744       -0.7065935     0.05054938    -0.16617002
##   tbodygyromeanz tbodygyrostdx tbodygyrostdy tbodygyrostdz
## 1     0.14868944    -0.8735439  -0.951090440    -0.9082847
## 2     0.06293138    -0.9772113  -0.966473895    -0.9414259
## 3     0.07480075    -0.9871919  -0.987734440    -0.9806456
## 4     0.08494482    -0.4735355  -0.054607769    -0.3442666
## 5     0.09008501    -0.4580305  -0.126349195    -0.1247025
## 6     0.05835955    -0.5448711   0.004105184    -0.5071687
```

```
##   tbodygyrojerkmeanx tbodygyrojerkmeany tbodygyrojerkmeanz
## 1        -0.10727095        -0.04151729        -0.07405012
## 2        -0.09367938        -0.04021181        -0.04670263
## 3        -0.09960921        -0.04406279        -0.04895055
## 4        -0.08999754        -0.03984287        -0.04613093
## 5        -0.07395920        -0.04399028        -0.02704611
## 6        -0.12223277        -0.04214859        -0.04071255
##   tbodygyrojerkstdx tbodygyrojerkstdy tbodygyrojerkstdz tbodyaccmagmean
## 1        -0.9186085        -0.9679072        -0.9577902     -0.84192915
## 2        -0.9917316        -0.9895181        -0.9879358     -0.94853679
## 3        -0.9929451        -0.9951379        -0.9921085     -0.98427821
## 4        -0.2074219        -0.3044685        -0.4042555     -0.13697118
## 5        -0.4870273        -0.2388248        -0.2687615      0.02718829
## 6        -0.6147865        -0.6016967        -0.6063320     -0.12992763
##   tbodyaccmagstd tgravityaccmagmean tgravityaccmagstd tbodyaccjerkmagmean
## 1    -0.79514486        -0.84192915       -0.79514486         -0.95439626
## 2    -0.92707842        -0.94853679       -0.92707842         -0.98736420
## 3    -0.98194293        -0.98427821       -0.98194293         -0.99236779
## 4    -0.21968865        -0.13697118       -0.21968865         -0.14142881
## 5     0.01988435         0.02718829        0.01988435         -0.08944748
## 6    -0.32497093        -0.12992763       -0.32497093         -0.46650345
##   tbodyaccjerkmagstd tbodygyromagmean tbodygyromagstd tbodygyrojerkmagmea
n
## 1        -0.92824563      -0.87475955      -0.8190102           -0.963461
0
## 2        -0.98412002      -0.93089249      -0.9345318           -0.991976
3
## 3        -0.99309621      -0.97649379      -0.9786900           -0.994966
8
## 4        -0.07447175      -0.16097955      -0.1869784           -0.298703
7
## 5        -0.02578772      -0.07574125      -0.2257244           -0.295463
8
## 6        -0.47899162      -0.12673559      -0.1486193           -0.594882
9
##   tbodygyrojerkmagstd fbodyaccmeanx fbodyaccmeany fbodyaccmeanz
## 1          -0.9358410   -0.93909905  -0.867065205    -0.8826669
## 2          -0.9883087   -0.97964124  -0.944084550    -0.9591849
## 3          -0.9947332   -0.99524993  -0.977070848    -0.9852971
## 4          -0.3253249   -0.20279431   0.089712726    -0.3315601
## 5          -0.3065106    0.03822918   0.001549908    -0.2255745
## 6          -0.6485530   -0.40432178  -0.190976721    -0.4333497
##   fbodyaccstdx fbodyaccstdy fbodyaccstdz fbodyaccjerkmeanx
## 1  -0.92443743  -0.83362556  -0.81289156       -0.95707388
## 2  -0.97641231  -0.91727501  -0.93446956       -0.98659702
## 3  -0.99602835  -0.97229310  -0.97793726       -0.99463080
## 4  -0.31913472   0.05604001  -0.27968675       -0.17054696
## 5   0.02433084  -0.11296374  -0.29792789       -0.02766387
## 6  -0.33742819   0.02176951   0.08595655       -0.47987525
##   fbodyaccjerkmeany fbodyaccjerkmeanz fbodyaccjerkstdx fbodyaccjerkstdy
```

```
## 1       -0.92246261        -0.9480609       -0.9641607       -0.9322179
## 2       -0.98157947        -0.9860531       -0.9874930       -0.9825139
## 3       -0.98541870        -0.9907522       -0.9950738       -0.9870182
## 4       -0.03522552        -0.4689992       -0.1335866        0.1067399
## 5       -0.12866716        -0.2883347       -0.0863279       -0.1345800
## 6       -0.41344459        -0.6854744       -0.4619070       -0.3817771
##   fbodyaccjerkstdz fbodygyromeanx fbodygyromeany fbodygyromeanz
## 1       -0.9605870     -0.8502492    -0.95219149    -0.90930272
## 2       -0.9883392     -0.9761615    -0.97583859    -0.95131554
## 3       -0.9923498     -0.9863868    -0.98898446    -0.98077312
## 4       -0.5347134     -0.3390322    -0.10305942    -0.25594094
## 5       -0.4017215     -0.3524496    -0.05570225    -0.03186943
## 6       -0.7260402     -0.4926117    -0.31947461    -0.45359721
##   fbodygyrostdx fbodygyrostdy fbodygyrostdz fbodyaccmagmean fbodyaccmagst
d
## 1    -0.8822965   -0.95123205    -0.9165825     -0.86176765     -0.798300
9
## 2    -0.9779042   -0.96234504    -0.9439178     -0.94778292     -0.928444
8
## 3    -0.9874971   -0.98710773    -0.9823453     -0.98535636     -0.982313
8
## 4    -0.5166919   -0.03350816    -0.4365622     -0.12862345     -0.398032
6
## 5    -0.4954225   -0.18141473    -0.2384436      0.09658453     -0.186530
3
## 6    -0.5658925    0.15153891    -0.5717078     -0.35239594     -0.416260
1
##   fbodybodyaccjerkmagmean fbodybodyaccjerkmagstd fbodybodygyromagmean
## 1             -0.93330036             -0.9218040           -0.8621902
## 2             -0.98526213             -0.9816062           -0.9584356
## 3             -0.99254248             -0.9925360           -0.9846176
## 4             -0.05711940             -0.1034924           -0.1992526
## 5              0.02621849             -0.1040523           -0.1857203
## 6             -0.44265216             -0.5330599           -0.3259615
##   fbodybodygyromagstd fbodybodygyrojerkmagmean fbodybodygyrojerkmagstd
## 1          -0.8243194               -0.9423669              -0.9326607
## 2          -0.9321984               -0.9897975              -0.9870496
## 3          -0.9784661               -0.9948154              -0.9946711
## 4          -0.3210180               -0.3193086              -0.3816019
## 5          -0.3983504               -0.2819634              -0.3919199
## 6          -0.1829855               -0.6346651              -0.6939305
```

Summary of variables

```
summary(tidyD)
```

```
##     subject                 activity  tbodyaccmeanx
##  Min.   : 1.0   laying            :30   Min.   :0.2216
##  1st Qu.: 8.0   sitting           :30   1st Qu.:0.2712
##  Median :15.5   standing          :30   Median :0.2770
##  Mean   :15.5   walking           :30   Mean   :0.2743
##  3rd Qu.:23.0   walkingdownstairs:30   3rd Qu.:0.2800
##  Max.   :30.0   walkingupstairs  :30   Max.   :0.3015
##  tbodyaccmeany       tbodyaccmeanz       tbodyaccstdx
##  Min.   :-0.040514   Min.   :-0.15251   Min.   :-0.9961
##  1st Qu.:-0.020022   1st Qu.:-0.11207   1st Qu.:-0.9799
##  Median :-0.017262   Median :-0.10819   Median :-0.7526
##  Mean   :-0.017876   Mean   :-0.10916   Mean   :-0.5577
##  3rd Qu.:-0.014936   3rd Qu.:-0.10443   3rd Qu.:-0.1984
##  Max.   :-0.001308   Max.   :-0.07538   Max.   : 0.6269
##   tbodyaccstdy       tbodyaccstdz     tgravityaccmeanx  tgravityaccmeany
##  Min.   :-0.99024   Min.   :-0.9877   Min.   :-0.6800   Min.   :-0.47989
##  1st Qu.:-0.94205   1st Qu.:-0.9498   1st Qu.: 0.8376   1st Qu.:-0.23319
##  Median :-0.50897   Median :-0.6518   Median : 0.9208   Median :-0.12782
##  Mean   :-0.46046   Mean   :-0.5756   Mean   : 0.6975   Mean   :-0.01621
##  3rd Qu.:-0.03077   3rd Qu.:-0.2306   3rd Qu.: 0.9425   3rd Qu.: 0.08773
##  Max.   : 0.61694   Max.   : 0.6090   Max.   : 0.9745   Max.   : 0.95659
##  tgravityaccmeanz   tgravityaccstdx   tgravityaccstdy   tgravityaccstdz
##  Min.   :-0.49509   Min.   :-0.9968   Min.   :-0.9942   Min.   :-0.9910
##  1st Qu.:-0.11726   1st Qu.:-0.9825   1st Qu.:-0.9711   1st Qu.:-0.9605
##  Median : 0.02384   Median :-0.9695   Median :-0.9590   Median :-0.9450
##  Mean   : 0.07413   Mean   :-0.9638   Mean   :-0.9524   Mean   :-0.9364
##  3rd Qu.: 0.14946   3rd Qu.:-0.9509   3rd Qu.:-0.9370   3rd Qu.:-0.9180
##  Max.   : 0.95787   Max.   :-0.8296   Max.   :-0.6436   Max.   :-0.6102
##  tbodyaccjerkmeanx tbodyaccjerkmeany    tbodyaccjerkmeanz
##  Min.   :0.04269   Min.   :-0.0386872   Min.   :-0.067458
##  1st Qu.:0.07396   1st Qu.: 0.0004664   1st Qu.:-0.010601
##  Median :0.07640   Median : 0.0094698   Median :-0.003861
##  Mean   :0.07947   Mean   : 0.0075652   Mean   :-0.004953
##  3rd Qu.:0.08330   3rd Qu.: 0.0134008   3rd Qu.: 0.001958
##  Max.   :0.13019   Max.   : 0.0568186   Max.   : 0.038053
##  tbodyaccjerkstdx  tbodyaccjerkstdy  tbodyaccjerkstdz   tbodygyromeanx
##  Min.   :-0.9946   Min.   :-0.9895   Min.   :-0.99329   Min.   :-0.20578
##  1st Qu.:-0.9832   1st Qu.:-0.9724   1st Qu.:-0.98266   1st Qu.:-0.04712
##  Median :-0.8104   Median :-0.7756   Median :-0.88366   Median :-0.02871
##  Mean   :-0.5949   Mean   :-0.5654   Mean   :-0.73596   Mean   :-0.03244
##  3rd Qu.:-0.2233   3rd Qu.:-0.1483   3rd Qu.:-0.51212   3rd Qu.:-0.01676
##  Max.   : 0.5443   Max.   : 0.3553   Max.   : 0.03102   Max.   : 0.19270
##  tbodygyromeany     tbodygyromeanz     tbodygyrostdx      tbodygyrostdy
##  Min.   :-0.20421   Min.   :-0.07245   Min.   :-0.9943   Min.   :-0.9942
##  1st Qu.:-0.08955   1st Qu.: 0.07475   1st Qu.:-0.9735   1st Qu.:-0.9629
##  Median :-0.07318   Median : 0.08512   Median :-0.7890   Median :-0.8017
##  Mean   :-0.07426   Mean   : 0.08744   Mean   :-0.6916   Mean   :-0.6533
##  3rd Qu.:-0.06113   3rd Qu.: 0.10177   3rd Qu.:-0.4414   3rd Qu.:-0.4196
##  Max.   : 0.02747   Max.   : 0.17910   Max.   : 0.2677   Max.   : 0.4765
```

```
##  tbodygyrostdz     tbodygyrojerkmeanx tbodygyrojerkmeany
##  Min.   :-0.9855   Min.   :-0.15721   Min.   :-0.07681
##  1st Qu.:-0.9609   1st Qu.:-0.10322   1st Qu.:-0.04552
##  Median :-0.8010   Median :-0.09868   Median :-0.04112
##  Mean   :-0.6164   Mean   :-0.09606   Mean   :-0.04269
##  3rd Qu.:-0.3106   3rd Qu.:-0.09110   3rd Qu.:-0.03842
##  Max.   : 0.5649   Max.   :-0.02209   Max.   :-0.01320
##  tbodygyrojerkmeanz  tbodygyrojerkstdx tbodygyrojerkstdy tbodygyrojerkstd
z
##  Min.   :-0.092500   Min.   :-0.9965   Min.   :-0.9971   Min.   :-0.9954
##  1st Qu.:-0.061725   1st Qu.:-0.9800   1st Qu.:-0.9832   1st Qu.:-0.9848
##  Median :-0.053430   Median :-0.8396   Median :-0.8942   Median :-0.8610
##  Mean   :-0.054802   Mean   :-0.7036   Mean   :-0.7636   Mean   :-0.7096
##  3rd Qu.:-0.048985   3rd Qu.:-0.4629   3rd Qu.:-0.5861   3rd Qu.:-0.4741
##  Max.   :-0.006941   Max.   : 0.1791   Max.   : 0.2959   Max.   : 0.1932
##  tbodyaccmagmean   tbodyaccmagstd    tgravityaccmagmean tgravityaccmagstd
##  Min.   :-0.9865   Min.   :-0.9865   Min.   :-0.9865    Min.   :-0.9865
##  1st Qu.:-0.9573   1st Qu.:-0.9430   1st Qu.:-0.9573    1st Qu.:-0.9430
##  Median :-0.4829   Median :-0.6074   Median :-0.4829    Median :-0.6074
##  Mean   :-0.4973   Mean   :-0.5439   Mean   :-0.4973    Mean   :-0.5439
##  3rd Qu.:-0.0919   3rd Qu.:-0.2090   3rd Qu.:-0.0919    3rd Qu.:-0.2090
##  Max.   : 0.6446   Max.   : 0.4284   Max.   : 0.6446    Max.   : 0.4284
##  tbodyaccjerkmagmean tbodyaccjerkmagstd tbodygyromagmean
##  Min.   :-0.9928     Min.   :-0.9946    Min.   :-0.9807
##  1st Qu.:-0.9807     1st Qu.:-0.9765    1st Qu.:-0.9461
##  Median :-0.8168     Median :-0.8014    Median :-0.6551
##  Mean   :-0.6079     Mean   :-0.5842    Mean   :-0.5652
##  3rd Qu.:-0.2456     3rd Qu.:-0.2173    3rd Qu.:-0.2159
##  Max.   : 0.4345     Max.   : 0.4506    Max.   : 0.4180
##  tbodygyromagstd   tbodygyrojerkmagmean tbodygyrojerkmagstd
##  Min.   :-0.9814   Min.   :-0.99732     Min.   :-0.9977
##  1st Qu.:-0.9476   1st Qu.:-0.98515     1st Qu.:-0.9805
##  Median :-0.7420   Median :-0.86479     Median :-0.8809
##  Mean   :-0.6304   Mean   :-0.73637     Mean   :-0.7550
##  3rd Qu.:-0.3602   3rd Qu.:-0.51186     3rd Qu.:-0.5767
##  Max.   : 0.3000   Max.   : 0.08758     Max.   : 0.2502
##  fbodyaccmeanx     fbodyaccmeany      fbodyaccmeanz      fbodyaccstdx
##  Min.   :-0.9952   Min.   :-0.98903   Min.   :-0.9895   Min.   :-0.9966
##  1st Qu.:-0.9787   1st Qu.:-0.95361   1st Qu.:-0.9619   1st Qu.:-0.9820
##  Median :-0.7691   Median :-0.59498   Median :-0.7236   Median :-0.7470
##  Mean   :-0.5758   Mean   :-0.48873   Mean   :-0.6297   Mean   :-0.5522
##  3rd Qu.:-0.2174   3rd Qu.:-0.06341   3rd Qu.:-0.3183   3rd Qu.:-0.1966
##  Max.   : 0.5370   Max.   : 0.52419   Max.   : 0.2807   Max.   : 0.6585
##   fbodyaccstdy       fbodyaccstdz     fbodyaccjerkmeanx fbodyaccjerkmeany
##  Min.   :-0.99068   Min.   :-0.9872   Min.   :-0.9946   Min.   :-0.9894
##  1st Qu.:-0.94042   1st Qu.:-0.9459   1st Qu.:-0.9828   1st Qu.:-0.9725
##  Median :-0.51338   Median :-0.6441   Median :-0.8126   Median :-0.7817
##  Mean   :-0.48148   Mean   :-0.5824   Mean   :-0.6139   Mean   :-0.5882
##  3rd Qu.:-0.07913   3rd Qu.:-0.2655   3rd Qu.:-0.2820   3rd Qu.:-0.1963
##  Max.   : 0.56019   Max.   : 0.6871   Max.   : 0.4743   Max.   : 0.2767
```

```
##  fbodyaccjerkmeanz fbodyaccjerkstdx  fbodyaccjerkstdy  fbodyaccjerkstdz
##  Min.   :-0.9920   Min.   :-0.9951   Min.   :-0.9905   Min.   :-0.993108
##  1st Qu.:-0.9796   1st Qu.:-0.9847   1st Qu.:-0.9737   1st Qu.:-0.983747
##  Median :-0.8707   Median :-0.8254   Median :-0.7852   Median :-0.895121
##  Mean   :-0.7144   Mean   :-0.6121   Mean   :-0.5707   Mean   :-0.756489
##  3rd Qu.:-0.4697   3rd Qu.:-0.2475   3rd Qu.:-0.1685   3rd Qu.:-0.543787
##  Max.   : 0.1578   Max.   : 0.4768   Max.   : 0.3498   Max.   :-0.006236
##  fbodygyromeanx    fbodygyromeany    fbodygyromeanz    fbodygyrostdx
##  Min.   :-0.9931   Min.   :-0.9940   Min.   :-0.9860   Min.   :-0.9947
##  1st Qu.:-0.9697   1st Qu.:-0.9700   1st Qu.:-0.9624   1st Qu.:-0.9750
##  Median :-0.7300   Median :-0.8141   Median :-0.7909   Median :-0.8086
##  Mean   :-0.6367   Mean   :-0.6767   Mean   :-0.6044   Mean   :-0.7110
##  3rd Qu.:-0.3387   3rd Qu.:-0.4458   3rd Qu.:-0.2635   3rd Qu.:-0.4813
##  Max.   : 0.4750   Max.   : 0.3288   Max.   : 0.4924   Max.   : 0.1966
##  fbodygyrostdy     fbodygyrostdz     fbodyaccmagmean   fbodyaccmagstd
##  Min.   :-0.9944   Min.   :-0.9867   Min.   :-0.9868   Min.   :-0.9876
##  1st Qu.:-0.9602   1st Qu.:-0.9643   1st Qu.:-0.9560   1st Qu.:-0.9452
##  Median :-0.7964   Median :-0.8224   Median :-0.6703   Median :-0.6513
##  Mean   :-0.6454   Mean   :-0.6577   Mean   :-0.5365   Mean   :-0.6210
##  3rd Qu.:-0.4154   3rd Qu.:-0.3916   3rd Qu.:-0.1622   3rd Qu.:-0.3654
##  Max.   : 0.6462   Max.   : 0.5225   Max.   : 0.5866   Max.   : 0.1787
##  fbodybodyaccjerkmagmean fbodybodyaccjerkmagstd fbodybodygyromagmean
##  Min.   :-0.9940         Min.   :-0.9944        Min.   :-0.9865
##  1st Qu.:-0.9770         1st Qu.:-0.9752        1st Qu.:-0.9616
##  Median :-0.7940         Median :-0.8126        Median :-0.7657
##  Mean   :-0.5756         Mean   :-0.5992        Mean   :-0.6671
##  3rd Qu.:-0.1872         3rd Qu.:-0.2668        3rd Qu.:-0.4087
##  Max.   : 0.5384         Max.   : 0.3163        Max.   : 0.2040
##  fbodybodygyromagstd fbodybodygyrojerkmagmean fbodybodygyrojerkmagstd
##  Min.   :-0.9815     Min.   :-0.9976          Min.   :-0.9976
##  1st Qu.:-0.9488     1st Qu.:-0.9813          1st Qu.:-0.9802
##  Median :-0.7727     Median :-0.8779          Median :-0.8941
##  Mean   :-0.6723     Mean   :-0.7564          Mean   :-0.7715
##  3rd Qu.:-0.4277     3rd Qu.:-0.5831          3rd Qu.:-0.6081
##  Max.   : 0.2367     Max.   : 0.1466          Max.   : 0.2878
```