Code book for the dataset "analysis_dataset.txt" (assignment 2 of the Course "data preparation and cleaning"

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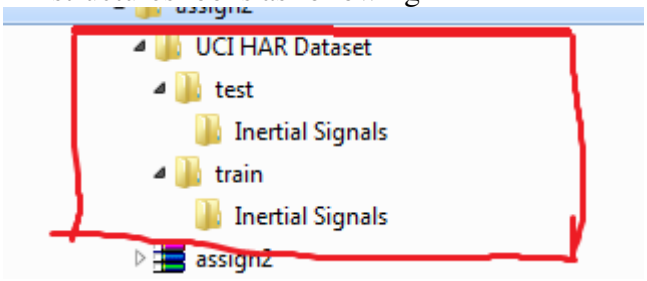
Original Data Source(s)

Description of the data: the data contain results of the experiments performed on 30 persons. 3-axes accelerations (boy and gravitational) and 3-axes rotational velocities were measured and recorded in a form of 2.56s time-series (128 instances) for each measurement point. The time series were subjected to the fast Fourier transformation (FFT) and resulting factors (561 per data point) were stored in the original data set. The dataset was split into the training and test ones and stored in the files, which were used in the present exercise. All the details of the original dataset can be found in following website: http://archive.ics.uci.edu/ml/datasets/Human+Activity+Recognition+Using+Smartphones#

Dataset preparation

Preparation and cleaning process

1. Downloading the original dataset and unpacking the files. The resulting folder structures looks as following



2. Reading the training and test datasets **X_test.txt** and **X_train.txt** files and the corresponding **y_test**.txt and **y_train.txt** files containing the activity labels and the **subject_train.txt** and **subject_test.txt** files containing the subject identification data.
3. Reading the activity identification table **activity_labels.txt** and names of the variables **features.txt** .

4. X_.., y_… subject_… and subject_… train and test data frames are merged, numerical activities ids are substituted with their verbal equivalents, then the subject and labels variables were attached to the FFT variables data frame from the left.
5. Names containing “mean” and “std” character sequences are identified and corresponding subset of the merged data frame is made. Corresponding (selected) names are assigned to the data frame columns. Characters sequence “()” is removed from the names.
6. Averages over the activities and subjects are generated and resulting dataset is written into the file “analysis_dataset.txt” with the following structure (subjects, activity labels and 79 data columns):

subjects	labels	tBodyAcc-mean-X	tBodyAcc-mean-Y	tBodyAcc-mean-Z ….
1	LAYING	0.22159824394	-0.0405139534294	-0.11320355358 ……..
1	SITTING	0.261237565425532	-0.00130828765170213	-0.104544182255319…….
1	STANDING	0.278917629056604	-0.0161375901037736	-0.110601817735849 ……
1	WALKING	0.277330758736842	-0.0173838185273684	-0.111148103547368 …….

Description of each variable is given further in the present document.

Dataset preparation script

```
#This sctript fulfills (hopefully) requirements of Assignment 2 for Data Science Course 3
##Downloading and unpacking the data
siteUrl="https://d396qusza40orc.cloudfront.net/getdata%2Fprojectfiles%2FUCI%20HAR%20Dataset.zip"
if(!file.exists("assign2.zip"))download.file(siteUrl,destfile = "assign2.zip", mode="wb")
if(!dir.exists("UCI HAR Dataset")){
unzip("assign2.zip", files = NULL, list = FALSE, overwrite = TRUE,
      junkpaths = FALSE, exdir = ".", unzip = "internal",
      setTimes = FALSE)}

##Reading training dataset
dir_tr="UCI HAR Dataset\\train\\"
dat_train<-read.table(paste(dir_tr, "X_train.txt",sep=""))
labels_train<-read.table(paste(dir_tr, "y_train.txt",sep=""),colClasses = "factor")
subject_train<-read.table(paste(dir_tr, "subject_train.txt",sep=""))

##Reading test dataset
dir_test="UCI HAR Dataset\\test\\"
dat_test<-read.table(paste(dir_test, "X_test.txt",sep=""))
labels_test<-read.table(paste(dir_test, "y_test.txt",sep=""),colClasses = "factor")
subject_test<-read.table(paste(dir_test, "subject_test.txt",sep=""))

##reading common for both datasets info
features<-read.table(file="UCI HAR Dataset\\features.txt",sep="")
activity_lables<-read.table(file="UCI HAR Dataset\\activity_labels.txt",sep="")

##merging datasets
dat<-rbind(dat_train, dat_test)
labels<-rbind(labels_train,labels_test)
subjects<-rbind(subject_train,subject_test)
```

```
##Subsetting dataset by extracting columns with means and stds only
needed_cols<-grepl("mean", features[,2]) | grepl("std", features[,2])
dat<-dat[,needed_cols]

##Tiding up and attaching activity names, labels and subjects
      for(i in 1:6){
      labels[,1]<-sub(activity_lables[i,1],activity_lables[i,2], labels[,1])
      }
dat<-cbind(subjects[,1],labels[,1], dat)
names_inter<-gsub("()","", features[,2],fixed=TRUE)
names(dat)<-c("subjects", "labels", as.character(names_inter[needed_cols]))


##THis function generates averages over the Activity for a given dataframe column
      fun<-function(dat, subj , j ){
      tapply(as.vector(dat[dat$subjects==subj, j]),
                  dat$labels[dat$subjects==subj], mean)
      }

##generating a resulting dataset of averages for Activities and Subjects
a<-3:dim(dat)[2]   ## columns to average
dat_result<-data.frame()
      for (j in 1:max(dat$subjects)){      ## looping over subjects
            interim<-sapply(X=a,FUN=fun, dat=dat, subj=j, simplify=TRUE)
            xx<-cbind(rep(j,6), row.names(interim),interim)
            dat_result<-rbind(dat_result,xx)
      }
names(dat_result)<-names(dat)

##if(!file.exists("analysis_dataset.txt"))
      write.table(dat_result, file="analysis_dataset.txt", row.names=FALSE,quote = FALSE)

      ##control: ww<-read.table(file="assign2.txt",  colClasses = "character")
```

Description of the dataset

The dataset consists of the following variables (quotes omitted, all lowcase, the text after the # sign is a description and does not belong to the variable name):

--subjects # number representing the personal identifier of the test participant (1-30)
--labels # the name of the activity, the measurements has been taken for (there are six of them : (WALKING, WALKING_UPSTAIRS, WALKING_DOWNSTAIRS, SITTING, STANDING, LAYING)
--the following 79 variables are representing the mean and average variable corresponding to the FFT of the original time series for nine degrees of freedom as described above. The names are self-explanatory. Detail description of their meaning is beyond the scope of the exercise):
tBodyAcc-mean-X
tBodyAcc-mean-Y
tBodyAcc-mean-Z
tBodyAcc-std-X

tBodyAcc-std-Y
tBodyAcc-std-Z
tGravityAcc-mean-X
tGravityAcc-mean-Y
tGravityAcc-mean-Z
tGravityAcc-std-X
tGravityAcc-std-Y
tGravityAcc-std-Z
tBodyAccJerk-mean-X
tBodyAccJerk-mean-Y
tBodyAccJerk-mean-Z
tBodyAccJerk-std-X
tBodyAccJerk-std-Y
tBodyAccJerk-std-Z
tBodyGyro-mean-X
tBodyGyro-mean-Y
tBodyGyro-mean-Z
tBodyGyro-std-X
tBodyGyro-std-Y
tBodyGyro-std-Z
tBodyGyroJerk-mean-X
tBodyGyroJerk-mean-Y
tBodyGyroJerk-mean-Z
tBodyGyroJerk-std-X
tBodyGyroJerk-std-Y
tBodyGyroJerk-std-Z
tBodyAccMag-mean
tBodyAccMag-std
tGravityAccMag-mean
tGravityAccMag-std
tBodyAccJerkMag-mean
tBodyAccJerkMag-std
tBodyGyroMag-mean
tBodyGyroMag-std
tBodyGyroJerkMag-mean
tBodyGyroJerkMag-std
fBodyAcc-mean-X
fBodyAcc-mean-Y
fBodyAcc-mean-Z
fBodyAcc-std-X
fBodyAcc-std-Y
fBodyAcc-std-Z
fBodyAcc-meanFreq-X
fBodyAcc-meanFreq-Y
fBodyAcc-meanFreq-Z
fBodyAccJerk-mean-X

fBodyAccJerk-mean-Y
fBodyAccJerk-mean-Z
fBodyAccJerk-std-X
fBodyAccJerk-std-Y
fBodyAccJerk-std-Z
fBodyAccJerk-meanFreq-X
fBodyAccJerk-meanFreq-Y
fBodyAccJerk-meanFreq-Z
fBodyGyro-mean-X
fBodyGyro-mean-Y
fBodyGyro-mean-Z
fBodyGyro-std-X
fBodyGyro-std-Y
fBodyGyro-std-Z
fBodyGyro-meanFreq-X
fBodyGyro-meanFreq-Y
fBodyGyro-meanFreq-Z
fBodyAccMag-mean
fBodyAccMag-std
fBodyAccMag-meanFreq
fBodyBodyAccJerkMag-mean
fBodyBodyAccJerkMag-std
fBodyBodyAccJerkMag-meanFreq
fBodyBodyGyroMag-mean
fBodyBodyGyroMag-std
fBodyBodyGyroMag-meanFreq
fBodyBodyGyroJerkMag-mean
fBodyBodyGyroJerkMag-std
fBodyBodyGyroJerkMag-meanFreq