Notes on R - Examples

Partition

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.

Subject

The experiments have been carried out with a group of 30 volunteers and each volunteer (subject) is identified with label 1-30 specified in subject_<partition>.txt.

> **partition**
> 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.

Activity

Each subject performed six activities (WALKING, WALKING_UPSTAIRS, WALKING_DOWNSTAIRS, SITTING, STANDING, LAYING) and each activity is identified with 1-6 in activity_labels.txt.

Label	Activity
1	WALKING
2	WALKING_UPSTAIRS
3	WALKING_DOWNSTAIRS
4	SITTING
5	STANDING
6	LAYING

Input Data X

Measurement records of the study are stored in X_<partition>.txt.

Features

Triaxial acceleration from the accelerometer (total acceleration), the estimated body acceleration, and triaxial Angular velocity from the gyroscope. There are 561 features as specified in the features.txt. Refer to features_info.txt and features.txt provided with the original data for specifications.

> *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*

Subject of each record of X

Subject of each row data in X_<partition> is identified with the label of the corresponding row in subject_<partition>.txt.

Activity of each record of X

Activity type of each row data in X_<partition> is identified with the label of the corresponding row in y_<partition>.txt.

Result output

Format

means.txt holds the result data as in the format below.

Subject	Activity	Features (multiple)

Features

The feature column names are below. Fox instance, time_bodyacc_mean_x is the mean value of the time domain signal of the body acceleration for X direction.

```
time_bodyacc_mean_x
time_bodyacc_mean_y
time_bodyacc_mean_z
time_bodyacc_std_x
time_bodyacc_std_y
time_bodyacc_std_z
time_gravityacc_mean_x
time_gravityacc_mean_y
time_gravityacc_mean_z
time_gravityacc_std_x
time_gravityacc_std_y
time_gravityacc_std_z
time_bodyaccjerk_mean_x
time_bodyaccjerk_mean_y
time_bodyaccjerk_mean_z
time_bodyaccjerk_std_x
time_bodyaccjerk_std_y
time_bodyaccjerk_std_z
time_bodygyro_mean_x
time_bodygyro_mean_y
time_bodygyro_mean_z
time_bodygyro_std_x
time_bodygyro_std_y
time_bodygyro_std_z
time_bodygyrojerk_mean_x
time_bodygyrojerk_mean_y
time_bodygyrojerk_mean_z
time_bodygyrojerk_std_x
time_bodygyrojerk_std_y
time_bodygyrojerk_std_z
time_bodyaccmag_mean
time_bodyaccmag_std
time_gravityaccmag_mean
time_gravityaccmag_std
time_bodyaccjerkmag_mean
time_bodyaccjerkmag_std
time_bodygyromag_mean
time_bodygyromag_std
time_bodygyrojerkmag_mean
time_bodygyrojerkmag_std
freq_bodyacc_mean_x
freq_bodyacc_mean_y
freq_bodyacc_mean_z
freq_bodyacc_std_x
freq_bodyacc_std_y
freq_bodyacc_std_z
freq_bodyacc_meanfreq_x
freq_bodyacc_meanfreq_y
freq_bodyacc_meanfreq_z
freq_bodyaccjerk_mean_x
freq_bodyaccjerk_mean_y
freq_bodyaccjerk_mean_z
freq_bodyaccjerk_std_x
freq_bodyaccjerk_std_y
freq_bodyaccjerk_std_z
freq_bodyaccjerk_meanfreq_x
freq_bodyaccjerk_meanfreq_y
freq_bodyaccjerk_meanfreq_z
freq_bodygyro_mean_x
freq_bodygyro_mean_y
freq_bodygyro_mean_z
freq_bodygyro_std_x
freq_bodygyro_std_y
freq_bodygyro_std_z
freq_bodygyro_meanfreq_x
freq_bodygyro_meanfreq_y
freq_bodygyro_meanfreq_z
freq_bodyaccmag_mean
```

```
freq_bodyaccmag_std
freq_bodyaccmag_meanfreq
freq_bodybodyaccjerkmag_mean
freq_bodybodyaccjerkmag_std
freq_bodybodyaccjerkmag_meanfreq
freq_bodybodygyromag_mean
freq_bodybodygyromag_std
freq_bodybodygyromag_meanfreq
freq_bodybodygyrojerkmag_mean
```

```
freq_bodybodygyrojerkmag_std
freq_bodybodygyrojerkmag_meanfreq
```