Data Source:

About the data

Human Activity Recognition Using Smartphones Dataset

Version 1.0

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Jorge L. Reyes-Ortiz, Davide Anguita, Alessandro Ghio, Luca Oneto.

Smartlab - Non Linear Complex Systems Laboratory

DITEN - Universit‡ degli Studi di Genova.

Via Opera Pia 11A, I-16145, Genoa, Italy.

activityrecognition@smartlab.ws

www.smartlab.ws

The list of files available:

'features\_info.txt': Shows information about the variables used on the feature vector.

-1’features.txt': List of all features.

-2 'activity\_labels.txt': Links the class labels with their activity name.

-3 'train/X\_train.txt': Training set.

-4 'train/y\_train.txt': Training labels.

-5’test/X\_test.txt': Test set.

-6 test/y\_test.txt': Test labels.

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

-7 'train/subject\_train.txt': Each row identifies the subject who performed the activity for each window sample. Its range is from 1 to 30.

Feature Selection

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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

The complete list of variables of each feature vector is available in 'features.txt'

TidyData Table

| Columns | Measure Category | Format |
| --- | --- | --- |
| Sample | Train or Test sample Source | Character |
| ActivityType | 1-6 | Integer |
| SubjectActivity | 1-30 | Subjects Number in study |
| tBodyAcc.Mean.X | At time Raw Accelerator Signals (Hz) | Numeric |
| tBodyAcc.Mean.Y | At time Raw Accelerator Signals (Hz) | Numeric |
| tBodyAcc.Mean.Z | At time Raw Accelerator Signals (Hz) | Numeric |
| tBodyAcc.Std.X | At time Raw Accelerator Signals (Hz) | Numeric |
| tBodyAcc.Std.Y | At time Raw Accelerator Signals (Hz) | Numeric |
| tBodyAcc.Std.Z | At time Raw Accelerator Signals (Hz) | Numeric |
| tGravityAcc.Mean.X | Raw Gravity Accelerator at time | Numeric |
| tGravityAcc.Mean.Y | Raw Gravity Accelerator at time | Numeric |
| tGravityAcc.Mean.Z | Raw Gravity Accelerator at time | Numeric |
| tGravityAcc.Std.X | Raw Gravity Accelerator at time | Numeric |
| tGravityAcc.Std.Y | Raw Gravity Accelerator at time | Numeric |
| tGravityAcc.Std.Z | Raw Gravity Accelerator at time | Numeric |
| tBodyAccJerk.Mean.X | At time Raw Accelerator Signals (Hz) | Numeric |
| tBodyAccJerk.Mean.Y | At time Raw Accelerator Signals (Hz) | Numeric |
| tBodyAccJerk.Mean.Z | At time Raw Accelerator Signals (Hz) | Numeric |
| tBodyAccJerk.Std.X | At time Raw Accelerator Signals (Hz) | Numeric |
| tBodyAccJerk.Std.Y | At time Raw Accelerator Signals (Hz) | Numeric |
| tBodyAccJerk.Std.Z | At time Raw Accelerator Signals (Hz) | Numeric |
| tBodyGyro.Mean.X | At time Raw Gyroscope Signals (Hz) | Numeric |
| tBodyGyro.Mean.Y | At time Raw Gyroscope Signals (Hz) | Numeric |
| tBodyGyro.Mean.Z | At time Raw Gyroscope Signals (Hz) | Numeric |
| tBodyGyro.Std.X | At time Raw Gyroscope Signals (Hz) | Numeric |
| tBodyGyro.Std.Y | At time Raw Gyroscope Signals (Hz) | Numeric |
| tBodyGyro.Std.Z | At time Raw Gyroscope Signals (Hz) | Numeric |
| tBodyGyroJerk.Mean.X | At time Raw Gyroscope Signals (Hz) | Numeric |
| tBodyGyroJerk.Mean.Y | At time Raw Gyroscope Signals (Hz) | Numeric |
| tBodyGyroJerk.Mean.Z | At time Raw Gyroscope Signals (Hz) | Numeric |
| tBodyGyroJerk.Std.X | At time Raw Gyroscope Signals (Hz) | Numeric |
| tBodyGyroJerk.Std.Y | At time Raw Gyroscope Signals (Hz) | Numeric |
| tBodyGyroJerk.Std.Z | At time Raw Gyroscope Signals (Hz) | Numeric |
| tBodyAccMag.Mean | At time Raw Accelerator Signals (Hz) | Numeric |
| tBodyAccMag.Std | At time Raw Accelerator Signals (Hz) | Numeric |
| tGravityAccMag.Mean | At time Raw Accelerator Signals (Hz) | Numeric |
| tGravityAccMag.Std | At time Raw Accelerator Signals (Hz) | Numeric |
| tBodyAccJerkMag.Mean | At time Raw Accelerator Signals (Hz) | Numeric |
| tBodyAccJerkMag.Std | At time Raw Accelerator Signals (Hz) | Numeric |
| tBodyGyroMag.Mean | At time Raw Gyroscope Signals (Hz) | Numeric |
| tBodyGyroMag.Std | At time Raw Gyroscope Signals (Hz) | Numeric |
| tBodyGyroJerkMag.Mean | At time Raw Gyroscope Signals (Hz) | Numeric |
| tBodyGyroJerkMag.Std | At time Raw Gyroscope Signals (Hz) | Numeric |
| fBodyAcc.Mean.X | FF transformed Accelerator Signal (Hz) | Numeric |
| fBodyAcc.Mean.Y | FF transformed Accelerator Signal (Hz) | Numeric |
| fBodyAcc.Mean.Z | FF transformed Accelerator Signal (Hz) | Numeric |
| fBodyAcc.Std.X | FF transformed Accelerator Signal (Hz) | Numeric |
| fBodyAcc.Std.Y | FF transformed Accelerator Signal (Hz) | Numeric |
| fBodyAcc.Std.Z | FF transformed Accelerator Signal (Hz) | Numeric |
| fBodyAccJerk.Mean.X | FF transformed Accelerator Signal (Hz) | Numeric |
| fBodyAccJerk.Mean.Y | FF transformed Accelerator Signal (Hz) | Numeric |
| fBodyAccJerk.Mean.Z | FF transformed Accelerator Signal (Hz) | Numeric |
| fBodyAccJerk.Std.X | FF transformed Accelerator Signal (Hz) | Numeric |
| fBodyAccJerk.Std.Y | FF transformed Accelerator Signal (Hz) | Numeric |
| fBodyAccJerk.Std.Z | FF transformed Accelerator Signal (Hz) | Numeric |
| fBodyGyro.Mean.X | FF transformed Gyroscope Signal (Hz) | Numeric |
| fBodyGyro.Mean.Y | FF transformed Gyroscope Signal (Hz) | Numeric |
| fBodyGyro.Mean.Z | FF transformed Gyroscope Signal (Hz) | Numeric |
| fBodyGyro.Std.X | FF transformed Gyroscope Signal (Hz) | Numeric |
| fBodyGyro.Std.Y | FF transformed Gyroscope Signal (Hz) | Numeric |
| fBodyGyro.Std.Z | FF transformed Gyroscope Signal (Hz) | Numeric |
| fBodyAccMag.Mean | FF transformed Accelerator Signal (Hz) | Numeric |
| fBodyAccMag.Std | FF transformed Accelerator Signal (Hz) | Numeric |
| fBodyBodyAccJerkMag.Mean | FF transformed Accelerator Signal (Hz) | Numeric |
| fBodyBodyAccJerkMag.Std | FF transformed Accelerator Signal (Hz) | Numeric |
| fBodyBodyGyroMag.Mean | FF transformed Gyroscope Signal (Hz) | Numeric |
| fBodyBodyGyroMag.Std | FF transformed Gyroscope Signal (Hz) | Numeric |
| fBodyBodyGyroJerkMag.Mean | FF transformed Gyroscope Signal (Hz) | Numeric |
| fBodyBodyGyroJerkMag.Std | FF transformed Gyroscope Signal (Hz) | Numeric |
| Activity | 6 levels of activity tested | Character |

Table TidyAvg

This Table takes the mean of the above table by Subject and Activity.

The data represents a summary table of all the above, with the exception of ‘Sample’ and ‘Activity Type’.