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## Human Activity Recognition Using Smartphones Dataset

Version 1.0

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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:

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- 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:

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- '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:

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- 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

#### License:

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Use of this dataset in publications must be acknowledged by referencing the following publication [1]

[1] Davide Anguita, Alessandro Ghio, Luca Oneto, Xavier Parra and

Jorge L. Reyes-Ortiz. Human Activity Recognition on Smartphones using a Multiclass Hardware-Friendly Support Vector Machine. International Workshop of Ambient Assisted Living (IWAAL 2012). Vitoria-Gasteiz, Spain. Dec 2012

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