===================================================================================================

Human Activity Recognition Using Smartphones Dataset

Version 1.0

===================================================================================================

Jorge L. Reyes-Ortiz(1,2), Davide Anguita(1), Alessandro Ghio(1), Luca Oneto(1) and Xavier Parra(2)

1 - Smartlab - Non-Linear Complex Systems Laboratory

DITEN - Università degli Studi di Genova, Genoa (I-16145), Italy.

2 - CETpD - Technical Research Centre for Dependency Care and Autonomous Living

Universitat Politècnica de Catalunya (BarcelonaTech). Vilanova i la Geltrú (08800), Spain

activityrecognition '@' smartlab.ws

===================================================================================================

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.

- The units used for the accelerations (total and body) are 'g's (gravity of earth -> 9.80665 m/seg2).

- The gyroscope units are rad/seg.

- A video of the experiment including an example of the 6 recorded activities with one of the participants can be seen in the following link: http://www.youtube.com/watch?v=XOEN9W05\_4A

For more information about this dataset please contact: activityrecognition '@' smartlab.ws

License:

========

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. A Public Domain Dataset for Human Activity Recognition Using Smartphones. 21th European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning, ESANN 2013. Bruges, Belgium 24-26 April 2013.

This dataset is distributed AS-IS and no responsibility implied or explicit can be addressed to the authors or their institutions for its use or misuse. Any commercial use is prohibited.

Other Related Publications:

===========================

[2] Davide Anguita, Alessandro Ghio, Luca Oneto, Xavier Parra, Jorge L. Reyes-Ortiz. Energy Efficient Smartphone-Based Activity Recognition using Fixed-Point Arithmetic. Journal of Universal Computer Science. Special Issue in Ambient Assisted Living: Home Care. Volume 19, Issue 9. May 2013

[3] 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. 4th International Workshop of Ambient Assited Living, IWAAL 2012, Vitoria-Gasteiz, Spain, December 3-5, 2012. Proceedings. Lecture Notes in Computer Science 2012, pp 216-223.

[4] Jorge Luis Reyes-Ortiz, Alessandro Ghio, Xavier Parra-Llanas, Davide Anguita, Joan Cabestany, Andreu Català. Human Activity and Motion Disorder Recognition: Towards Smarter Interactive Cognitive Environments. 21th European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning, ESANN 2013. Bruges, Belgium 24-26 April 2013.

==================================================================================================

Jorge L. Reyes-Ortiz, Alessandro Ghio, Luca Oneto, Davide Anguita and Xavier Parra. November 2013.