

MHEALTH Dataset Data Set

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Abstract: The MHEALTH (Mobile Health) dataset is devised to benchmark techniques dealing with human behavior analysis based on multimodal body sensing.

Data Set Characteristics:	Multivariate, Time-Series	Number of Instances:	120	Area:	Computer
Attribute Characteristics:	Real	Number of Attributes:	23	Date Donated	2014-12-07
Associated Tasks:	Classification	Missing Values?	N/A	Number of Web Hits:	97282

Source:

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Data Set Information:

The MHEALTH (Mobile HEALTH) dataset comprises body motion and vital signs recordings for ten volunteers of diverse profile while performing several physical activities. Sensors placed on the subject's chest, right wrist and left ankle are used to measure the motion experienced by diverse body parts, namely, acceleration, rate of turn and magnetic field orientation. The sensor positioned on the chest also provides 2-lead ECG measurements, which can be potentially used for basic heart monitoring, checking for various arrhythmias or looking at the effects of exercise on the ECG.

DATASET SUMMARY:
#Activities: 12
#Sensor devices: 3
#Subjects: 10

EXPERIMENTAL SETUP
The collected dataset comprises body motion and vital signs recordings for ten volunteers of diverse profile while performing 12 physical activities (Table 1). Shimmer2 [BUR10] wearable sensors were used for the recordings. The sensors were respectively placed on the subject's chest, right wrist and left ankle and attached by using elastic straps (as shown in the figure in attachment). The use of multiple sensors permits us to measure the motion experienced by diverse body parts, namely, the acceleration, the rate of turn and the magnetic field orientation, thus better capturing the body dynamics. The sensor positioned on the chest also provides 2-lead ECG measurements which are not used for the development of the recognition model but rather collected for future work purposes. This information can be used, for example, for basic heart monitoring, checking for various arrhythmias or looking at the effects of exercise on the ECG. All sensing modalities are recorded at a sampling rate of 50 Hz, which is considered sufficient for capturing human activity. Each session was recorded using a video camera. This dataset is found to generalize to common activities of the daily living, given the diversity of body parts involved in each one (e.g., frontal elevation of arms vs. knees bending), the intensity of the actions (e.g., cycling vs. sitting and relaxing) and their execution speed or dynamicity (e.g., running vs. standing still). The activities were collected in an out-of-lab environment with no constraints on the way these must be executed, with the exception that the subject should try their best when executing them.

ACTIVITY SET
The activity set is listed in the following:
L1: Standing still (1 min)
L2: Sitting and relaxing (1 min)
L3: Lying down (1 min)
L4: Walking (1 min)
L5: Climbing stairs (1 min)
L6: Waist bends forward (20x)
L7: Frontal elevation of arms (20x)
L8: Knees bending (crouching) (20x)
L9: Cycling (1 min)
L10: Jogging (1 min)
L11: Running (1 min)
L12: Jump front & back (20x)
NOTE: In brackets are the number of repetitions (Nx) or the duration of the exercises (min).

A complete and illustrated description (including table of activities, sensor setup, etc.) of the dataset is provided in the papers presented in the section "Citation Requests".

Attribute Information:

The data collected for each subject is stored in a different log file: 'mHealth_subject.log'. Each file contains the samples (by rows) recorded for all sensors (by columns). The labels used to identify the activities are similar to the abovementioned (e.g., the label for walking is '4').

The meaning of each column is detailed next:
Column 1: acceleration from the chest sensor (X axis)
Column 2: acceleration from the chest sensor (Y axis)
Column 3: acceleration from the chest sensor (Z axis)
Column 4: electrocardiogram signal (lead 1)
Column 5: electrocardiogram signal (lead 2)
Column 6: acceleration from the left-ankle sensor (X axis)
Column 7: acceleration from the left-ankle sensor (Y axis)
Column 8: acceleration from the left-ankle sensor (Z axis)
Column 9: gyro from the left-ankle sensor (X axis)
Column 10: gyro from the left-ankle sensor (Y axis)
Column 11: gyro from the left-ankle sensor (Z axis)
Column 13: magnetometer from the left-ankle sensor (X axis)
Column 13: magnetometer from the left-ankle sensor (Y axis)
Column 14: magnetometer from the left-ankle sensor (Z axis)
Column 15: acceleration from the right-lower-arm sensor (X axis)
Column 16: acceleration from the right-lower-arm sensor (Y axis)
Column 17: acceleration from the right-lower-arm sensor (Z axis)
Column 18: gyro from the right-lower-arm sensor (X axis)
Column 19: gyro from the right-lower-arm sensor (Y axis)
Column 20: gyro from the right-lower-arm sensor (Z axis)
Column 21: magnetometer from the right-lower-arm sensor (X axis)
Column 22: magnetometer from the right-lower-arm sensor (Y axis)
Column 23: magnetometer from the right-lower-arm sensor (Z axis)
Column 24: Label (0 for the null class)

*Units: Acceleration (m/s^2), gyroscope (deg/s), magnetic field (local), ecg (mV)

Relevant Papers:

Banos, O., Garcia, R., Holgado, J. A., Damas, M., Pomares, H., Rojas, I., Saez, A., Villalonga, C. mHealthDroid: a novel framework for agile development of mobile health applications. Proceedings of the 6th International Work-conference on Ambient Assisted Living an Active Ageing (IWAAL 2014), Belfast, Northern Ireland, December 2-5, (2014).
Nguyen, L. T., Zeng, M., Tague, P., Zhang, J. (2015). Recognizing New Activities with Limited Training Data. In IEEE International Symposium on Wearable Computers (ISWC).

Citation Request:

Use of this dataset in publications must be acknowledged by referencing the following publications:

Banos, O., Garcia, R., Holgado, J. A., Damas, M., Pomares, H., Rojas, I., Saez, A., Villalonga, C. mHealthDroid: a novel framework for agile development of mobile health applications. Proceedings of the 6th International Work-conference on Ambient Assisted Living an Active Ageing (IWAAL 2014), Belfast, Northern Ireland, December 2-5, (2014).
Banos, O., Villalonga, C., Garcia, R., Saez, A., Damas, M., Holgado, J. A., Lee, S., Pomares, H., Rojas, I. Design, implementation and validation of a novel open framework for agile development of mobile health applications. BioMedical Engineering OnLine, vol. 14, no. S2:S6, pp. 1-20 (2015).

We recommend to refer to this dataset as the 'MHEALTH dataset' in publications.
We would appreciate if you send us an email (oresti.bl '@' gmail.com) to inform us of any publication using this dataset.