Dataset of tactile signatures of the human hand in twenty one activities of daily living

Dataset description

This dataset contains the tactile data corresponding to 22 subjects, 12 women and 10 men, performing 21 different activities of daily living. The dataset was obtained using the Grip System, with sensor 4256E from Tekscan, Inc., USA. The tasks corresponded to common ADL, selected to cover most of the areas related to hand function of the different chapters of the International Classification of Functioning, Disability and Health (ICF). This open dataset is, to our knowledge, the greatest and most diverse database with tactile information of the human hand in ADL.

Dataset

The dataset is contained in a Matlab MAT-file named 'dataset.mat'. For loading its content in Matlab you have to write the instruction 'load dataset'. The following variables are loaded:

Variable 'tasks':

It is a cell array containing a description of each task.

Variable 'dataset':

It is a structure array with size 21-by-22 , with the first index corresponding to the task, in the order indicated by variable 'tasks', and the second to the subject. The fields of this structure are:

- *task*: task description
- *subjectSex*: the sex of the subject
- *presRaw*: Nx725 matrix of raw pressure data (in kPa), where rows correspond to time instants and columns to the different locations or sensels of the pressure sensor, including inactive cells or gaps in the sensor (with value -1). See attached file 'sensor' explaining the location of the sensel corresponding to each column of the matrix.
- *presInterpSync*: 101x725 matrix of pressure data (in kPa) once interpolated for normalized time increments of 0.01 and synchronized among subjects for the same task
- *refSubject*: reference subject for synchronization in the task
- *indexSync*: 4-element vector with row indexes used for time warping and synchronization [i1ref, i2ref, i1, i2] where i1ref and i2ref correspond to the reference subject rows and i1 and i2 to the actual subject rows shifted to be coincident in time with i1ref and i2ref respectively.
- *GF*: 101x1 vector of total grip force (in N) for each normalized time instant
- *iColRegion*: 1x18 cell array of indexes of the columns corresponding to the sensels included in each one of the 18 sensing regions of the sensor.
- *CGF*: 101x18 matrix containing the relative contribution to the grip force, non-dimensional value between 0 and 1, for each normalized time instant and for each of the 18 sensing regions.

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<u>Variables 'senselCol' and 'colSensel':</u>

The variables 'senselCol' (matrix 29x25) and 'colSensel' (matrix 725x2) allow indexing between rows and columns of the original sensor array (matrix of 29x25) and the columns of fields 'presRaw' or 'presInterpSync' in dataset structure, or vice versa. See file 'sensor.png' attached for a picture of this correspondence.

Files

The file 'sensor.png' shows the matrix of the sensor, with blue color corresponding to gaps or inactive cells in the sensor and yellow cells to active cells or sensels. The numbers shown in the sensels relate their position in the manufacturer matrix of 29x25 to the corresponding columns of matrices 'presRaw' and 'presInterpSync' of the dataset.