Artifact Abstract: Kitchen Task Assessment Dataset for Measuring Errors due to Cognitive Impairments

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I. General information

Dataset title	Kitchen Task Assessment Dataset for Measuring Errors due to Cognitive Impairments
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Type	Measurement
Location	Smart Appliance Lab, Albert-Einstein-Strae 22, 18059 Rostock, Germany
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A. Objective

This document provides guidelines to using the data in the kitchen task assessment dataset. This dataset contains normal behaviour as well as erroneous behaviour due to dementia. The dataset including annotation, sensor data and synchronisation scripts is publicly available and can be downloaded from the Library of the University of Rostock [4], download link **https://doi.org/10.18453/rosdok_id00002605**. The video data is accessible on request. If you are interested in the video data, please, contact Peter Eschholz at **peter.eschholz(at)uni-rostock.de**.

B. Problem Statement

With the demographic change towards ageing population, the number of people suffering from neurodegenerative diseases such as dementia increases. As the ratio between young and elderly population changes towards the seniors, it becomes important to develop intelligent technologies for supporting the elderly in their everyday activities. Such intelligent technologies usually rely on training data in order to learn models for recognising problematic behaviour. One problem these systems face is that there are not many datasets containing training data for people with dementia. What is more, many of the existing datasets are not publicly available due to privacy concerns. To address the above problems, in this paper we present a sensor dataset for the kitchen task assessment containing normal and erroneous behaviour due to dementia. The dataset is recorded by actors, who follow instructions describing normal and erroneous behaviour caused by the progression of dementia. Furthermore, we present a semantic annotation scheme which allows reasoning not only about the observed behaviour but also about the causes of the errors.

II. Description

The dataset contains different types of sensor and video data: video data from GoPro camera and from hand held camera, acceleration data from different objects and from body-worn sensors as well as annotation. The dataset consists of 12 normal runs and 12 erroneous runs, where the participants simulated typical errors due to dementia. The annotation consists of both action annotation in the form "action_object_object" as well es annotation about the object being manipulated and the hand that is manipulating it. For more details on the dataset see [3].

A. Data format

1) Annotation: The `anno/` folder contains two types of files, one for the annotation of the actions and the corresponding objects and the second only for the objects. The first annotation type has .eaf extension and can be opened with the

ELAN annotation tool[1] [1]. This annotation contains labels in the form "action_object_object", which can be mapped to a semantic model. For more information on the semantic model see [2]. The second type of annotation has .txt extension and it is in the form "objects" being manipulated, "hand", in which the object is, "start time" of the object usage, and "end time" of the object usage.

2) Sensor data: The `objects/` folder contains the data from the sensors attached to the objects. For acquiring sensor data from the objects, object motion sensor from Bosch Sensortec (DIANA-boards) were used. Each sensor contains accelerometer, gyroscope, and magnetometer with a sampling rate of 25Hz. Each sample in the files has the form of timestamp of the sensor, timestamp of the system, address of the sensor, accelerometer, gyroscope and magnetometer data from x, y and z axis. Here too, the names of the files correspond to the names of the annotation files.

The `xsens/` folder contains the data from a full body motion capture suite (XSens MVN-Biomch) with 17 sensors with a sampling rate of 120Hz. The XSens data is in .arff format and the names of the files match the names of the annotation files.

Note that the annotation, objects data and XSens data are publicly available and can be downloaded from the Library of the University of Rostock [4], download link **https://doi.org/10.18453/rosdok_id00002605**.

3) Video data: The `gopro/` folder contains the video from the GoPro camera, which was located on the chest of the experiment participant. The camera is a GoPro ultrawideangle camera with resolution 1280x720 and sampling rate of 25Hz. The name of the videos correspond to the name of the annotation files.

The `video/` folder contains the video logs from a hand-held camcorder, used to record third person video full body with resolution 704x576 and sampling rate of 25Hz. Here too, the names of the files match the names of the annotation files.

Note that the video data is not part of the publicly available dataset. If you are interested in the video data, contact Peter Eschholz at **peter.eschholz(at)uni-rostock.de**.

B. Scripts

Apart from the data folders listed below, there are four "offsets" files. These files contain the offsets of the sensors with respect to the annotation.

Additionally, the "sensors.txt" file contains the mapping between the addresses of the sensors from folder "objects/" and the name of the object, to which the sensor was attached.

To read and synchronise the data, one can use the RScript "calculate_correlations.R". The necessary R libraries are listed at the beginning of the script with "requre()". The package "bit64", currently commented is required for x64 architectures. The script reads the data from the folders "xsens/", "anno/", and "objects/", augments the annotations and calculates the correlation between the object sensors and the XSens sensors. It finally calculates the evaluation measures and plots the ROC curve.

[1] https://tla.mpi.nl/tools/tla-tools/elan/

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