

Glass Eating and Motion (GLEAM) Dataset

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Introduction

The *Glass Eating and Motion (GLEAM)* dataset is a head motion tracking dataset collected with Google Glass. The labeled data from this head-mounted sensor can be used to recognize eating and other activities, and ultimately to assist individuals with chronic disease (e.g. insulin dosing and glucose testing reminders for people with diabetes). Head movement has been underappreciated as a data source for eating and activity recognition, so this study aims to address this by creating a public data resource that contains labeled data from human head movement.

The data can be used for any non-commercial purpose with proper attribution, but cannot be used for commercial purposes and cannot be redistributed. You are also not allowed to attempt to reidentify any individuals who participated in the study.

Citation Please cite the pervasive health paper, which contains more detail and analysis of the data:

S. A. Rahman, C. Merck, Y. Huang, and S. Kleinberg. Unintrusive Eating Recognition using Google Glass. In Pervasive Health, Istanbul, Turkey, May 2015.

Data collection

The study and data distribution was approved by Stevens IRB. We collected data from 38 participants wearing Google Glass while conducting a series of activities in a controlled environment. Our protocol involved 2 hours of data collection, spanning eating, walking, and other activities. In general, the sequence of activities as talking with the researcher, eating a meal in two parts with a 5-minute break in between, walking down and up stairs and around the building, drinking, and finally using the rest of the two hours for the activity of their choice (e.g. reading a book, working on a computer). While most of the participants followed this sequence, a few of them altered the order of the first few activities (e.g. start meal with drinking or ate before talking).

Participants Data was collected from 38 individuals aged 18-21, with no prior Lasik surgery or difficulty chewing or swallowing. All participants completed the full 2 hours of data collection.

Data recorded Activity start and end times were recorded by a researcher using a custom Android app as they observed the participant. In addition to marking activity times, the annotator took pictures of the food at the beginning, end, and halfway through the meal, which can be used to analyze results based on food type. For some participants, notes on factors that may affect data analysis were also recorded as free text.

Data was collected from all of Glass's sensors (accelerometer, gravity, linear acceleration, rotation, gyroscope, magnetic field, and light). The table on the following page gives brief descriptions of the sensors. We aimed to record data at a resolution of 200 milliseconds. However, due to some system processes and their higher priorities, data recording was occasionally preempted so the median interval between recordings was 395 milliseconds.

The data also include demographic characteristics (age, sex) and factors relevant to eating detection (chair type, objects used for eating and drinking. Participants brought their own food with constraints on food type.

Senor	What it measures	Unit
Linear Acceleration	Acceleration forces along 3 axis (excluding gravity)	meter/sec ²
Gravity	Forces of gravity along 3 axis	meter/sec ²
Accelerometer	Acceleration forces along 3 axis including gravity (i.e. acceleration = linear acceleration + gravity)	meter/sec ²
Rotation vector	Rotation vector component along 3 axis (i.e. axis value * sin($\theta/2$))	Unit less
Gyroscope	Rate of rotation	radian/sec
Geomagnetic	Geomagnetic field strength along 3 axes	Micro-Tesla (μ T)
Light	Environment luminance	lux

Data organization

The GLEAM directory contains sub-directories for each participant, plus two files containing data for all participants.

Demographic information (e.g. age, sex) for all participants with food types and other recorded factors (e.g. object used for eating and drinking, seating on rolling vs. fixed chairs, notes about the participants) are stored in Demographics_Glass_data.csv file, which is located in the root directory. All other data are stored in directories labeled with each participant's ID. Inside each directory there are at least 5 files: one sensor data file (ID_sensorData.csv), one annotation file (pid_annotate.csv), and three image files of food taken at different stages of the meal (FoodIMG_ID-start.jpg, FoodIMG_ID-half.jpg, FoodIMG_ID-end.jpg). For some participants there may be an additional file (ID_notes.csv), which contains annotator's comments recorded during data collection.