CECS 450 Data Visualization
Fall 2019
Assignment 1

1. Overview

In your assigned teams, work together to generate interactive visualization(s) of one given dataset that captures gaze behavior recorded during a human-computer interaction session. The recommended JavaScript library to use for this assignment is D3 (see https://d3js.org). However, this is not a requirement, i.e. if you feel another visualization toolkit works better (provided that the team agrees with you), then you are free to choose alternative programming tools.

The ***aim*** of this assignment is to demonstrate that you know which appropriate visualization technique(s) to apply for your specific dataset, and that you have implemented the visual objects with appropriate interaction mechanisms.

The ***goal*** of this assignment is to provide interactive visualization support to users who are interested in explorative activities, e.g. finding "interesting" things, examine the dataset by exploring whether a particular feature/trend/pattern is present, etc.

Recommended steps:

1. determine the objective(s) of your visualization (i.e. the questions your visualization will be able to answer);
2. identify the appropriate parameters/coordinates to use in your visualization; and
3. generate interactive visualizations that aim to support user exploration.

Hint: To score high in this assignment, try to generate interactive visualization(s) that can answer multiple complex questions, e.g. did the user struggle more when searching or processing the given visual information; was the user more successful at completing the given task when using one visual support than the other; as opposed to answering very simple questions, e.g. how long was the user's fixation; how many fixations were captured. In other words, the visualization you have generated should be able to present several different kinds of data and provides the user with multiple means to draw compound conclusions.

2. Deadline

Friday, Oct. 18, 2019, 5pm local time.

3. Submissions

Each team should submit TWO seperate items that are NOT in one zip folder, to the designated Dropbox folder via BeachBoard:

1) the visualization in one .html file that is self-contained (i.e. anyone with a web browser can open and display your visualization without having to configure any other dependencies); and
2) presentation slides in either .ppt or .pdf format summarizing all the work done for this assignment.

Important:

1) Assignments submitted via email will NOT be accepted.

2) DropBox folders will automatically close promptly at 5pm sharp. Late submissions will receive a 5-point deduction penalty.

4. Required Deliverables

Your visualization

1) must be interactive; and
2) was written by you, i.e. generated using a programming tool/library and NOT an interface where no programming is required.

Your presentation

1) should be prepared for a 12-minute talk and 3-minute Q&A;
2) must be concise, clear, and present a good summary of your work; and
3) must contain the following sections:

    a. Goal – explain the goal of your visualization, and what question(s) your visualization aims to answer;

    b. Data Processing – give detailed explanation on how you went about processing the raw data by providing code snippets, e.g. whether you excluded any data entries and why, etc. ex) invalid data input.

    c. Design & Implementation - discuss the type of interaction your visualization is designed to support, how parameters/coordinates were determined in your design process, and how your visualization meets the goal identified in a) above. You must clearly identify the explorative tasks the visualization supports.

    d. Contribution: discuss teamwork, outline each member's contribution, and any challenges encountered and had to overcome.

5. Grading Guidelines

This assignment is worth 20% of the final grade. All members of the same group will receive the same points, which are subject to peer review (see below). The visualization and the presentation are marked out of 10% each. You will be graded on the extent to which the required deliverables discussed above have been successfully met.

Peer review: contributions in a team-based assignment should be understood as the individual input that is valued by your peers and is advancing the collective team outcome positively. Thus, your final grades may be adjusted to reflect the evaluations rated by your peers. Please be reminded that the instructor cannot give credit to any individual who makes zero contribution to group-based assignments. Further peer review submission instructions will be provided to the class after the due-date of this assignment.

6. Datasets

Each team is given one raw dataset (downloadable from BeachBoard) capturing the eye gaze data recorded from one participant who has interacted with a given visualization scenario. Different teams will be working with different datasets that will vary in size, duration, and data points. Please refer to the further readings on BeachBoard for details regarding the raw gaze data entry and how it was collected.

Each participant has 6 .txt raw eye tracking data files associated, which were recorded from interacting with two different visualizations, namely “graph” and “tree” visualization.

For each visualization, 3 .txt raw gaze data files are generated. For example, p1.graphEVD.txt, p1.graphFXD.txt, and p1.graphGZD.txt are generated for participant named “p1” who interacted with the “graph” visualization; p2.treeEVD.txt, p2.treeFXD.txt, p2.treeGZD.txt are generated for participant named “p2” who interacted with the “tree” visualization.

See the eye tracking manual on BeachBoard for details regarding the EVD, FXD, and GZD files (p. 48-51). A summary is provided below.

EVD (Event Data)
This exports the event data for each recording. The following columns are created:

Data column	Description	
Time	The timestamp in ms indicating when the event occurred from the start of the recording	
Event	The type of event in text format. This can be either of the following:	
	Showslide	The command to show the next slide in a slide show has been received by the graphics board.
	Hideslide	The command to remove the active slide in a slide show has been received by the graphics board.
	Keyboard	A key has been pressed.
	LmouseButton	Left mouse button has been pressed.
	RMouseButton	Right mouse button has been pressed.
	TCPData	A trigger event has been received by ClearView.
	TCPKeyPress	A trigger keypress event has been received by ClearView.
	ShowAVI	The command to show the next AVI movie in a AVI stimuli has been received by the graphics board.
Event key	An unique identifier for each event type.	
Data 1	A data field for the event. The contents of this field vary depending on what type of event this is. See below table.	
Data2	As above.	
Description	A description of the event. The contents vary depending on what type of event this is. See below table.	

An example EVD file may show:

Event	Event Key	Data 1	Data 2	Description
Showslide	4	Slide number	-	Slide label
Hideslide	5	Slide number	-	Slide label
Keyboard	3	ASCII code for key pressed	-	Key name
LMouseButton	1	X mouse coordinate	Y mouse coordinate	-
RMouseButton	2	X mouse coordinate	Y mouse coordinate	-

FXD (Fixation data)

This exports one data row per fixation. The validity filter, eye filter and fixation filter settings are used to filter the data. Gaze data that do not belong to any fixation are omitted. The following columns are created:

Data column	Description
Number	A sequential serial number given to the gaze point
Time	The timestamp, in ms, for start of this fixation from the start of the recording
Duration	The duration, in ms, of the fixation
Screen X	The horizontal position of the fixation centre, measured in pixels from the left
Screen Y	The vertical position of the fixation centre, measured in pixels from the top

GZD (Gaze data)

This exports the raw gaze data from each recording with the columns below.

Data column	Description
Number	A sequential serial number given to the gaze point
Time	The timestamp, in ms, for this gaze point from the start of the recording
Screen X (left eye)	The horizontal position of the gaze point, measured in pixels from the left.
Screen Y (left eye)	The vertical position of the gaze point, measured in pixels from the top
Cam X (left eye)	The horizontal location of the pupil in the camera image, on a scale from 0 to 1
Cam Y (left eye)	The vertical location of the pupil in the camera image, on a scale from 0 to 1
Distance (left eye)	The distance from the camera to the left eye, in mm
Pupil (left eye)	The size of the pupil, in mm
Code (left eye)	The validity of the gaze data

Screen X (right eye)	The horizontal position of the gaze point, measured in pixels from the left
Screen Y (right eye)	The vertical position of the gaze point, measured in pixels from the top
Cam X (right eye)	The horizontal location of the pupil in the camera image, on a scale from 0 to 1
Cam Y (right eye)	The vertical location of the pupil in the camera image, on a scale from 0 to 1
Distance (right eye)	The distance from the camera to the right eye, in mm
Pupil (right eye)	The size of the pupil , in mm
Code (right eye)	The validity of the gaze data

7. Assigned Teams

Team	*Member*
1	Nagargoje,Shraddha Madhukar
	Nair,Suraj Bhaskar
	Drennan,Brian Stephan
	Ta,John Khanh
	Lawson,Eric Alexander
2	Kumari,Sarita
	Mao,Martin
	Szeto,Matthew Garrett
	Valdriz,Ryan Pagsanhan
	Yoon,San
3	Singh,Prateechi
	Shinde,Aniruddha Bhagwan
	Tubon,Celeste Angelique
	Sanchez,Javier
	Rodriguez,Marcos Samuel
4	Thakkar,Mit Rajen
	Schenck,Ian M
	Rowe,Kacy Matthew
	Nguyen,Brian Edison
	Johnson,Steven Robert
5	Saumya,Saumya
	Shetty,Adheep Vishwanath
	Regudo,Pamela Louise Repol
	Mahaut,Sylviana Mialisoa
	Pietruska,Kai
6	Gallardo-Hernandez,Jose Alberto

	Chao,Jimmy Lee
	Bhat,Anvita Satyanarayan
	Delgado,Sean Henry
	Chen,Xinyi
7	Khambhati,Monish Chetan
	Bae,Sella
	Aslam,Amaan
	Kapadia,Visajkumar Harshadkumar
	Kamath,Adithya Betoli Vijya
	Khodadoustan,Pardis