Human-centered Computer Graphics Mini Assignment 1

Processing eyetracking data and looking for patterns (20 pts)
Due Date: Oct 23rd, Friday, 5pm.
Please put your answers (incl plots) in a Word file, and slip the printout under the instructor’s door. Please use 12 point font. All graphs should be readable in printed form. If I can’t read your plots, I can’t grade you.

Part 1 Implement a function to process raw gaze data into fixations and saccades with the velocity threshold method. Report the threshold you used. (1 pt)

Your answer will be in the form of a diagram showing how your function performs on 998_fixationvid.

(a) First, plot all the gaze data points on a plot whose axes are 0-1680 and 0-1050. Label the fixation crosses A B C D E. (1 pts)

(b) Now, plot a new graph where the x-coordinate of the gaze point is along the vertical axis, and time is along the horizontal axis. All gaze points that belong to the same fixation should be marked with the same marker, e.g., a cross. Change the marker for the gaze points belonging to the next fixation, and so on. Mark the fixations by their text labels A B C D E. (1 pts)

(c) Plot the same graph but for the y-coordinate of the gaze point. Make sure that the time axes are synchronized for both these graphs. (1 pts)

(d) When you overlay, the plots of part (b) and (c) do the time points at which the markers change match exactly? If not, what steps did you take to debug? (1 pts)

Grading criterion: The x-coordinates for the graph in (b) should match the labeled locations in (a) for full points. Same for (c). All axes should be labeled, and there should be a legend on each graph. There are no partial points. (d) helps you debug so that you can get full points in all the parts. TOTAL = 5 pts

Part 2
Write code to compute the Normalized Scanpath Saliency score if one subject is chosen to be the test subject (your choice), and all others are used to generate the saliency map as described in class. Make sure to normalize the saliency map by subtracting the mean, and dividing by the standard deviation.

(a) For each frame in 998_fixationvid, compute the NSS score. Plot the NSS score on the vertical axis, and time on the horizontal axis. Report the average NSS score across all frames. (1 pt)

(b) Now, you will plot a new line on the same graph as (a), but with the time for your test subject reversed. Report the average NSS score. Is this average less than the average in (a)? Why or why not? (1 pt)
(c) Now plot the NSS score for each movie. Discuss in one-two line below each plot where NSS is particularly high or low and why. In other words, briefly interpret your graph. **(8pts, 1 pt per movie)**

(d) Report the average values for each movie in a table. Discuss which movie is highest scoring, and why do you think that is in one-two lines. **(2 pts)**

Grading criterion: If the NSS plot for (b) is always below (a), full points on (a) and (b). Presence of a graph gets you 0.5 points on part (c). Your interpretation earns you the remaining 0.5 points per movie. Creating a neat well-labeled table gets you 1 point in part (d). Your interpretation gets you the remaining 1 point. TOTAL = 12 pts

**Part 3**

Explore center bias. Create a centrally biased saliency map by generating a Gaussian fall off from the center of the map. Select the standard deviation to be such that the central third of the screen contains 95% of the distribution.

For each movie, plot the NSS score for the same test subject you used in Part 2, but with this centrally biased saliency map. Report the average values for each movie in a table. Discuss which movie is highest scoring, and why do you think that is in one-two lines. **(3pts)**

Grading criterion: Creating a neat well-labeled table gets you 1 point. Your interpretation gets you the remaining 2 points. TOTAL = 3pts