



CECS 450

Data Visualization

PHASE 1

PRESENTED BY:

TEAM 3

Goal of the project

To generate interactive visualization(s) of a given dataset that captures gaze behavior recorded during a human-computer interaction session.

Libraries Used:

1. Plotly
2. D3.js

QUESTIONS

1. What is the time duration of fixation?
 - When the user looks for too long, maybe the information was difficult to process
2. What is the fixation pattern over time?
 - What is the most important path of the user.
3. In which quadrants, does the fixation points lie the most?
 - If there is any area with more fixation points, then maybe less space is needed to display the information
4. Which fixation quadrants have the most click events?
 - How much is each quadrants viewed or clicked?

Data Preprocessing

Language: Python

1. In Gaze data, we deleted inconsistent data having validity code as 0 and 4 on each side and anything above 2 on both sides.

```
gaze_data = pd.read_csv("p3/p3.graphGZD.csv", names=['No.', 'Time', 'L_ScreenX', 'L_ScreenY', 'L_CamX', 'L_CamY', 'L_Distance', 'L_Pupil',  
                    'L_Code', 'R_ScreenX', 'R_ScreenY', 'R_CamX', 'R_CamY', 'R_Distance', 'R_Pupil', 'R_Code'])  
cleaned_gaze_data = gaze_data.loc[(gaze_data['L_Code']==0) & (gaze_data['R_Code']==0)]
```

2. Merged Fixation and Gaze data using Left Join on the column-Time.

```
fixation_data = pd.read_csv("p3/p3.graphFXD.csv", names=["No.", "Time", "Duration", "ScreenX", "ScreenY"])  
  
fxd_gz_data = pd.merge(cleaned_gaze_data, fixation_data, on=['Time'])  
fxd_gz_data = fxd_gz_data.drop(columns=['No._x', 'No._y'])  
fxd_gz_data.to_csv("fxd_gz_graph.csv", sep=',', index=False)
```

Data Preprocessing

3. Deleted “Event” and “Description” columns from Event Data.

```
event_data = pd.read_csv("p3/p3.graphEVD.csv", names=["Time", "Event", "Event_Key", "Data1", "Data2", "Description"])
event_data = event_data.drop(columns=['Event', 'Description'])
```

4. In Event data, we assumed that when the user uses the keyboard the camera loses the focus of the user’s eye. Thus, the data will return an incorrect reading.

```
mouse_event_data = event_data.loc[(event_data['Event_Key']==1) | (event_data['Event_Key']==2)]
mouse_event_data.to_csv("mouse_EVD_graph.csv", sep=',', index=False)

keyboard_event_data = event_data.loc[(event_data['Event_Key']==3)]
keyboard_event_data = keyboard_event_data.drop(columns=['Data2'])
keyboard_event_data = keyboard_event_data.rename({'Data1': 'ASCII_code'}, axis=1)
```

5. Merged Event and Fixation Data on “Time”

```
event_fxd_data = pd.merge(fixation_data, event_data, on=['Time'])
event_fxd_data.to_csv("graph_EVD_FXD_data.csv", sep=',', index=False)
```

Results from Data Preprocessing

No.	Process	Graph Visualization	Tree Visualization
1	Total Gaze Data Points	145095	31587
2	Total Fixation Points	7967	1564
3	Total Events	1061	277
4	Gaze_Fixation Merged Data Points	392	84
5	Event_Fixation Merged Data Points	5	1
6	Event_Gaze Merged Data Points	48	4
7	Mouse Clicks	892	173
8	Keyboard clicks	169	104

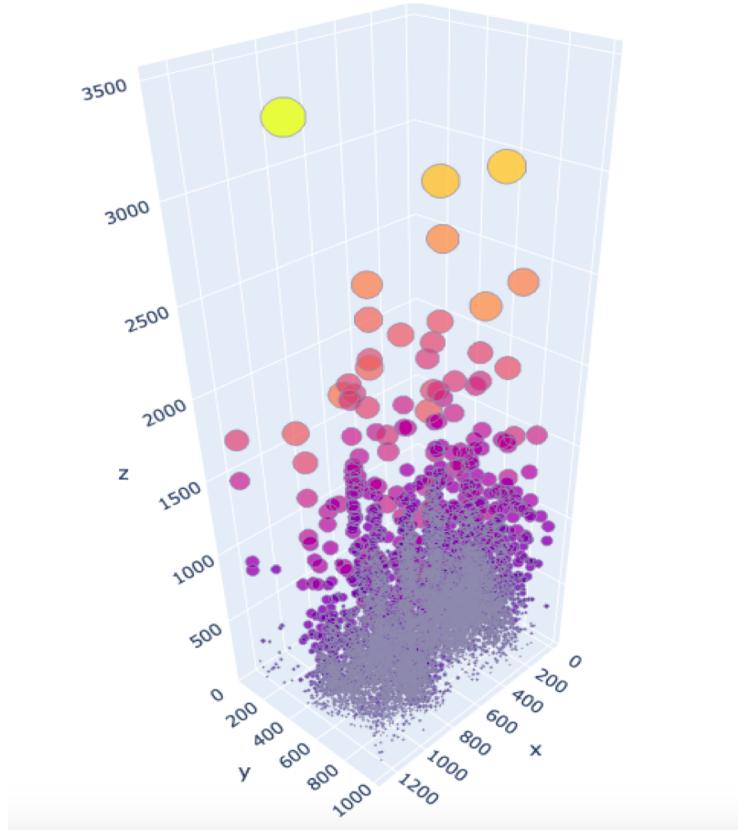
VISUALIZATIONS

Plotly

D3.js

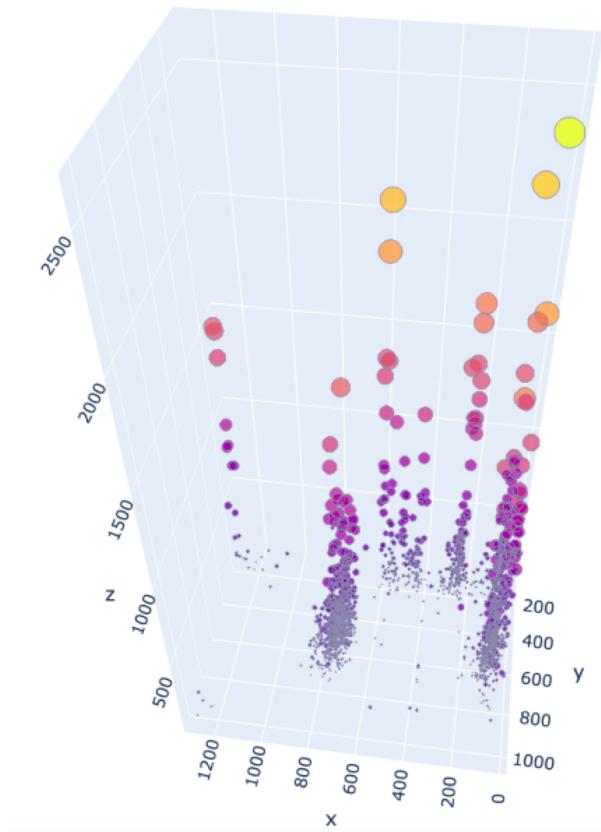
1.a What is the time duration of fixation? (Graph)

In this graph, we have plotted a 3D scatter plot using x and y-coordinates of the screen with duration on the z axis. The size and color of the data points is based on Duration of the data.

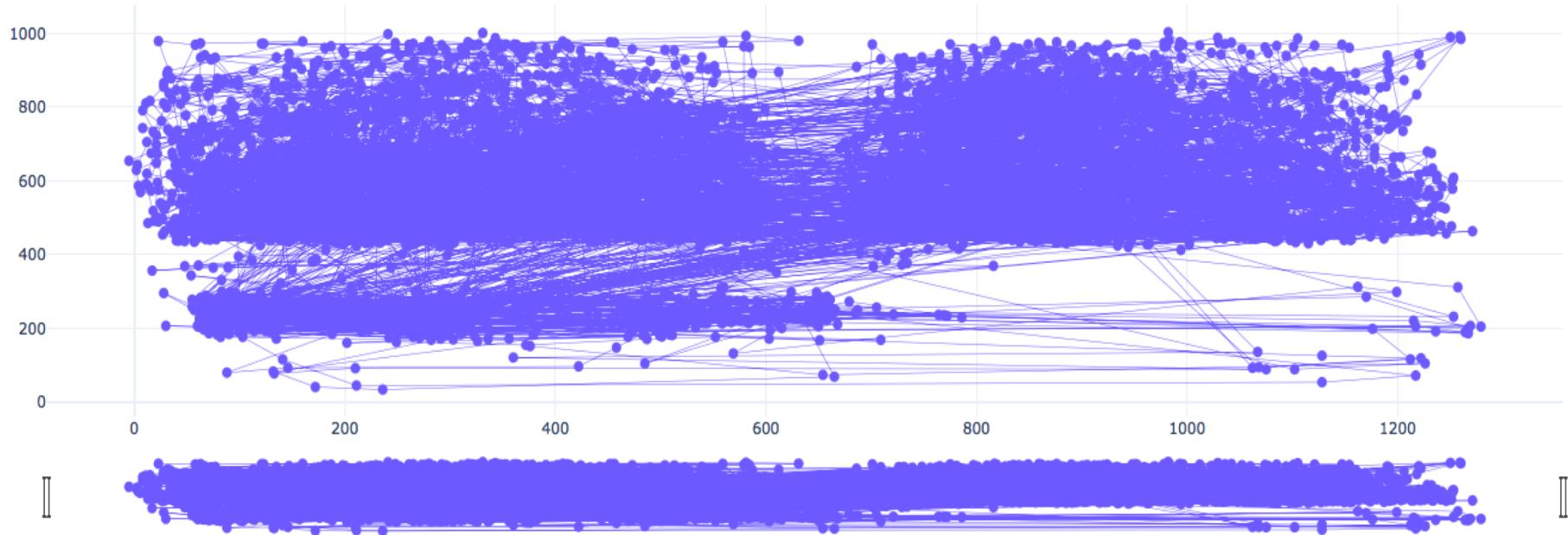


1.b What is the time duration of fixation? (Tree)

In this graph, we have plotted a 3D scatter plot using x and y-coordinates of the screen with duration on the z axis. The size and color of the data points is based on Duration of the data.

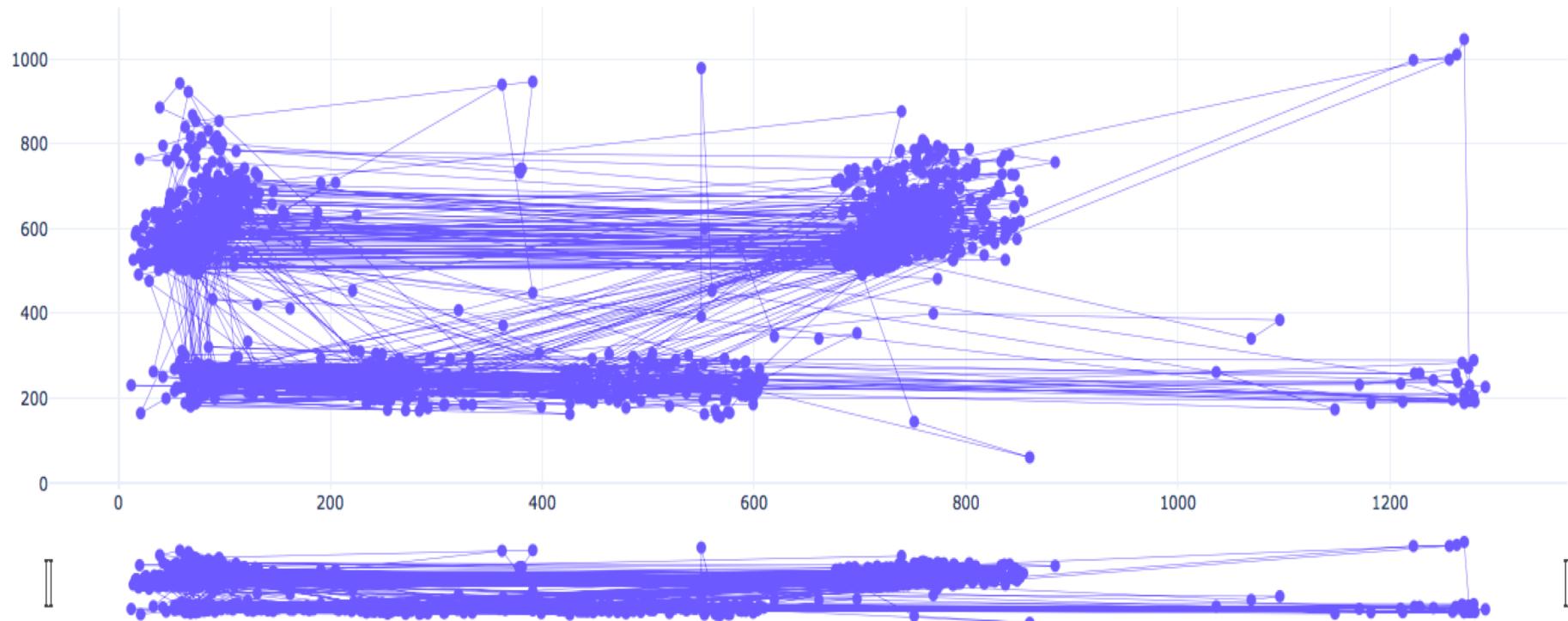


2.a What is the fixation pattern over time? (Graph)

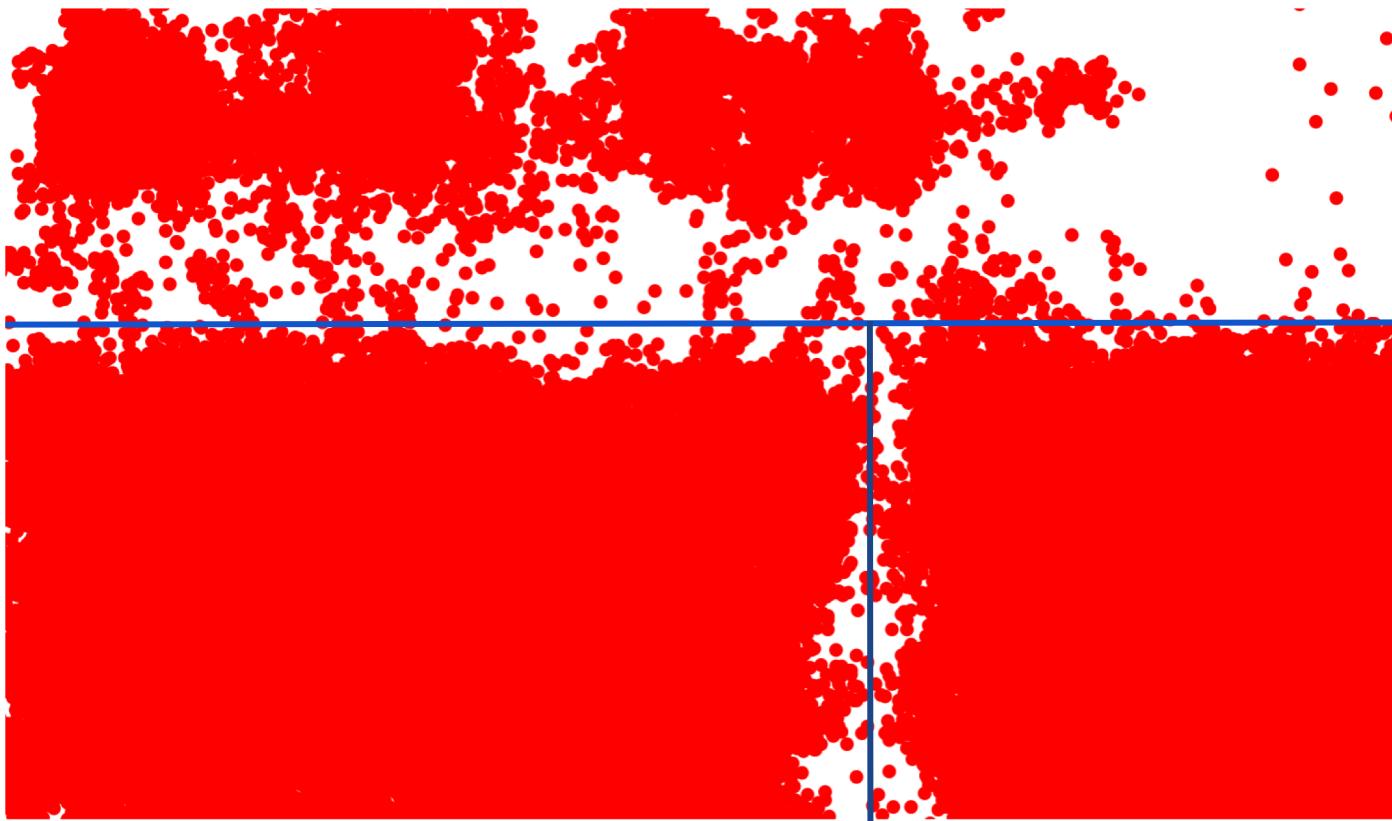


To find the fixation pattern pattern over time, we decided to plot the x data points v/s y data points along with a range slider.

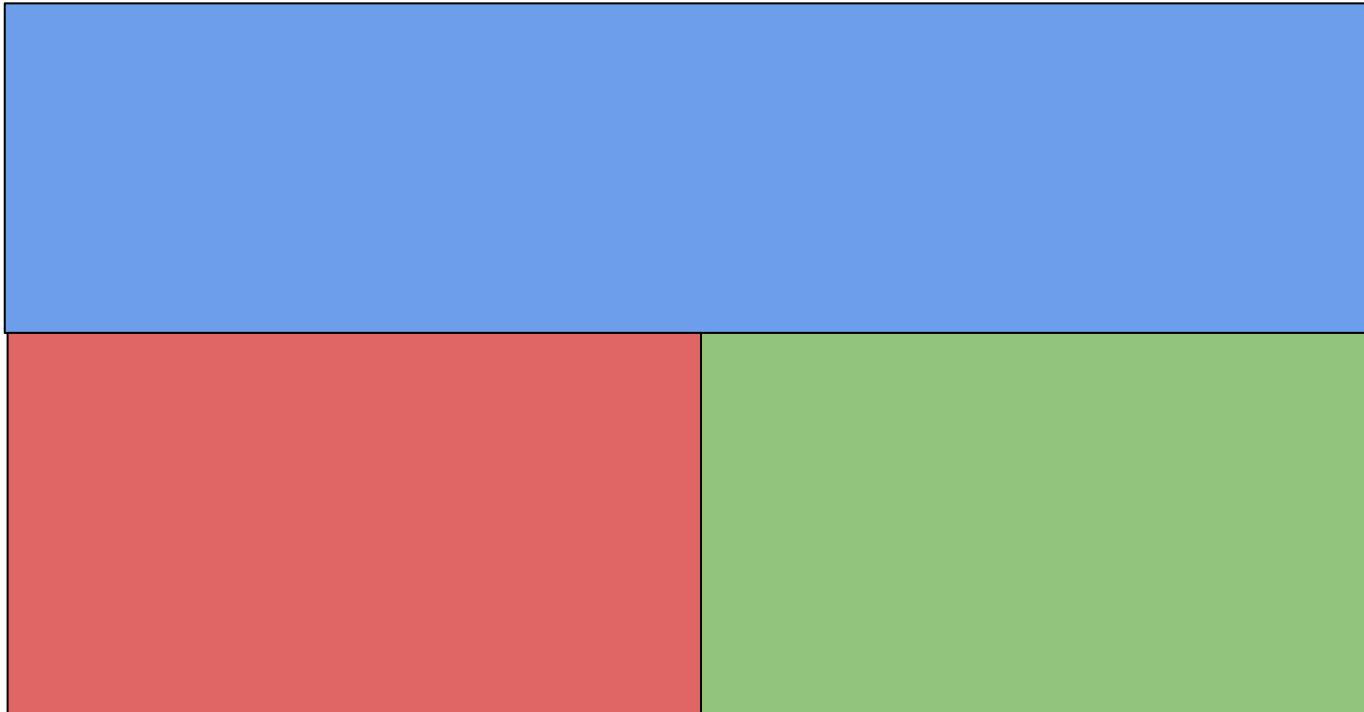
2.b What is the fixation pattern over time? (Tree)



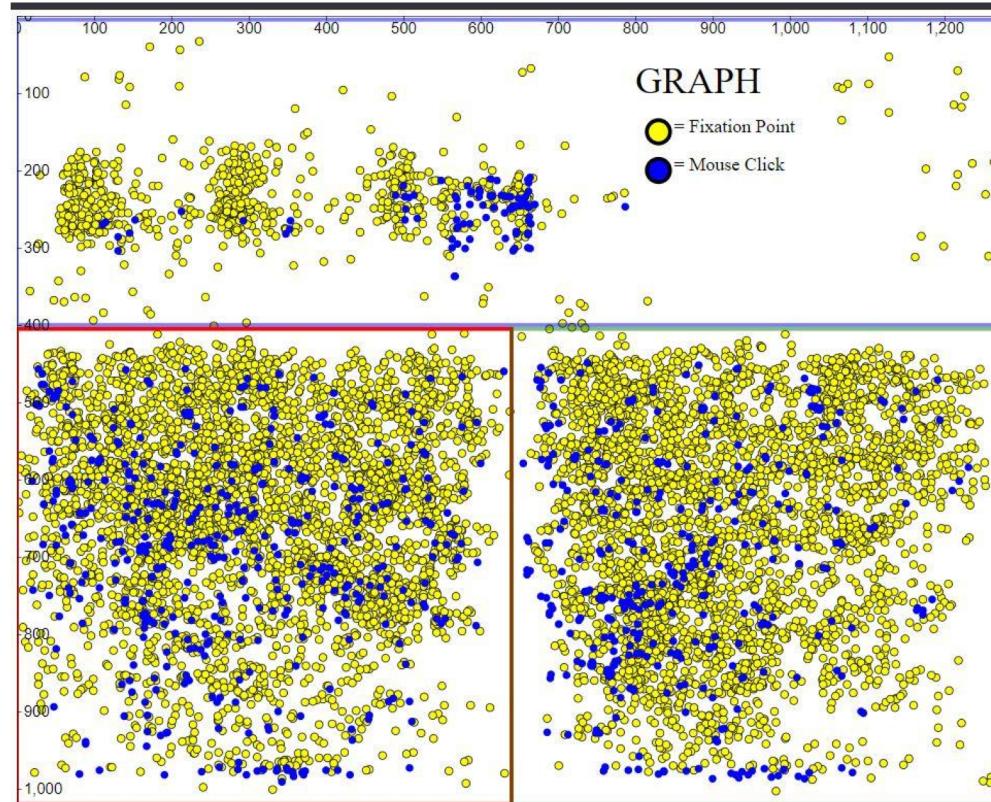
Finding divisions



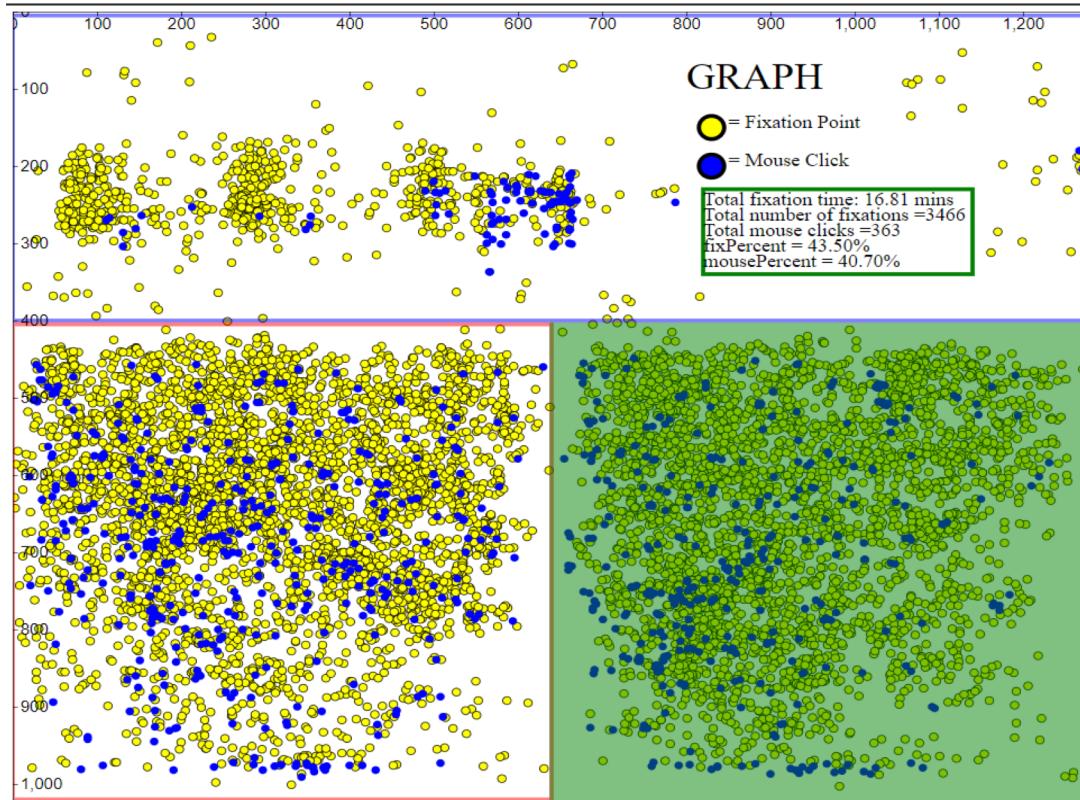
Planned visualization Divide the screen into quadrants



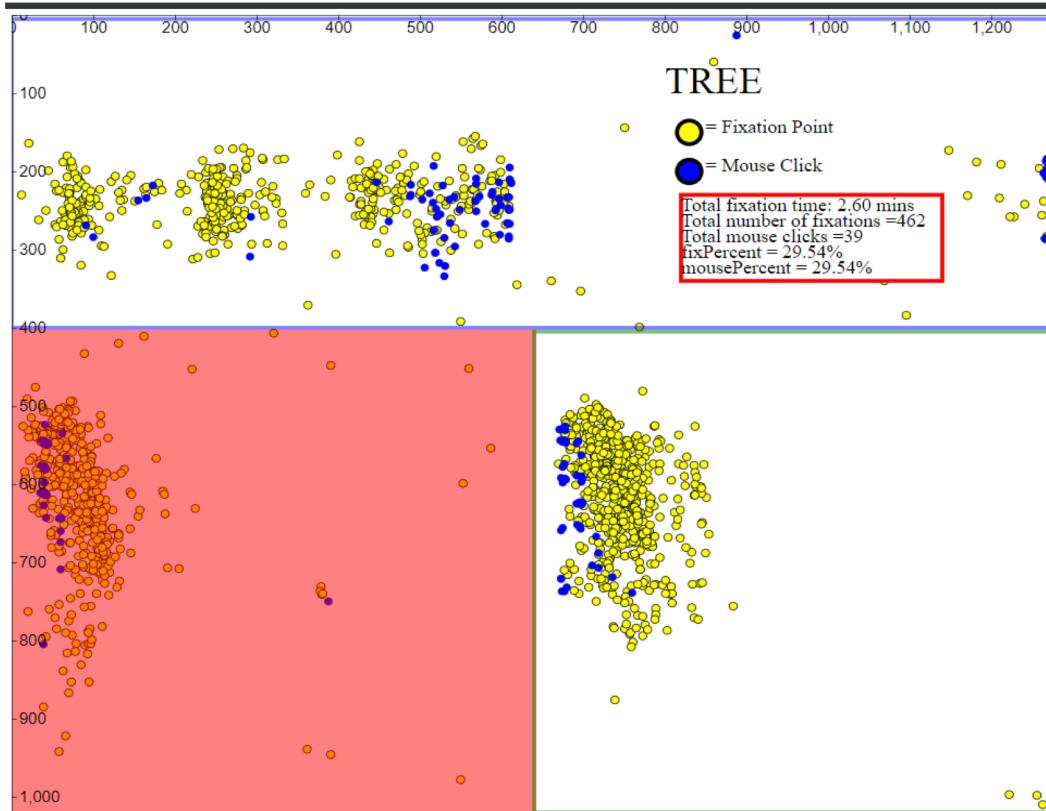
Combined View of Fixation Points and Mouse Clicks



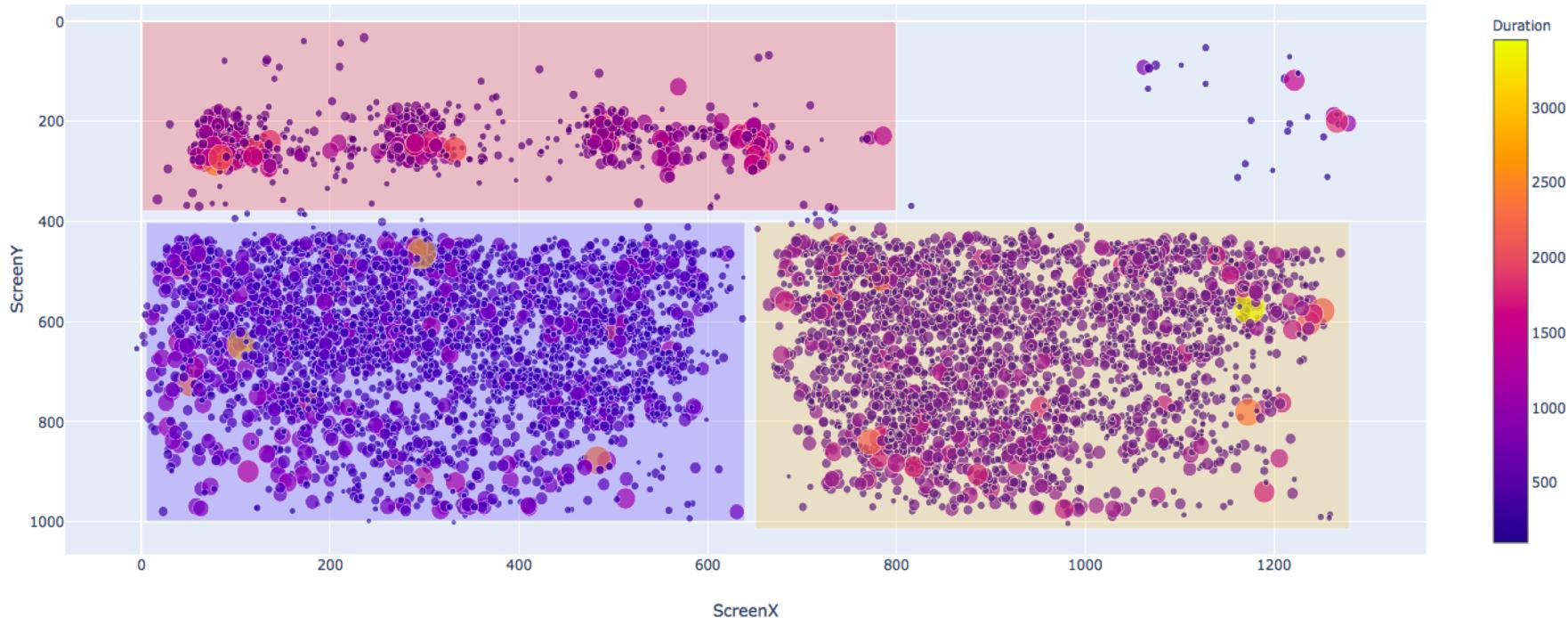
Which quadrants have more clicks/fix and percent?



Which quadrants have more clicks/fix and percent?

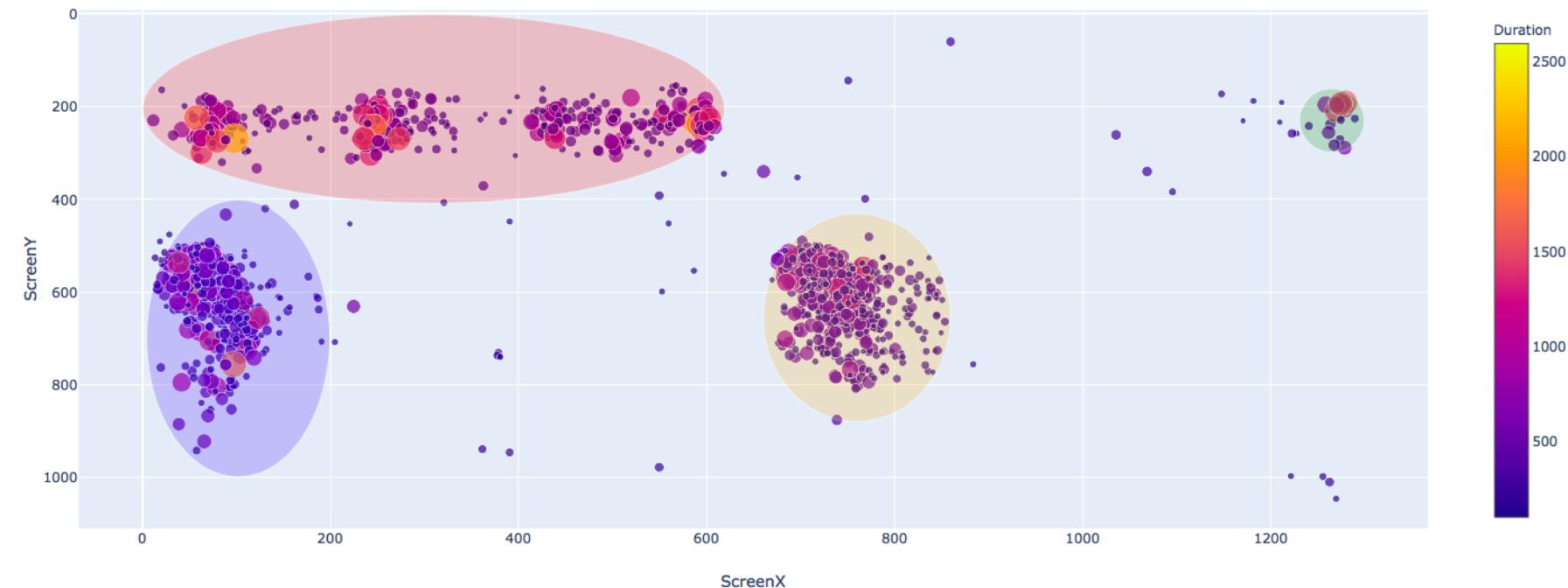


3.a In which quadrants, does the fixation points lie the most? (Graph)



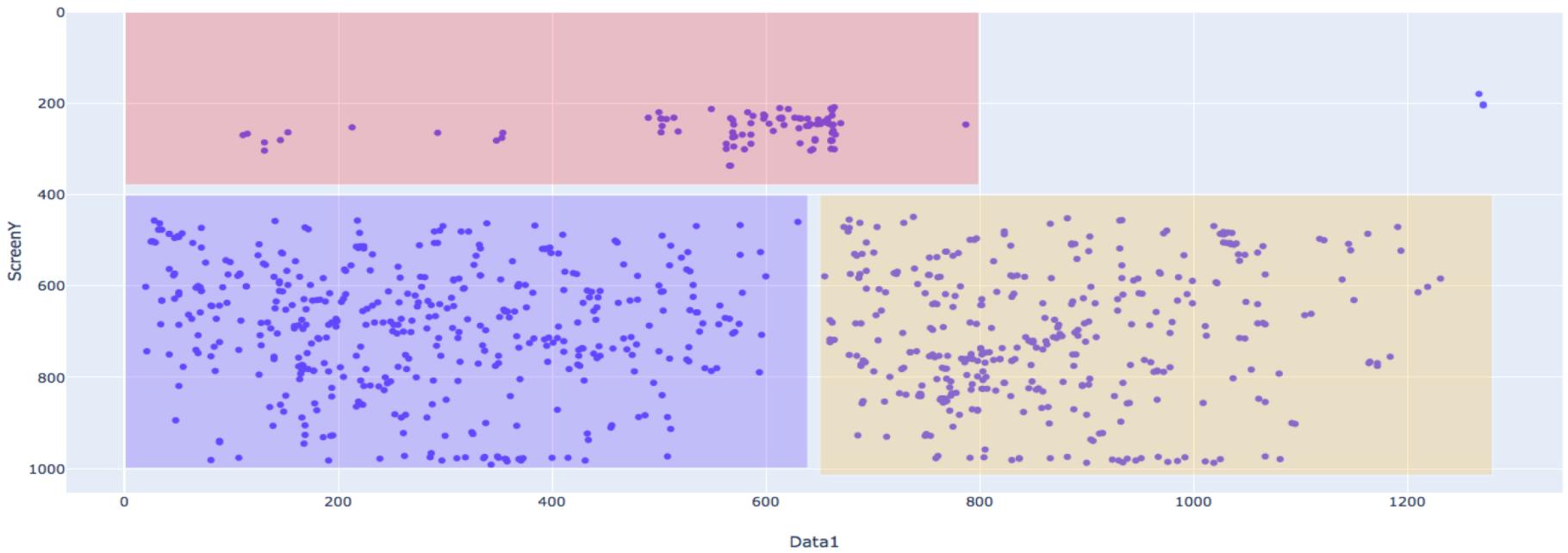
Each quadrant has fixation points based on their duration. The bottom left has more fixation points with more duration than the rest.

3.b In which quadrants, does the fixation points lie the most? (Tree)



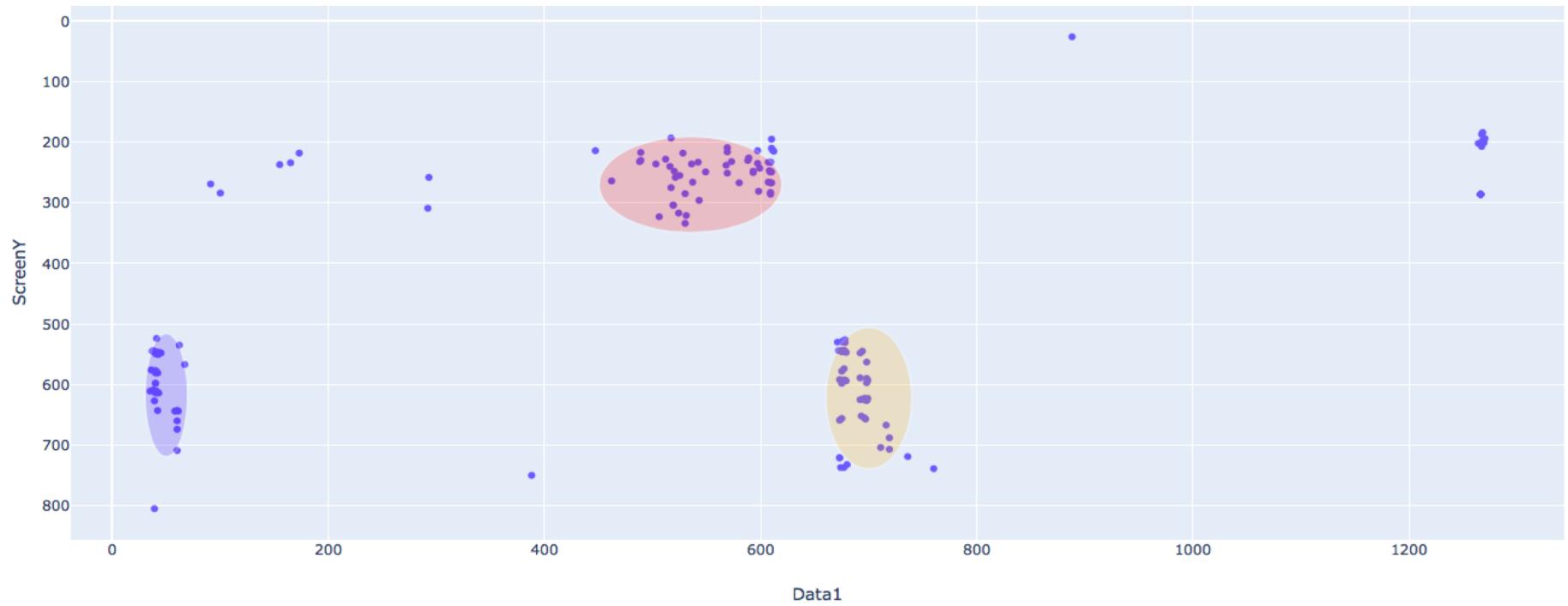
Each cluster has fixation points based on their duration. The clusters were created using Clustering technique in plotly.

4.a Which quadrant has more click events? (Graph)



Each quadrant has click events. The bottom left has more click events than the rest.

4.b Which quadrant has more click events? (Tree)



Each cluster has click events. The top cluster has more click events than the rest.

Contribution

Prateechi Singh	Questions Selection, Data Preprocessing, Generating graphs through Plotly, Presentation
Aniruddha Bhagwan Shinde,	Questions Selection, Generating graphs through Plotly, Presentation
Celeste Angelique Tubon	Questions Selection, Graphs explorations
Javier Sanchez	Questions Selection, Generating graphs through D3.js
Marcos Samuel Rodriguez	Questions Selection, Generating graphs through D3.js, Presentation

THANK YOU