

## Assignment 5 CSE 5544

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In this assignment, we extend the EHR data temporal analysis performed in assignment 3. We extend the baseline graph from the previous assignment where all the encounters are color-coded based on medical condition revealed. We still have the ordering functionality where y-axis or the Patient IDs are sorted based on four different criteria ('ID Number', 'First Encounter before TBI', 'Position of TBI', 'Number of Encounters'). But in addition to this, we also introduce glyphs that represent A->B type occurrences in the encounter timeline for each patient, where A is injury (or medical condition) and B is another medical condition such that A precedes B on the timeline. Another thing to notice here is that B might not immediately follow A and there might be some encounters that fall between A and B. When the code identifies A->B it draws the corresponding glyph over the last A encounter before a B encounter. (for example, in the figure below the first 'cross' for patient 382268 occurs over the last dark blue block, and not the first one).

The image below shows an example of Vision -> Headache and Headache -> Vision type of relationships. The 'dot' represents the Headache->Vision and 'cross' represents Vision->Headache. It can be observed (red circle) that the first patient '382268' had multiple headache and vision issues.

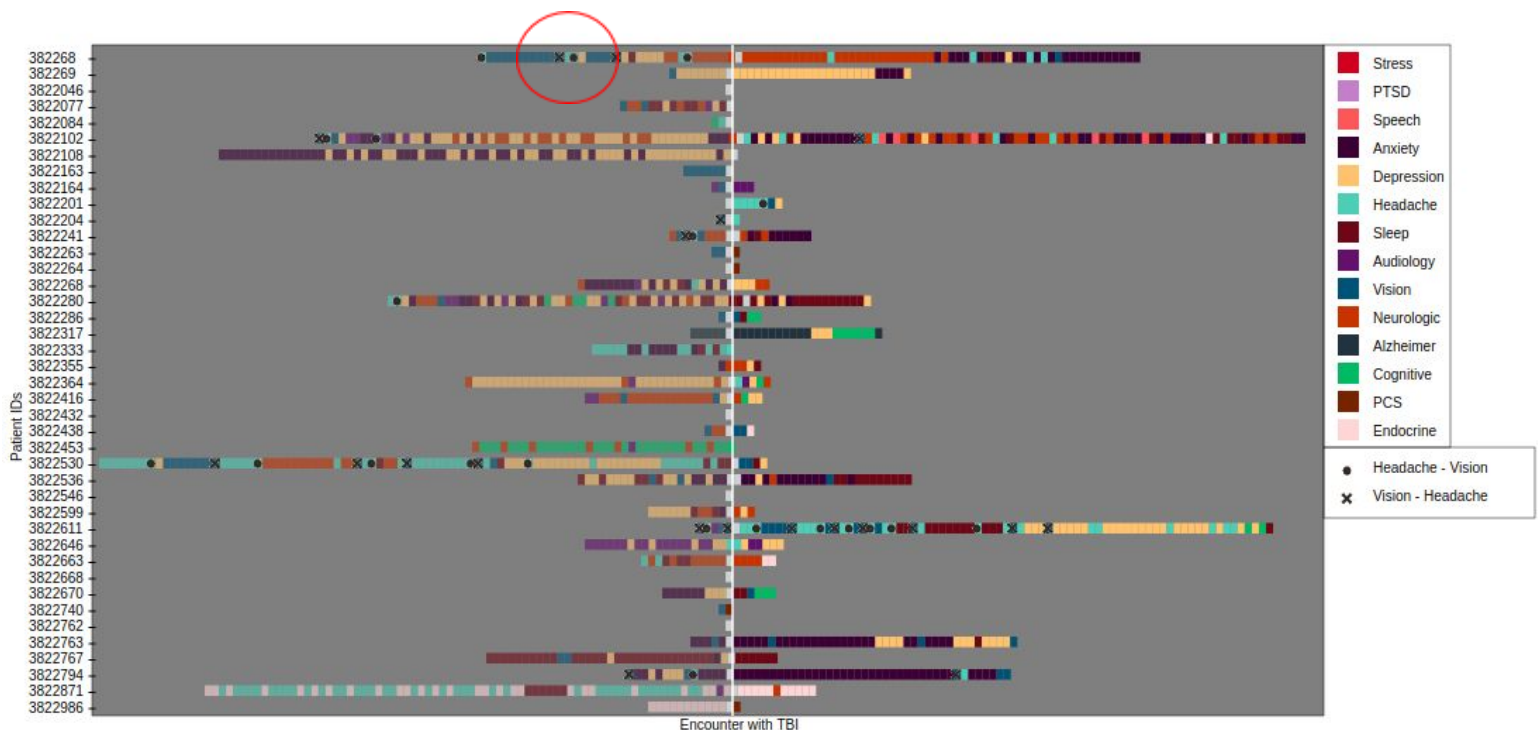


Figure1: Output for Vision-Headache and Headache-Vision

The main difference between this and the previous assignment is the involvement of the user. The last assignment had hard-coded constructs (like 'ordering of patients' and 'incremental increase in block size') but this 'tool' lets the user enter the custom A->B pairs

(up to 16). The figure below shows an example where the user provides 8 pairs (given in the legend-box on lower right corner).

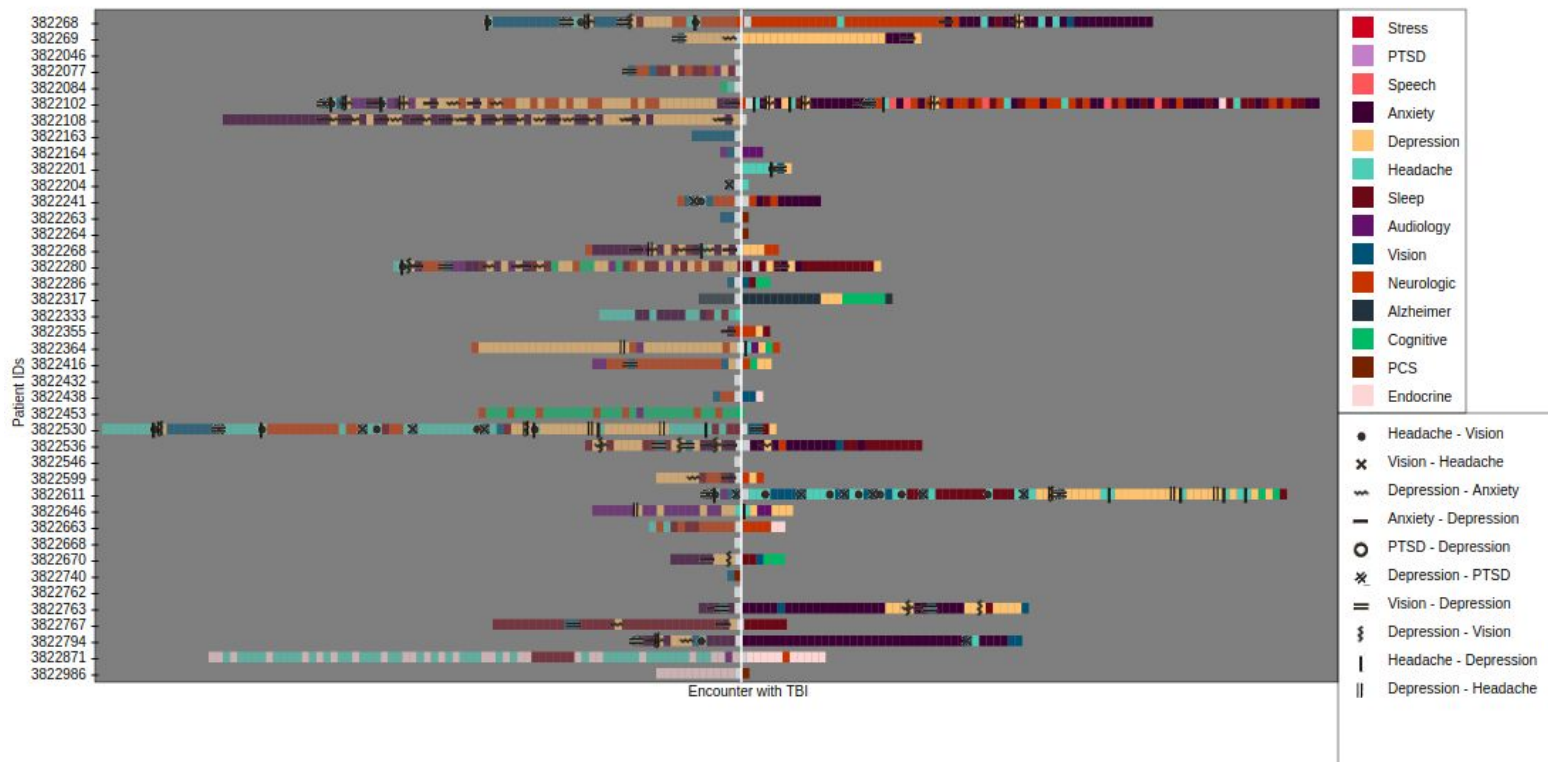


Figure2: Output for 10 different A->B pairs.

## Pre-processing

The pre-processing of data and computation of glyph positions have been coded in the same javascript file (please find glyph\_dict in the baseline.html and extra.html files)

## Critical Evaluation

This visualization lets the user focus on specific relations. For instance, consider two closely related medical conditions Headache and Visual problems. The figure below shows the plot where A->B corresponds to 'Headache-Vision' for 'dot' and 'Vision-Headache' for 'cross'. This figure shows us that almost all the patients who show these patterns have more 'crosses' than 'dots'. This tells us that Vision issues are lead to Headaches.

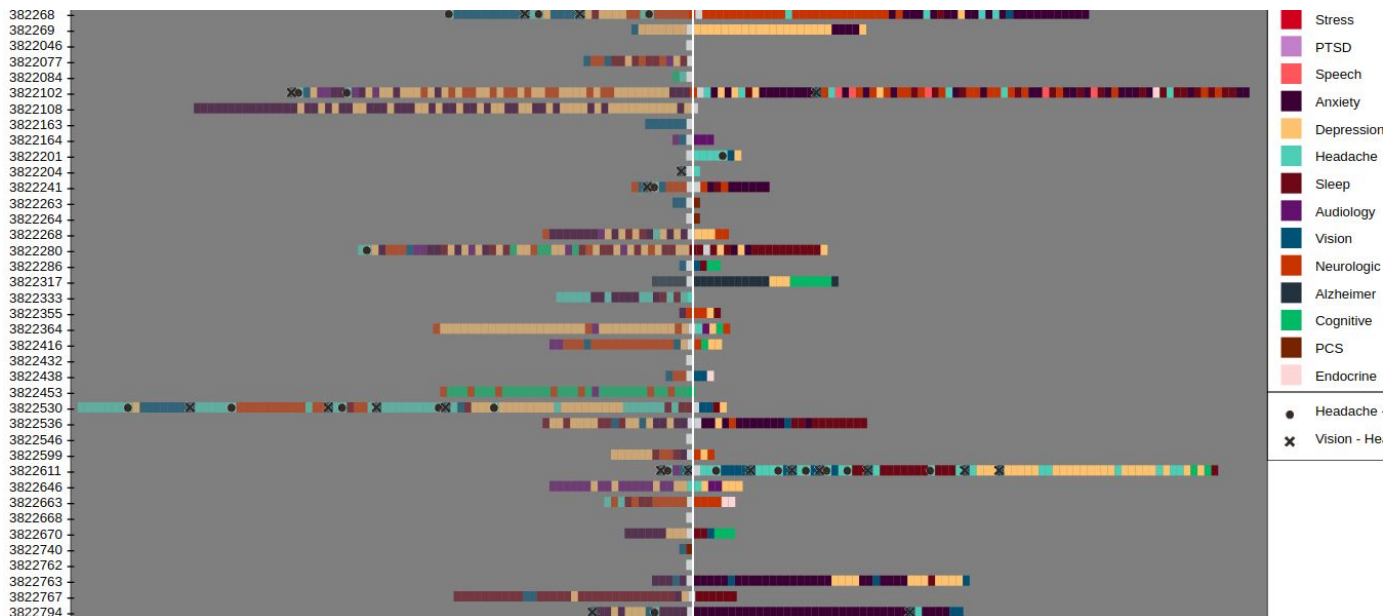


Figure3: Analyzing headache and vision.

Another interesting observation is the Anxiety-Depression relationship. The figure below shows a similar plot for Anxiety-Depression and Depression-Anxiety. The plot shows that most patient that have Depression also have Anxiety. This is true if any patient that has Depression has either a 'dot' or a 'cross' on the timeline.

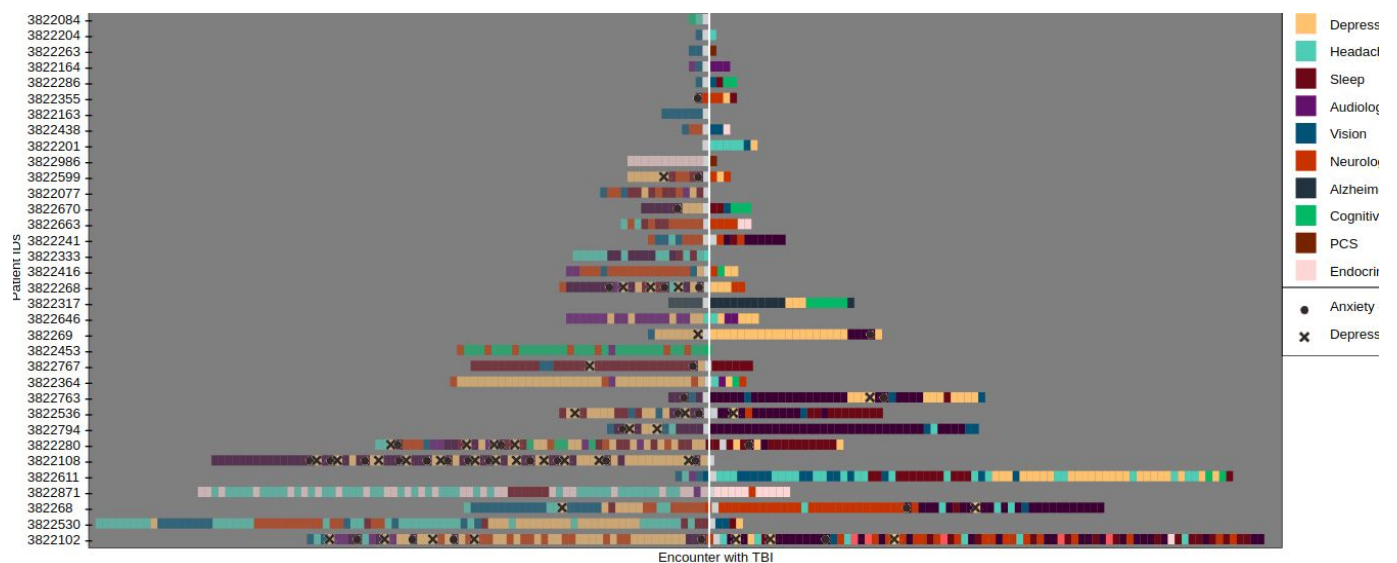


Figure4: Analyzing Anxiety-Depression (sorted by number of encounters)

Pros:

- This visualization gives more control to the user. Now user can focus on specific things (just like the analysis above).
- User can choose the complexity of the plot. This means that the user can either analyze one relationship at once or can go as high as sixteen.

Cons:

- Some glyphs might overlap on each other which makes the analysis difficult.
- This approach is computationally expensive (especially when we are analyzing A->B->C or something even more complex).

## Extra Credit

The extra credit portion of the assignment is in file extra.html. This is exact interface with an added text box that takes input from the user instead of text file.

The figure below shows an example of this.

### Select Y-Axis Ordering

ID Number | Earliest First Encounter before TBI | Effective Position of TBI in the timeline | Number of Encounters

### Incremental size

[Click here](#)

### Enter the input

Vision Headache  
Headache Vision

