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Final Project Revision

Project Scope and Prioritization

I completely agree with the reviewer's concerns about the scope of the project, and their feedback confirmed my fears that I've taken on too much for a semester project. Because this is an ongoing project for work, I would like to include everything I originally planned at some point, but perhaps overestimated my Shiny programming skills. The reviewer's prioritization scheme is much appreciated, and I have incorporated some of their suggestions in my plan. The aggregate glucose profile (AGP) is certainly the most important part of this visualization, as it is the global standard across every continuous glucose monitor (CGM) platform I've seen. I have discussed it at length with clinicians at the BDC, while time in range (TIR) is a relatively new metric in diabetes and I am significantly less familiar with it. Eventually I would like to include some TIR visualizations, as I anticipate it may replace HbA1c as the gold standard diabetes outcome measure. Unfortunately, I have not been able to discuss TIR visualization ideas with any clinicians though, so this is by far the weakest part of my plan. As a result of this feedback, I will prioritize development as follows:

1. AGP line plot with cohort average, no options
2. AGP radial plot, no options
3. Summary table
4. AGP options and interactions
5. Scented widgets for summary table
6. Demographic information
7. AGP small multiples
8. TIR plots
9. TIR small multiples

Compare Tasks

I did a really poor job of explaining the comparison task, and did not provide enough clinical background in my descriptions. In general, glycemic control is well-defined and patients should be between 70 – 180 mg/dL (although this range does differ depending on disease state). So the ability to highlight specific patients or split the AGP into small multiples is meant to facilitate the comparison between each patient and "normal" glucose patterns, as opposed to comparing patients directly. The idea was that these features would allow a clinician to see how a group of patients are doing in general, and then to drill down on a select few patients rather than comparing individuals. However, I agree that perhaps small multiples are not the best choice for this task, which is why I have moved them down on the priority list. The ability to highlight/select lines on the AGP allows for this sort of drilling down, but it would be worthwhile to talk about this in more depth with clinicians, in order to better understand the tasks they need to accomplish with TIR.

It's also possible that this tool could be used to compare multiple CGM data exports for one person, in which case the comparison would be between the AGP for one time period compared to another. For this task the small multiples would be much more useful, although it isn't clear how often clinicians would use the tool this way.

Finally, while the idea of prediction bands is interesting from a statistical point of view, this would likely be confusing and unhelpful to most clinicians.

Layout

The reviewers suggestion regarding placement of navigation bars is incredibly helpful, and not something that I put much thought into when drafting the design. I will certainly try to group the navigation bars together, and to label everything in a more intuitive way that will be easy to interpret. After this class has concluded, I am planning on conducting some user testing with the clinicians I work with in order to get additional feedback. And if possible, I would like to test the visualization with diabetes clinicians unfamiliar with my previous work, in order to gauge how intuitive the tool is for new users.

Device Accuracy

This is part of the visualization that I actually decided against between the initial proposal and revision. It quickly became clear that getting accuracy data from CGM companies would be difficult (the reviewer is correct that the data I have is not adequate, so I should have been more clear about the fact that accuracy data would essentially be a second dataset). Also, I was concerned that an accuracy band for each patient would clutter the AGP unnecessarily. It's my impression that clinicians generally consider all CGMs equally accurate (or equally inaccurate as the case may be), so this aspect of the tool was clearly irrelevant, and I completely agree with the reviewer that it shouldn't be included.

Additional Notes

Another classmate agreed to provide additional feedback on this design and pointed out a glaring omission in my design: the lack of any demographic variables. This is slightly more difficult to incorporate than one might expect, since the raw CGM data exports generally don't contain any demographic variables. So, I would need to add the ability to upload an additional dataset that links to the CGM data by patient ID. This functionality would likely be more useful for clinician scientists doing exploratory data analysis than it would for day to day clinic use, but one of the major goals of this project is to build a useful and open source research tool. If time permits, I will include the ability to encode demographic variables (sex, race, etc.) on the AGP using hue. This is the simplest possible implementation, but I would like to continue working on including demographics as the project continues. However, it's important to discuss these attributes with clinicians before adding too much to the tool.