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Final Project Description

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*cgmanalysis Shiny App*

Domain Description

Continuous glucose monitors (CGMs) are devices that people with diabetes wear which measure blood glucose (BG) every 5 – 15 minutes. Use of CGM has increased dramatically over the past 15 years or so, because they allow physicians to monitor free living glucose patterns throughout the day and provide significantly more information than traditional fingerstick BG measurements. In some age groups, as many as 50% of patients regularly wear a CGM2.

However, there are several companies competing in the CGM market (Dexcom, Abbott, and Medtronic seem to be the most popular) and each company has gone through multiple development cycles. Each company also reports different glucose summary statistics (e.g. time in range 70 – 180 mg/dL vs. time in range 70 – 140 mg/dL), and the algorithms for their analyses are proprietary. This can be frustrating for diabetes researchers and physicians, as it makes comparing patients across devices difficult.

As part of my work at the Barbara Davis Center (BDC), I’ve developed an R package for cleaning exported CGM data and generating summary statistics. The idea is that because the package is open source and works on all the major CGM systems, researchers and physicians can see how the summary statistics are calculated and know they are computed the same way across all devices. However, using R is a rather large barrier to many people who would otherwise find the package useful, and the plots it currently generates are not very good. So, I would like to convert the R package into a Shiny app that provides diabetes physicians and researchers with interactive visualizations and summary statistics, in order to make it more useful to those without programming experience.

Dataset

One of the physicians I work with at the BDC has provided me with 51 Dexcom, 51 Libre, and 50 Medtronic CGM exports from his research participants. Each CGM export is a small CSV spreadsheet, and all together the data only takes up 375.4 MB. We are working on getting additional data from the Senseonics system as well, although this may not happen in time for this project.