Project overview - Spring 2020

Project summary:

For this group project, we were interested in exploring new techniques for analyzing and representing data. While significant work has been done to develop ways of visualizing data, few people have looked into methods involving our other sense (e.g. sound and touch).

As should always be the goal at The Hacker Within, we were hoping that this project would provide us with fun ways to combine our passion for coding with our curiosity of all things computer/science/math. Certainly we could use this project to learn more about things like front-end development, database management, and machine learning, but it will also give us the opportunity to create some fun products. Printing 3D objects, composing music, and building robots are just a few of the many possibilities!

Goals:

- **(short-term)** have at least one alternative representation of a data set of our choice (one piece of music, one 3D printed object, etc.)
- **(short-term)** develop a prototype app that handles data I/O and pre-processing, and organizes the conversion of data into various representations
- **(long-term)** have a publishable website that lets people input any data that they want, then provides outputs for different representations (mp4 files, CAD files, etc.). Essentially, a production-ready version of the prototype described in our short-term goals.
- **(long-term)** a poster and/or a department article to help showcase our work increase the campus-wide visibility of THW.

Project sub-groups:

Front-end:

The front-end team would obviously be in charge of the app/website development, and is a good place for people who are interested in all things front-end (web/app development, UI/UX design, graphic design, etc.). This team will most likely be coding-heavy (more writing code, less working with data), and will require good communication with the other sub-groups to make sure that our app/website interfaces smoothly with each of the back-end tools that the other groups will be developing.

Audio representation:

This group will focus on researching and experimenting with different ways of using sound to represent data. Could you use different tones to describe the variances in different dimensions of your data? Maybe gaps of silence could be used for distances between clusters in the data? This will be one of the back-end development teams; you will be writing the drivers for extracting information from data and generating audio files.

Physical representation:

As above, but using tangible objects instead of sound. This group would be ideal for those of us who miss getting to build things with our hands; 3D printing and robotics are two obvious routes, so this would be the perfect place to start learning those skills! This group also has the opportunity to combine multiple representations (for example, building an Arduino/Pi-based tool that uses sound, light, AND motion).

Visual representation:

Data visualization is a hot field right now, and many people in THW have expressed interest in this. The visualization team would be looking into the cutting-edge visualization algorithms and learning to apply them to our data. If our goal is to make a website for exploring data, then it's absolutely essential to have visualization as one of the options.