Project Portfolio

Abstract: The following listings contain brief descriptions of projects I've worked on and links to access them. This is, of course, not a comprehensive list but it contains a few highlights.

Music genre classification using artificial neural networks:

This group project was completed at the end of my STAT 5810: *Theory and Application of Deep Learning* course. Using three-second audio clips, we trained a neural network to classify music into one of ten genres. My major contributions to the project included feature extraction with Python's **librosa** module and network design using the **tensorflow** framework. Click here to see the paper.

Predicting legislature structure using development indicators:

This group project was completed at the end of my STAT 5650: *Statistical Learning and Data Mining* course. This project combined my interest in machine learning with my interest in political science. My portion of the project focused on using World Bank development indicators to classify a country's legislature into one of two categories: unicameral or bicameral. Using **R**, I built a web scraping app to gather data. Sparse data complicated the analysis, so an imputation method based on PCA was used. Models were built using algorithms such as the **SVM, random forests, classification trees, boosted trees,** and various **regression** models. Click here to see the project.

Scientific computing software manual

As part of my MATH 4610: *Fundamentals of Numerical Analysis* course, I implemented over 45 algorithms for tasks involving root finding, matrix generation and decomposition, vector operations, error computation, and plotting. Algorithms were implemented in **Java** or **Python**, depending on the nature of the task. Click here to access the software manual.

The effects of candidate demographic on voter turnout

This project predicted voter turnout based on candidate race and gender. Control variables included how competitive the election was and whether there was an incumbent running. GINI coefficient was also included as a proxy for district demographic, but future research must include more of these controls. For example, a better model would describe more demographic characteristics of each district. A poster summarizing the findings of this work was

presented at **UCUR** in 2019 and was accepted for presentation at **MPSA,** though the conference was cancelled due to COVID-19. Click here to see the poster.

Gay Lynn Bennion Campaign Website

While interning for Gay Lynn Bennion's campaign, I taught myself **HTML**, **CSS**, **Javascript,** and a tiny bit of **PHP.** I quickly learned and applied these tools, building a new website for the campaign when the previous web designer quit. Though subsequent computer science courses have shown me that my code is incredibly inefficient, I'm including this project for two reasons. First, the completion of the project shows an ability to quickly learn and apply new information. Second, the project sparked an interest in computer science and its associated fields which led me to machine learning. Click here to check out the website.