CS486C – Senior Capstone Design in Computer Science

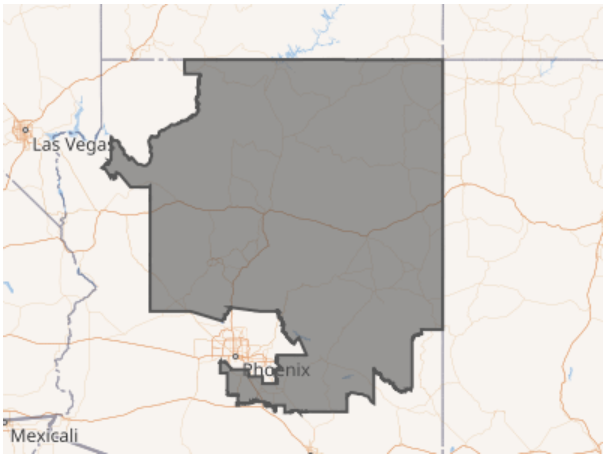
Project Description

Project Title: Unbiased Congressional District Algorithm	
Sponsor Information: NAU NORTHERN ARIZONA UNIVERSITY Civil and Environmental Engineering	Bridget Bero, PhD, PE NAU CECMEE Bridget.bero@Nau.edu

Project Overview:

The problem: One of the most critical components in a healthy democracy is the citizens' ability to be represented by their vote. Over the past several years, this has become problematic as political parties in power at a certain time are allowed to redraw the voting districts, and they generally do this to favor their own party's success in the next succeeding elections. This became called "gerrymandering" which is a combination of an individual who pioneered the process – named "Gerry" – and the fact that the voting districts sometimes looked like a salamander when the redistricting process was completed.

While there are good examples around the country, one of the best is the voting district currently being used for voters in Flagstaff. This covers most of northern Arizona but goes south and curls around Phoenix, generally favoring the political party that most recently implemented the redistricting process. Notice also the unusual shape of the west side of the district.



The sponsor is a citizen who believes that this may not appropriately represent the voting characteristics of our local community and recognizes that this kind of voting management is conducted all around the United States. Gerrymandering has become so acute that it has been in the news recently. There are currently lawsuits in Alaska, Maryland, New York, North and South Carolina, and Ohio, and in fact, more than 25 states at some level.

Since voting outcomes are driven by these legislative districts rather than by a simple majority across the states, there are areas in the country where some voters do not feel represented in their district as a result of these practices.

The final piece of the problem is, how then can a state or a country fairly represent the will of the voters in the redistricting process?

An idea: While it could be very challenging, an algorithm that considers the population in a given area, sets boundaries in a more consolidated – and less salamander-like – form, and fairly represents the citizens living in a given region of a state. This would involve consideration for population density (i.e. how many citizens in a given area), reasonable perimeters that are minimized for fixed numbers of a population, and more broadly fair representation of the citizens in the given region. Obviously, there are many more variables to consider.

The work: The first and most important part of the project would be to model voting regions around the country. Identify through research natural boundaries such as city limits, state borders, and even geographical considerations (e.g., rivers, mountains, lakes, etc.). Creating this model would be a significant part of the project.

And then: The next part of the project would be to put together a web-based interface that could be used by state leaders to create at least a rough first-level district organization in a given state. This might start out as a graphic representation but should include specific perimeter points possibly by longitude and latitude or as mentioned previously, by alignment with geographic, city/county/state, or other appropriate boundaries.

Because: As noted previously, current practices are leading to voting districts not being mapped in a way that fairly represents the voting population. A product such as the one proposed could make a significant difference in the continued success of our democratic form of government. That's serious.

Knowledge, skills, and expertise required for this project:

This is a unique challenge that represents the best of what can be achieved through Computing Science. The practice of researching the parameters, modeling a solution, and putting into action is a challenge worth attempting.

SKILLS NEEDED:

- Researching current status of apportioning congressional districts and understanding the impact of gerrymandering on voting/voting rights.
- Modeling several representative districts in states across the country looking for natural and/or consistently fair and representative voter recognition
- Developing the web-based program that effectively applies the modelling to a specific voting district
- Representing the voting district in appropriate consumer orientation so that the proposed redistricting regions are easily understood by the voters and program users (i.e., high-quality User Experience)

Equipment Requirements:

This project is more related to research and Computing Science functionality and modelling

- There should be no equipment or software required beyond development platform(s) and software/tools that are freely available

Software and other Deliverables:

The outcome of this project would be an easy-to use product that can accept data in an appropriate form to support the modelling of the voters in a given region within a state, and from there, provide an effective presentation of the data needed to implement the voting district

- A strong as-built report detailing the design and implementation of the product in a complete, clear and professional manner. This document should provide a strong basis for future development or upgrading of the product

- Complete professionally-documented codebase, delivered both as a repository in GitHub, BitBucket, or some other version control repository; and as a physical archive on a USB drive

- Effective and appropriate instructions for applying the software product to the above-specified redistricting task