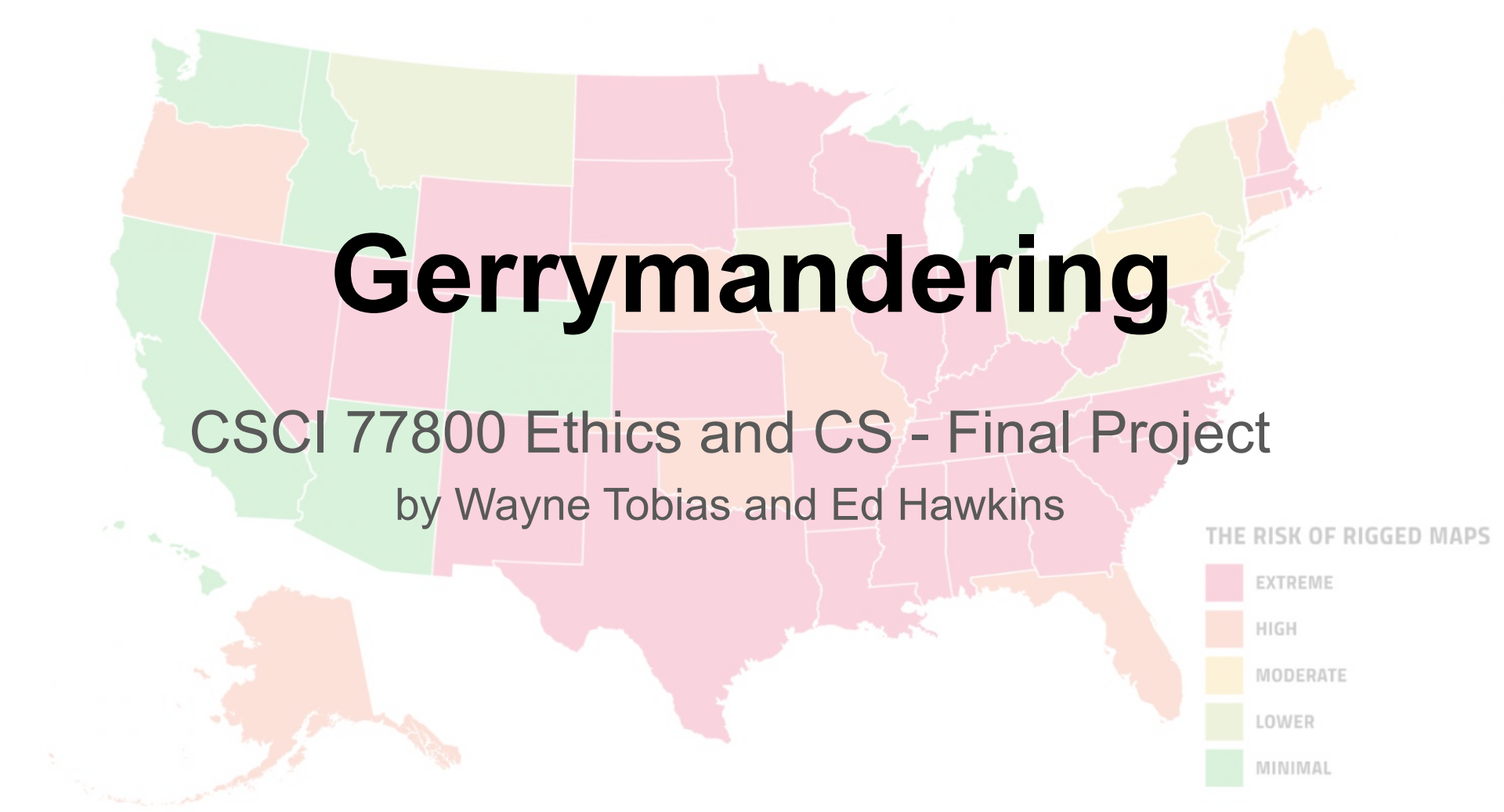
Gerrymandering

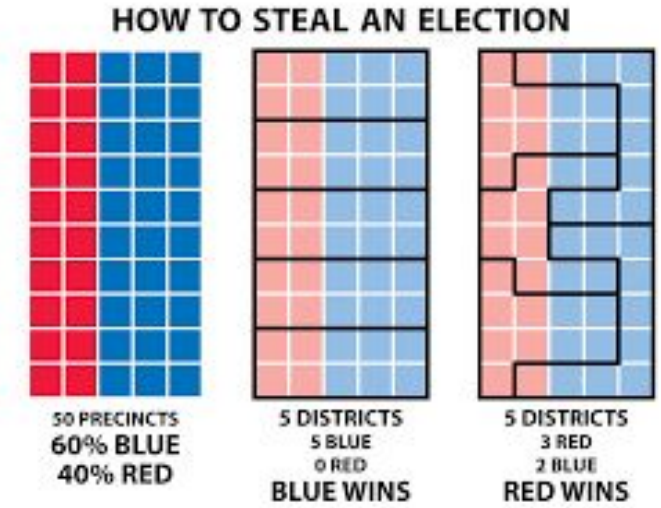
CSCI 77800 Ethics and CS - Final Project

by Wayne Tobias and Ed Hawkins



Overview

- Federal and State legislators are elected from districts
- District lines are redrawn every 10 years (redistricting)
- Gerrymandering is the purposeful manipulation of the redistricting process to favor one party or class
- Gerrymandering is a threat to equitable representation for all
- There are tools to identify and combat gerrymandering in the redistricting process



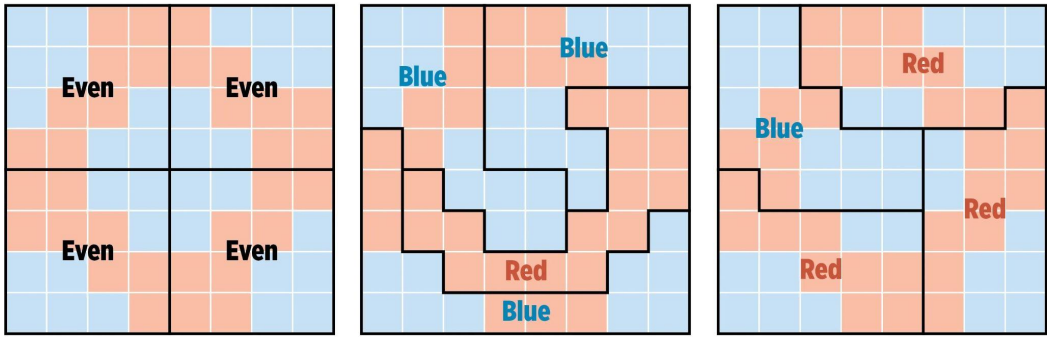
How is gerrymandering measured?

There are 4 common measures of gerrymandering:

- Efficiency Gap
- Partisan Bias
- Mean - Median Difference
- Declination

Two Ways to Gerrymander: Packing and Cracking

Even in an area with an even distribution of voters along party lines, politicians can redraw boundaries to create favorable conditions for the party in power. Azavea, a Philadelphia-based geographic software company, created this example to show how it can be done.



Even distribution
2 red, 2 blue
In the example above, there are an even number of red and blue voters to be split among four districts. Drawing four squares creates districts that split red and blue voters equally.

Packing
1 red, 3 blue
Packing concentrates members of a party in a single district, allowing the other party to win the others. Here, one district is packed entirely with red voters. Blue voters have a majority in the three others.

Cracking
3 red, 1 blue
Cracking splits a group among multiple districts to dilute their voting power. Above, blue voters are divided in such a way that red voters have a slim majority in three of the districts.

SOURCE: Azavea

Staff Graphic

Efficiency Gap

- Cracking - spreading votes among districts so candidates lose by relatively slim margins
- Packing - concentrating votes in just a few districts where candidates win by unnecessarily large margins
- The losing votes in Cracking and the excess winning votes in Packing are inefficient votes - they don't count toward a candidate's victory

North Carolina 2012

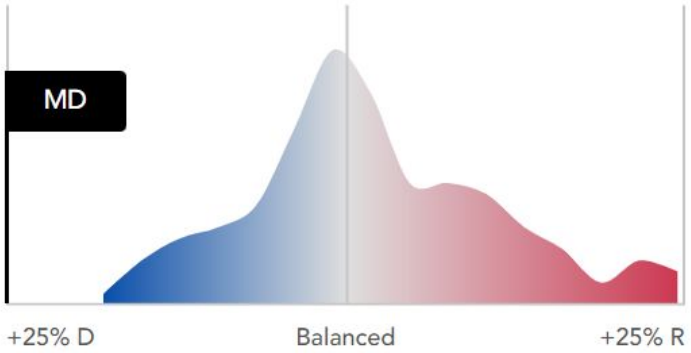
Under North Carolina's 2012-2014 congressional plan, votes for Republican candidates were inefficient at a rate 20.3% lower than votes for Democratic candidates.

Partisan Bias

- Each party should win half of the districts in a tied election
- Partisan bias measures the difference between 50% and the actual percentage each party would win in a tied election

Maryland 2012

Under Maryland's 2012-2016 congressional plan, Democrats would win 25% extra seats in a hypothetical, perfectly tied election.



Mean - Median Difference

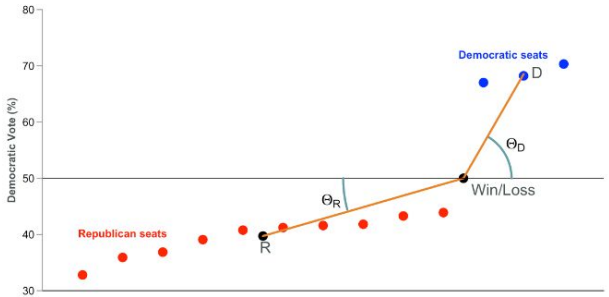
- Measured as a party's median vote share minus its mean vote share
- When the mean and the median diverge significantly, the district distribution is skewed in favor of one party and against its opponent

Georgia 2006

Under Georgia's 2006-2010 congressional plan, the median Republican vote share was 11% higher than the mean Republican vote share.

Declination

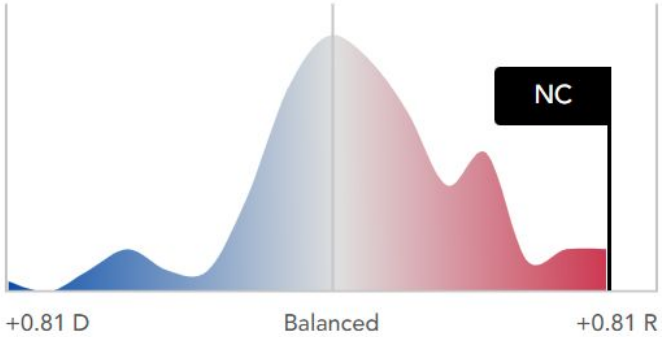
- A measure of the extent to which the win/loss threshold has been used to design a redistricting plan
- Districts are designed to ensure that more districts of the favored party end up on the winning side of the threshold
- The actual calculation is statistically sophisticated and is beyond the scope of this project



R: center of mass for Republican seats, D: center of mass for Democratic seats, and Win/Loss threshold.

North Carolina 2016

Under North Carolina's 2016-2018 congressional plan, the Democratic mean vote share in districts they won was 12% higher than the Republican mean vote share in districts they won.



Possible Solutions

- Establish Independent Redistricting Committees (IRC's)
- Pass Federal Legislation to Ban Gerrymandering
- Use Web Tools to Identify Gerrymandering in Redistricting Maps

Code Component

Get User Input:

```
>>> %Run GerrymanderingSimulationV2.py
 How many voters are in each district? 25000
 How many districts would you like to create? 501
 How many elections would you like to run? 7
```

For our code component, we wrote a simulation (in Python) showing that a tied general election with districts containing an equal number of voters each could be won by either party depending on how the district lines are drawn.

Output Results:

```
Gerrymandering simulation results for 501 districts with 25000 voters each:
Total number of election simulations =  7
Total Democratic Wins =  2
Total Republican Wins =  5
```