Predicting Voting Outcomes with Numerical Computation

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Predicting voting outcomes is crucial for understanding political trends, campaign strategies, and public opinion. It is often mentioned how, "single events — such as a debate, campaign activities or legal rulings — might affect the potential outcome of the U.S. presidential election" (Northwestern University, 2024). I am interested in this problem because numerical computation methods are often useful in estimating electoral results. These can can help fill gaps in polling data and make them more valuable for researchers and data analysts. In this study, I will use the numerical computation methods, interpolation and extrapolation, to predict voting outcomes. Interpolation is a technique used to estimate unknown values within a known range. Extrapolation is a technique that predicts beyond observed data. Prior research has used interpolation and extrapolation in public opinion forecasting. For example: academic studies have applied extrapolation to predict election results based on demographic shifts.The data I used comes from election polls conducted by the Pew Research Center. These were collected to gauge public opinion. In addition, I used demographic data archived by the U.S. Census Bureau. In this study, the main question that I hope to answer is, "How accurately can interpolation and extrapolation predict voting outcomes and are these methods reliable to forecast election results in future elections using data from past trends?

Methods

Data Collection

The datasets for this study was collected using two publicly available sources found online. The first dataset was from the U.S. Census Bureau. This dataset included the reported registration rates in presidential election years by selected characteristics from November 1968 to 2024. The second dataset was from Pew Research Center. This dataset included the 2016, 2018, 2020 and 2022 Voter demographics, based on validated voters.

Exploratory Data Analysis Methods

Data Cleaning was used to handle missing values and create a clean frame for data analysis. Data cleaning ensured the reliability and quality of the data used in our study.

Linear Interpolation

Interpolation was used to estimate values within the range of known data points. The formula is as follows:

$$y = y_1 + \frac{(x - x_1)(y_2 - y_1)}{(x_2 - x_1)}$$

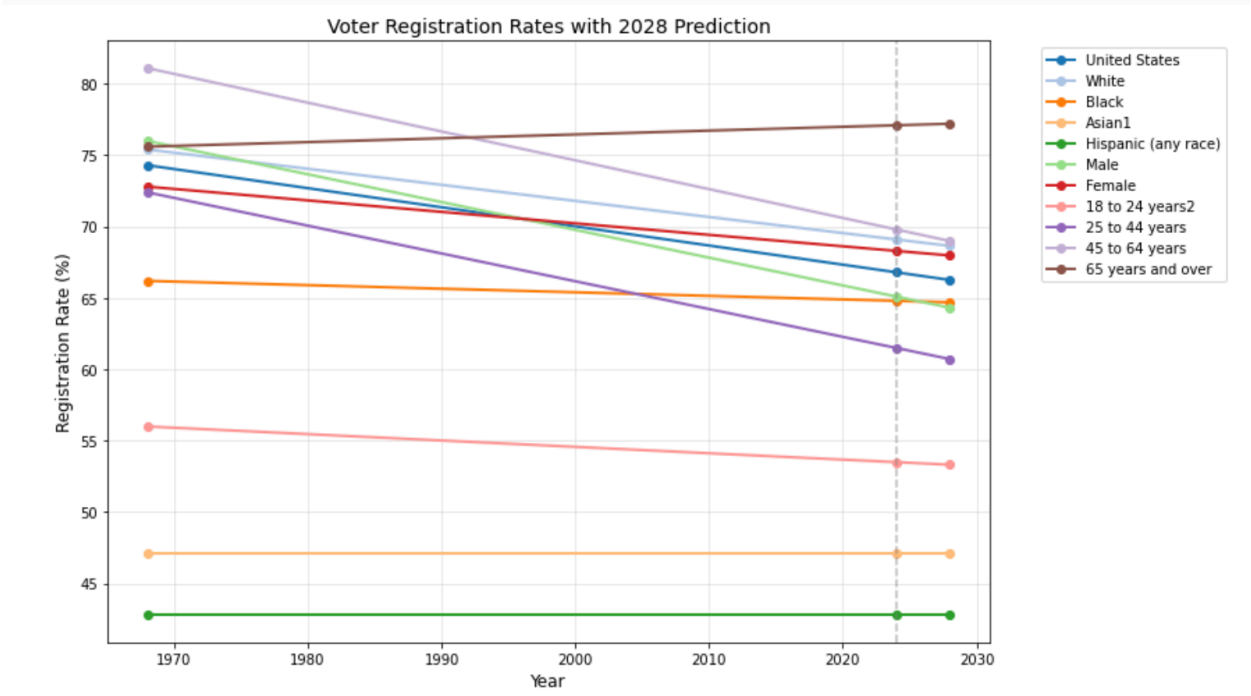
Linear Extrapolation

Extrapolation was used to predict values outside of the known data points. The formula is as follows:

$$y = y_0 + m * (x - x_0), \text{ where m is the rate of change}$$

Results

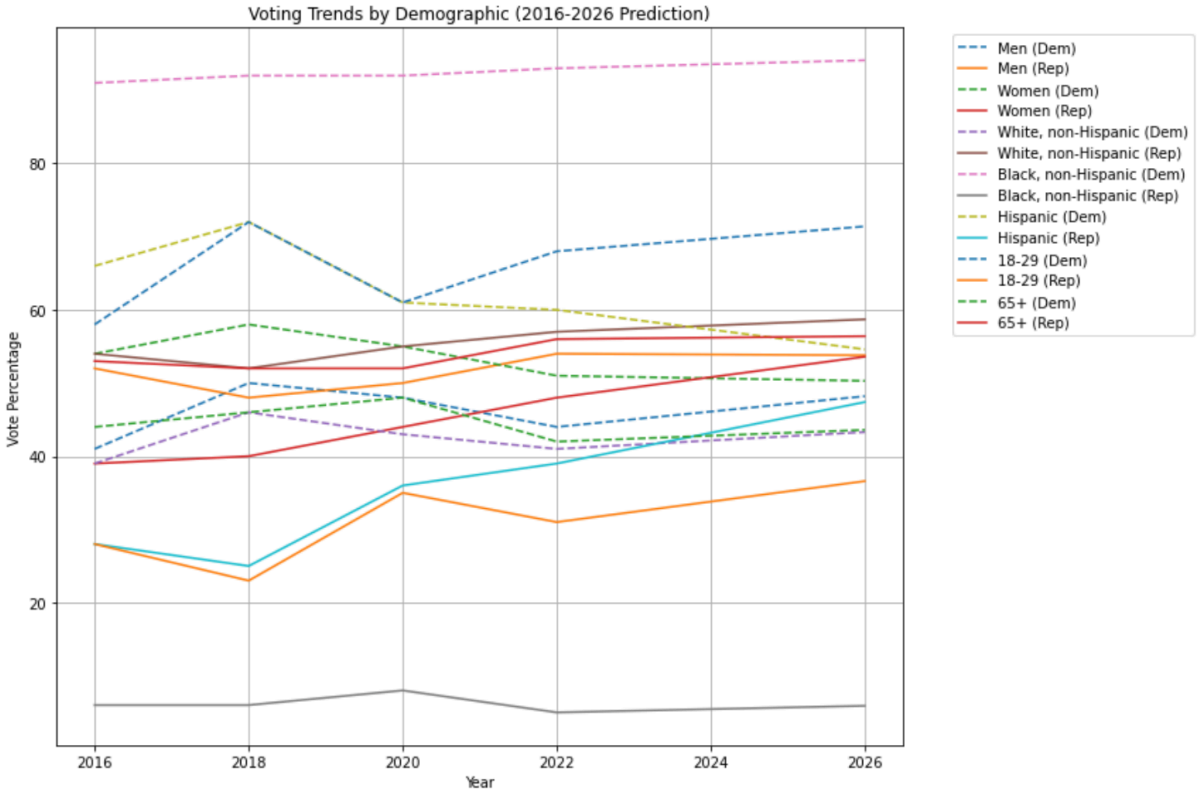
Interpolation and extrapolation were used on the data from the U.S Census to predict the 2028 voter registration rates. The results were as follows:



Predicted Voter Registration Rates for 2028:

	Prediction
65 years and over	77.2
45 to 64 years	69.0
White	68.6
Female	68.0
United States	66.3
Black	64.7
Male	64.3
25 to 44 years	60.7
18 to 24 years2	53.3
Asian1	47.1
Hispanic (any race)	42.8

Extrapolation was used on the data from the Pew Research Center to predict the voting trends by demographic for year 2026. The results were as follows:



2026 Election Predictions:

Category	2026_Dem	2026_Rep	2026_Margin	Trend
Men	48.2	53.8	-5.6	Rep+
Women	50.3	53.6	-3.3	Rep+
White, non-Hispanic	43.3	58.7	-15.4	Rep+
Black, non-Hispanic	94.1	5.9	88.2	Dem+
Hispanic	54.6	47.4	7.2	Dem+
Asian*, non-Hispanic	70.3	34.6	35.7	Dem+
Other, non-Hispanic	33.0	67.2	-34.2	Rep+
18-29	71.4	36.6	34.8	Dem+
30-49	53.9	48.5	5.4	Dem+
50-64	43.8	57.7	-13.9	Rep+
65+	43.6	56.4	-12.8	Rep+
Postgrad	59.9	41.1	18.8	Dem+
4-year college	52.5	50.7	1.8	Dem+
Some college	48.2	56.1	-7.9	Rep+
HS or less	35.4	64.4	-29.0	Rep+

Conclusion

The analysis of the dataset from the U.S. Census Bureau suggest that the overall voter registration rate in the United States is predicted to be approximately 66.3 % in 2028. In this year, White, non-Hispanic voters will have the highest registration rate. More females are projected to register than males. The analysis of the dataset from the Pew Research Center suggests that in 2026, men will favor the republican party and men will favor the democrat party. White, non-Hispanic, will favor the republican party and Black, non-Hispanic, will favor democrats. Ages 50 and up will factor republicans and 49 and under will favor democrats.

References

Election forecast tracks a tight presidential race. Election forecast tracks a tight presidential race: School of Professional Studies | Northwestern University. (n.d.). https://sps.northwestern.edu/stories/news-stories/2024-election-forecast-tracks-tight-presidential-race.html

GitHub: https://github.com/davidfarrow757/Final_Project