

Project 3 – Voting

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Summary

Data

Results

Conclusion

Overall, our project focused on building models to predict the outcome of the 2024 presidential election in Virginia and provide quantitative information about the precision of the prediction. Through methods of linear regression, polynomial feature expansion, and data visualization via geospatial mapping, we generated predictions for each county in Virginia to see what party they will vote for: Democratic or Republican. We utilized various factors like total votes and which party each county voted for from previous years in order to see how it affected the variable of candidate votes. After thorough data cleaning, we implemented one-hot encoding to convert categorical variables into numerical ones, then we also applied polynomial feature expansion to generate interaction terms up to degree 2. Once we had this information, we built our linear regression model on our target variable, candidate votes. Using our model, we were able to conclude definitive results about growth rate calculation which computed historical growth rates for each county to estimate the total votes for 2024 and also results about the prediction for each candidate by using the trained linear regression model. Finally, we created a state map to visualize the party each county will vote for based on 2024 inputs to the model.

The predictions drawn from the final state map model are pivotal for the opposing party to direct their attention to in an attempt to sway some votes. Focusing on specific regions, the southern counties seem to be predominantly red indicating right-leaning so we predicted them to vote for Trump. The more

populated counties, however, like the Chesapeake and northern Virginia counties seem to be mostly blue indicating more left-leaning voters for Biden. Northern Virginia in particular seems to have a mix of colors, reflecting its diverse political landscape, so it will be interesting to see what the actual turnout will be since this area is more densely populated than most other countries meaning it would have a bigger impact in Virginia's overall vote. This geographic visualization helps in identifying key battleground areas and understanding demographic influences on voting behaviors, which could be pivotal for future political strategies and campaigns.

As for criticism, we evaluated the model's performance by computing the coefficient of determination (R^2) to defend our work. The value calculated was 0.9661787960748086 which suggests a generally good result. Approximately 96.6% of variation in our target variable, candidate votes, is explained by features used in the model. By calculating growth rates for each county to analyze voting trends in order to predict them for the 2024 election, we can rely on past data and results in order to strengthen our own conclusions.

Looking into further exploration and ways to improve our project outside the scope given, we suggested using an inflation metric across the years in order to improve how we forecasted voting behavior over time. This could include adding a socioeconomic factor to further detail voting trends in various demographics within counties using sources like the Federal Reserve Economic Data. Unfortunately, we did not possess the skills to compile all of the data by hand which hindered us from using this data. Our limited knowledge of data scraping in large capacities made collecting the vast information out of scope for this specific project.

In conclusion, while our final model from this project was not perfect, it gave us some insight on voting outcomes for each Virginian county. These outcomes could be influential in the 2024 presidential election as every vote will have an impact. Since this election will be a Biden-Trump rematch, it will be extremely interesting to see how our model using past results from 2020 compares to the final results in the fall. Our hopes with this project and our models will be for others to analyze trends for opposing parties to try to sway voters and focus on these regions

Appendix

No additional plots or tables were useful to include in this write-up, however the source code can be found within the '.ipynb' files in the project's repository's root at:

https://github.com/gaboojie/project_voting