DEPARTMENT:

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PROJECT TITLE:

Spatial Relationships Among Colorado Counties

Spatial Relationships Among Colorado Counties

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Why Spatial Statistics?

- When a spatial relationship is present, we can draw data from other geographically close regions and fit a better model based on this
- Spatial plots reveal relationships among the responses that are not visible by numeric regression alone
- Allows us to use data that is not independent as compared to a lot of other statistical methods that assume independence

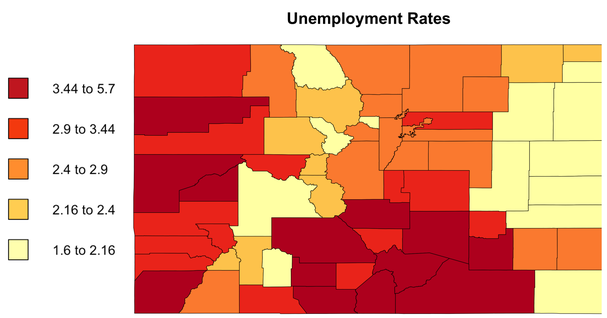
Methods

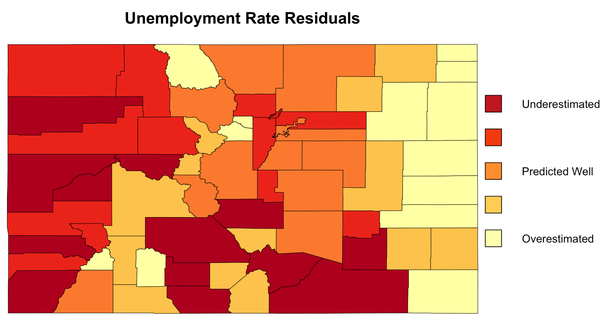
- A backwards selection process is used to determine what predictors will be used in the linear models
  - This process takes out the least significant variable in the model and runs it again until all the predictors in the model are significant at the .05 level.
- Larger positive residuals mean the model underestimated the number and large negative residuals mean it is overestimating

Linear Model Significant Predictors

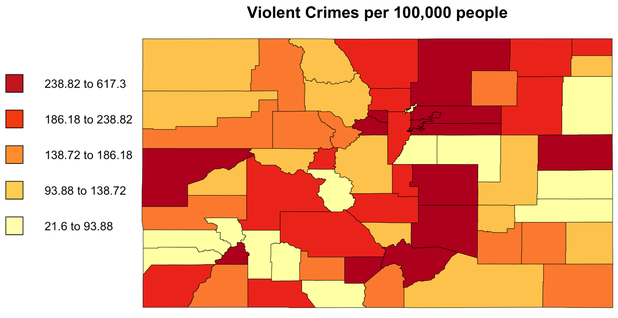
- Unemployment Rates
  - Violent Crimes per 100,000 People and Excessive Drinking Rates
- Violent Crimes per 100,000 People:
  - Graduation Rates, Percent of Adult Smokers, Insufficient Sleep Rates, Percent of Single Parent Households, Percent of Women Not Married, and Population Density
- Graduation Rates:
  - Violent Crimes per 100,000 People and Percent of Single Parent Households

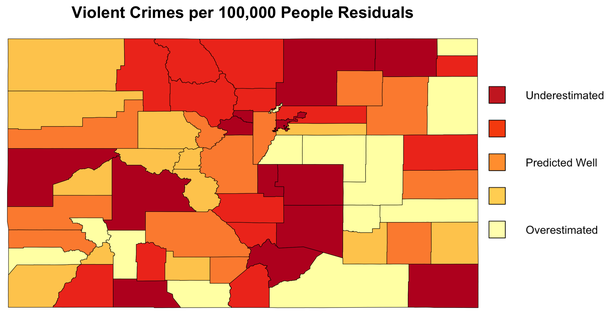
Spatial Plots



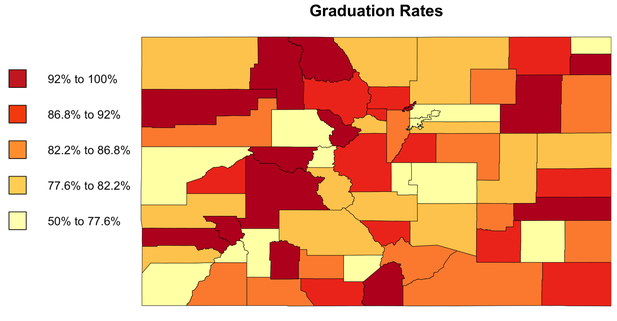


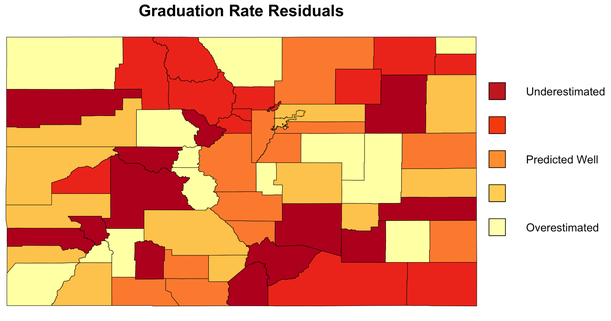
- Same basic spatial relationship still present even though residuals are being plotted not the raw data





- Stronger spatial relationship present in residuals but we still see the basic I-25 relationship





- A spatial relationship becomes apparent even though the raw data looked random when plotted

Conclusions

- In all three models, there is evidence that adding a spatial component would make the model fit better
- We see a clear relationship between violent crime rates and other negative indicators like unemployment rates and excessive drinking rates
- All of the R-squared values for the three linear models considered are below 0.5, meaning that the models don't fit the data very well and we need something else to make it fit better

Future Research

- Add a spatial component into the models and test its significance
- Look further into possible reasons that violent crime is often a significant predictor and its affect on other variables not considered in this project

Acknowledgements

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References

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