

“Longstanding effects of different variables on the academic success of the general population”

IST 718 – Final Presentation

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Summary:

Based on our teams' models and observations, we found that:

- Certain factors such as **divorce rate, state, median age, median family size, population, and the percentage of people not in the labor force** have an impact on the high school graduation rate.
- **Median age** was the leading indicator for graduation, followed by the **percentage of people not in the labor force**.

With these findings, our recommendation from the perspective of promoting academic success would be:

- **Develop tax incentives** leading to a **growth in high-paying jobs** in the area.
- Host **government-sponsored job fairs** within the school.

Specification:

With the **average graduation rate for the United States in 2021-2022 sitting at 88%** ¹, it is important as ever to look at why that is. With a high school degree, **individuals are provided with further opportunities to earn a higher income, gain a better living condition, and an increase to the health of the general population, overall.**

We are using census data to analyze **the effects of different variables such as divorce rate, state, homeownership, and family size to predict academic success**, outlined by the rate of graduation.

By analyzing these variables, we will look to **understand the longstanding effects and outline potential programs to help students who are suffering academically**, to increase the graduate rate.

Observation:

Combined state property taxes and lottery data. Focusing on four states: New York, California, Florida, and Texas.

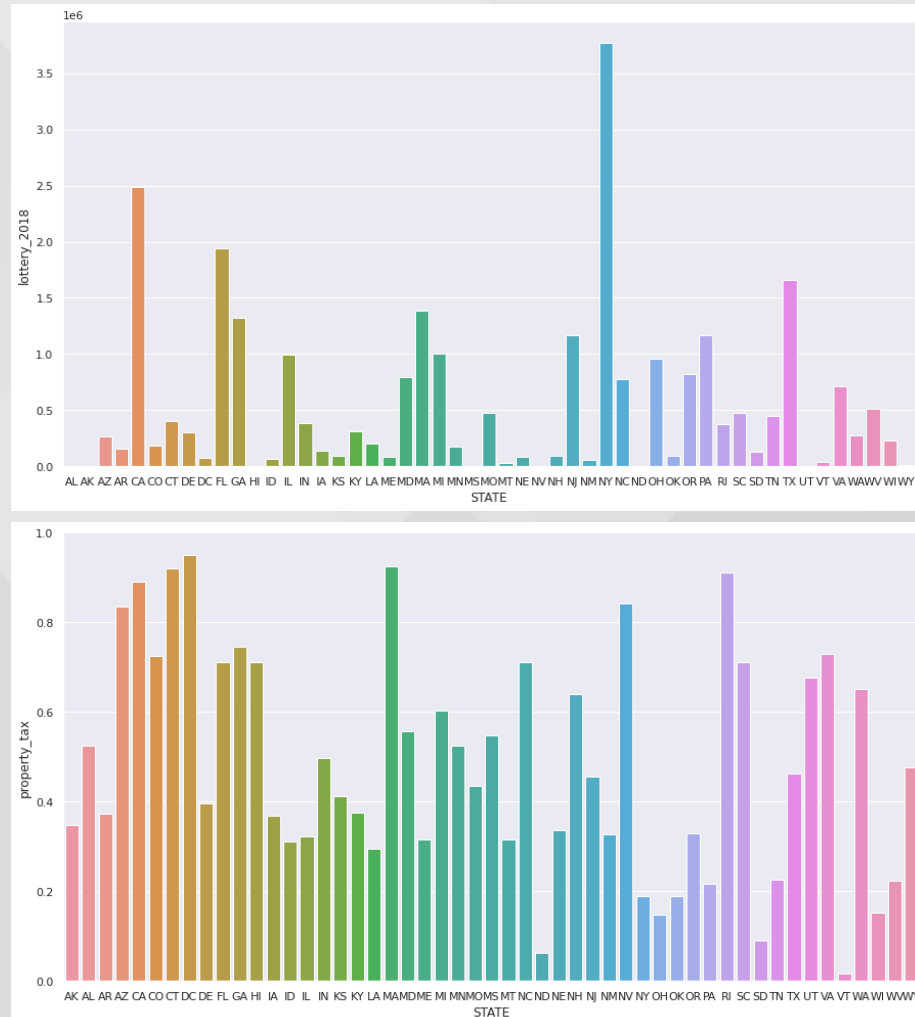
These 4 states have the highest lottery revenue from the order of the highest to lowest are

NY -> CA -> FL -> TX.

But in term of property taxes from the highest to lowest are ranking from

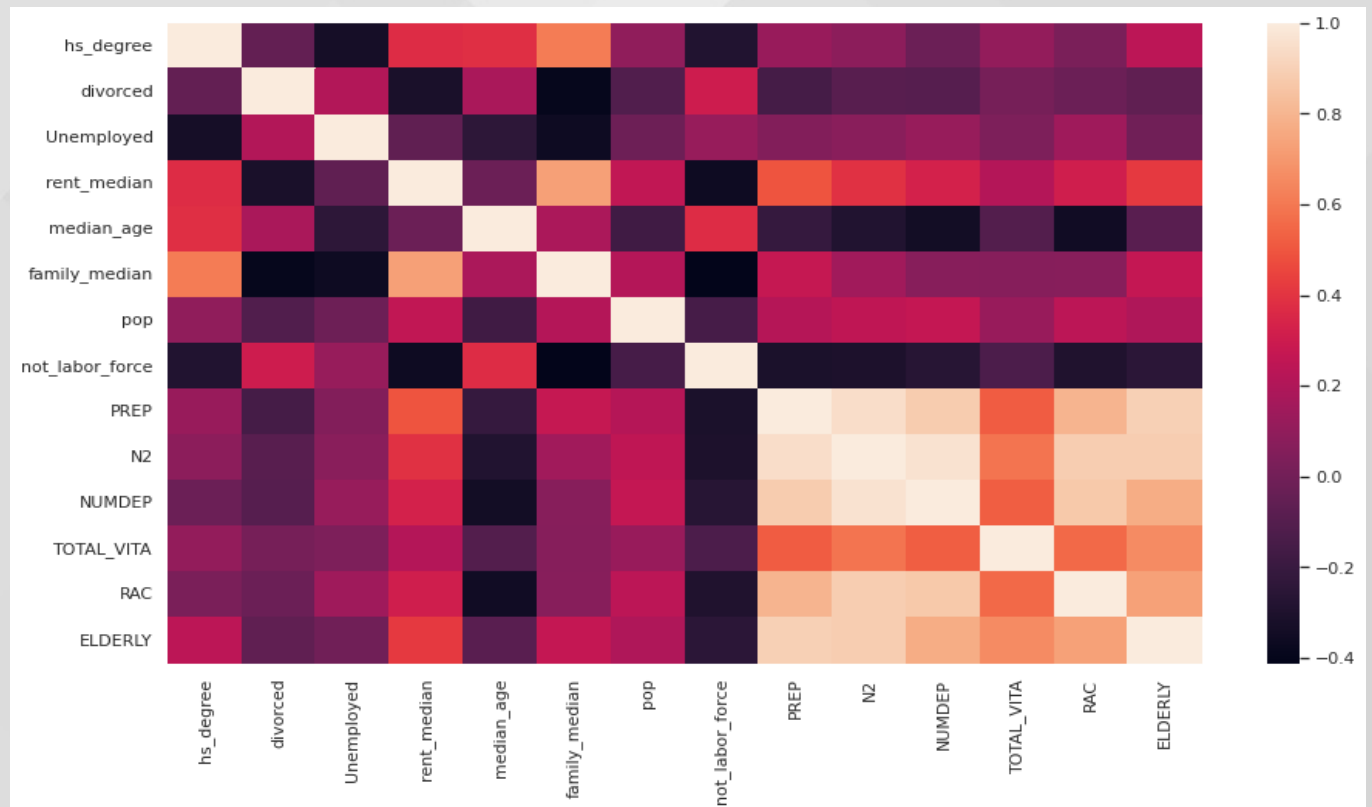
CA -> FL -> TX -> NY.

Linear models generated based on the whole US and the four states showed property taxes and lottery did not have a significant impact on high school graduation rate.



Observation:

Based on a linear model and some visualizations, we observed that **divorce rate, state, median age, median family size, population, and the percentage of people not in the labor force** have an impact on the high school graduation rate.



Analysis

- OLS Regression Model
 - Input variables: divorced, median age, family median, population, state, not labor force and elderly
 - Predicting high school degree rate
 - Transformation: Squared to gain better results
 - Adjusted R^2 : 0.623
- Random Forest Model
 - Predicting high school degree rate
 - RMSE: 0.00047

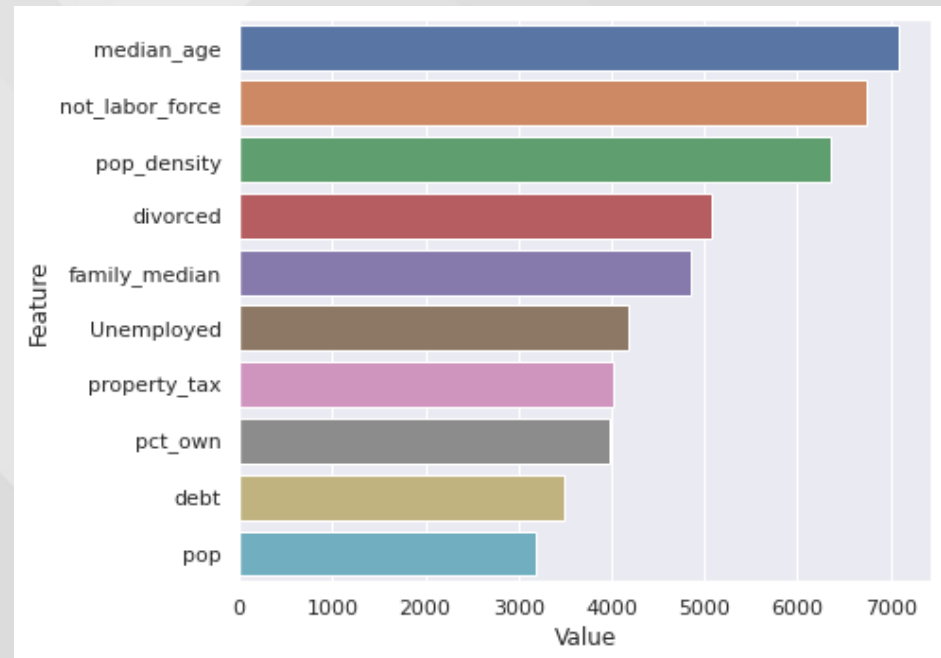
Model Results

- Median age was the leading indicator.

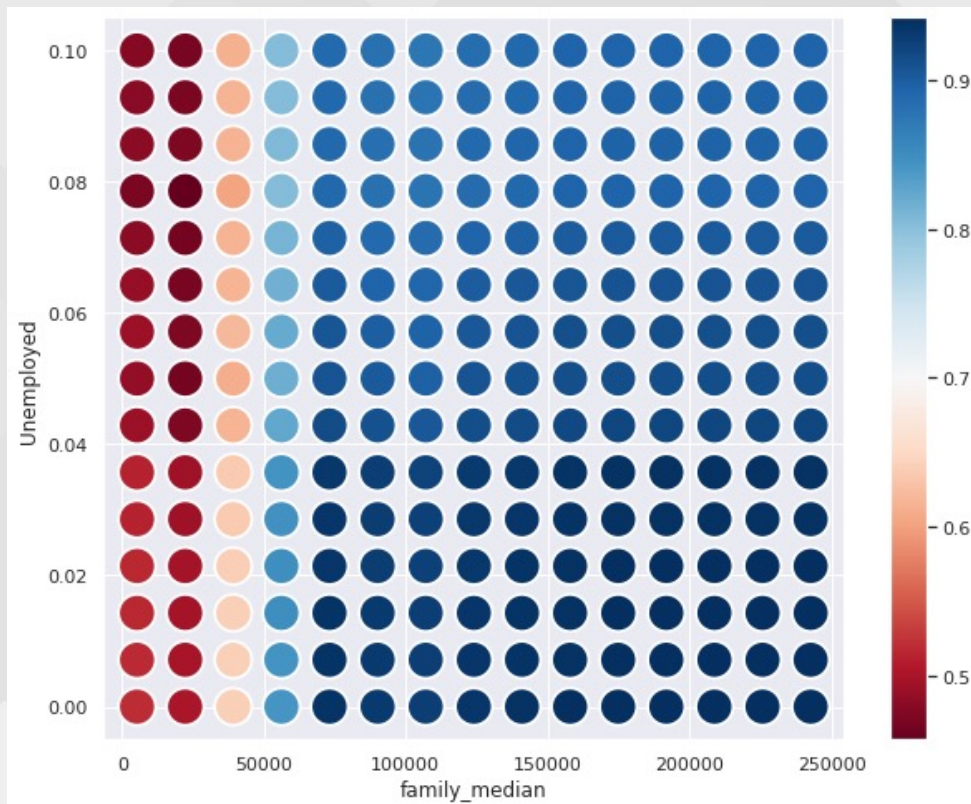
(As age increases High School Graduation Increases)

- Metric to train the model was: **RMSE**
- Number of leaves: **31**
- Max Depth: **4**

Method	Test	Train
MAE	0.042896	0.039363
RMSE	0.00374	0.00299
MAPE	0.05640	0.07586



Recommendation:



- Create tax incentives to bring high-paying jobs to the area thereby increasing the median family income and decreasing unemployment.
- Have government-sponsored job fairs.



References & Appendences:

1. <https://nces.ed.gov/fastfacts/display.asp?id=805>
2. <https://www.census.gov/data.html>
3. https://www2.census.gov/geo/docs/maps-data/data/gazetteer/2016_Gazetteer/
4. <https://www2.census.gov/geo/docs/maps-data/data/>
5. <https://www.taxpolicycenter.org/statistics/lottery-revenue>
6. <https://www.irs.gov/pub/irs-soi/18zpallagi.csv>



Thank you all for
listening!

Please reach out with
any questions or
comments!

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