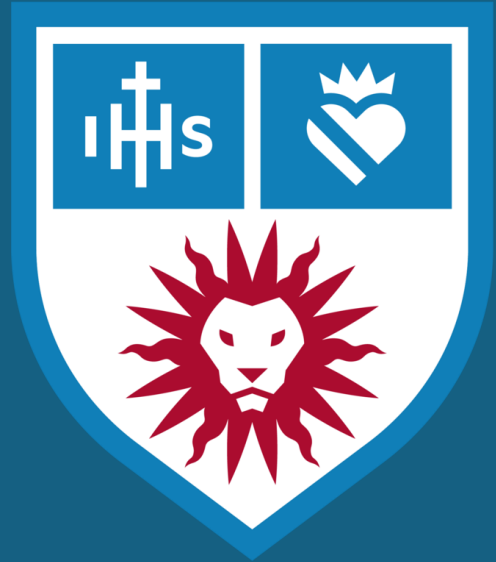


How Reliable are Nursing Homes as an Investment?

2024 Business Analytics Competition @ Manhattan College

Presenters: Sam Biner, Andrew Kim, Iris Gallagher, Sam Nielsen

Advisor: Gregory Lontok, M.S., Clinical Assistant Professor



Loyola Marymount University

Story

Geri Attrick's Data Analytics team was tasked with figuring out if nursing homes and the elder care market could be a potential profitable investment. To do this, we did the following:

- Explored the data
- Defined clear questions to guide our analysis
- Used predictive modeling to find the best states and zip codes
- Answer if nursing homes and the elder care market is a good investment opportunity

Questions

1. How did different States respond to COVID?
2. What features Influence Overall Rating the most?
3. How profitable are Nursing Homes as a business?
4. What is the expected return?

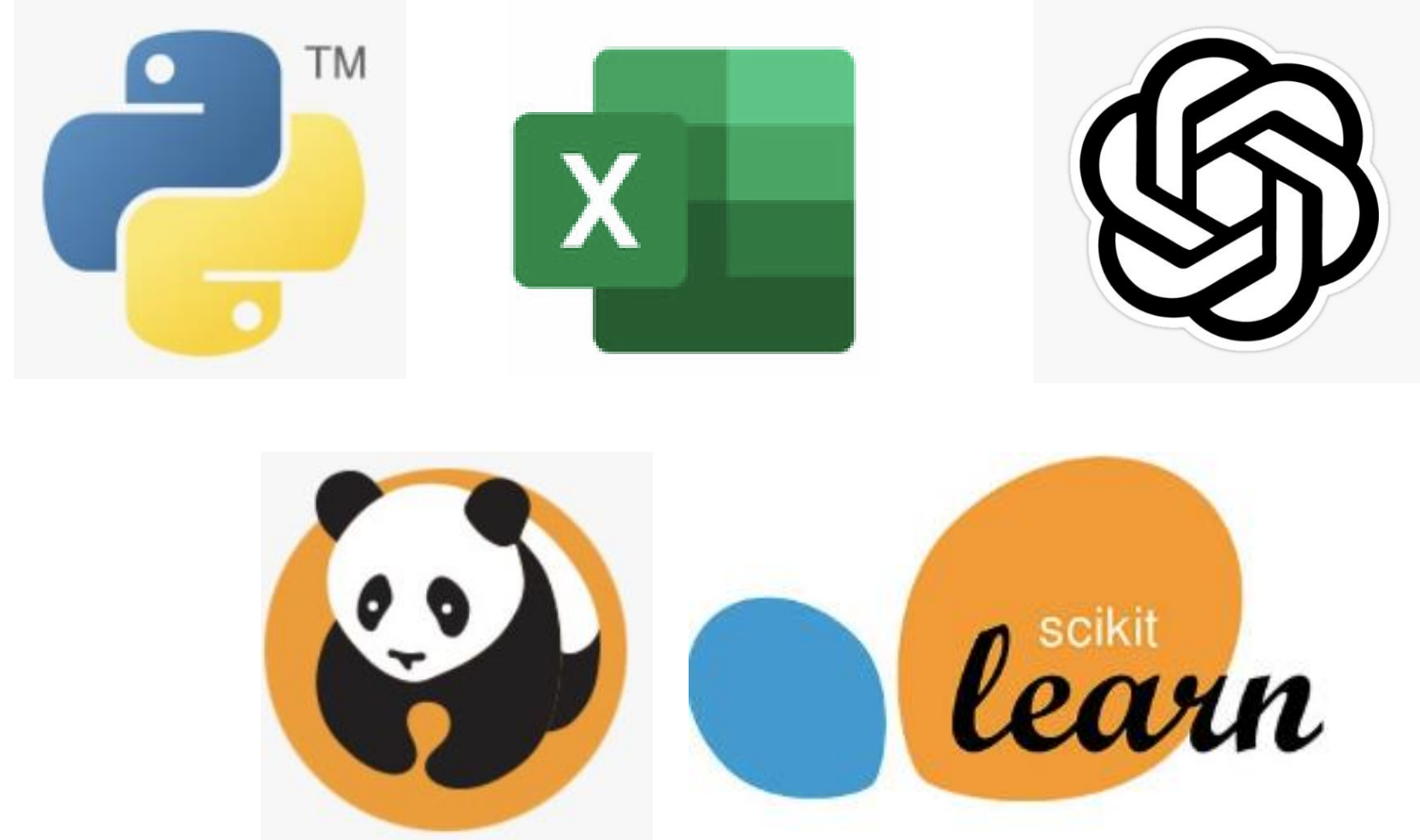
Conclusion

We recommend adding nursing homes into your investment portfolio, only if the following criteria are met.

1. Target states (CA & NY) that had a fast response to COVID-19 pandemic
2. Avoid states (DE & WV) with low quality scores that pay high amounts of fines
3. Pay close attention to these variables: Deficiency counts, Zip Code, Total Fine Amounts, Date of Medicaid and Medicare, Numbers of Beds
4. Only look at states that had a positive Net Income
5. For safety, only consider investing if the overall score is 3 or more

We recommend the New York Zip codes given these qualifications. Specifically, the Bronx and Queens zip codes given to generate the highest return.

Tools Used



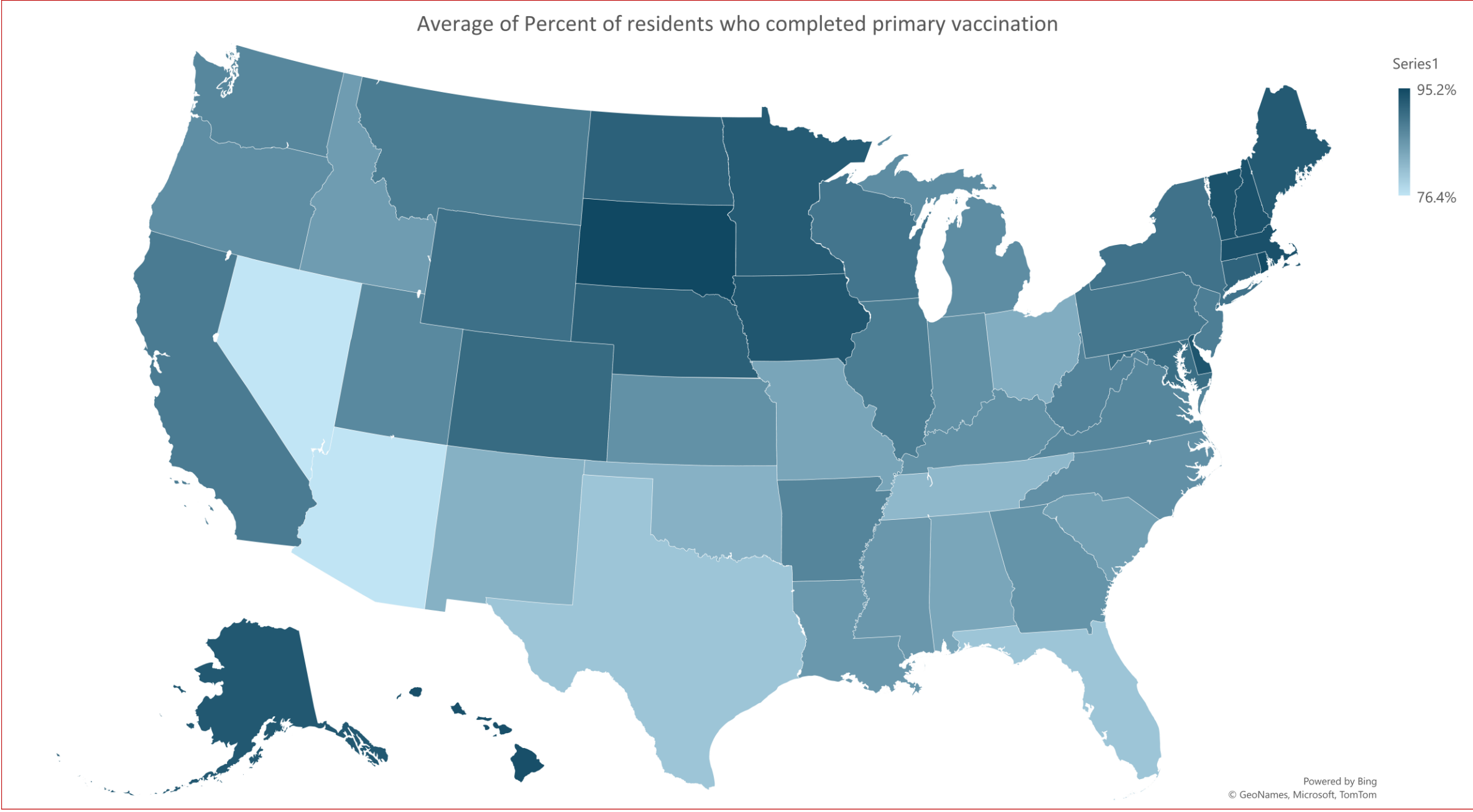
1: How did Different States Respond to COVID?

Step 1:

First exploring the outlier data sets of the COVID VAX information, we started the analysis by looking at the individual state level.

Step 2:

We found that states in the **Northeast, West Coast and Mid West** had a higher adoption level to Vaccines. We wanted to continue this analysis to find if these states provided the highest returns.



2: What Features Influence Overall Ratings the Most?

Step 1:

To continue our analysis on a state-by-state detail, we wanted to look at the fine amounts and the quality scores to see if they were relatively consistent for our analysis period. We decided to exclude 2020 and 2021 due to being an outlier from COVID and we expect the data to return to normal in upcoming years.

Step 2:

We found a consistent pattern from each state on both metrics, so we decided to look more into the overall rating per each nursing home.

Step 3:

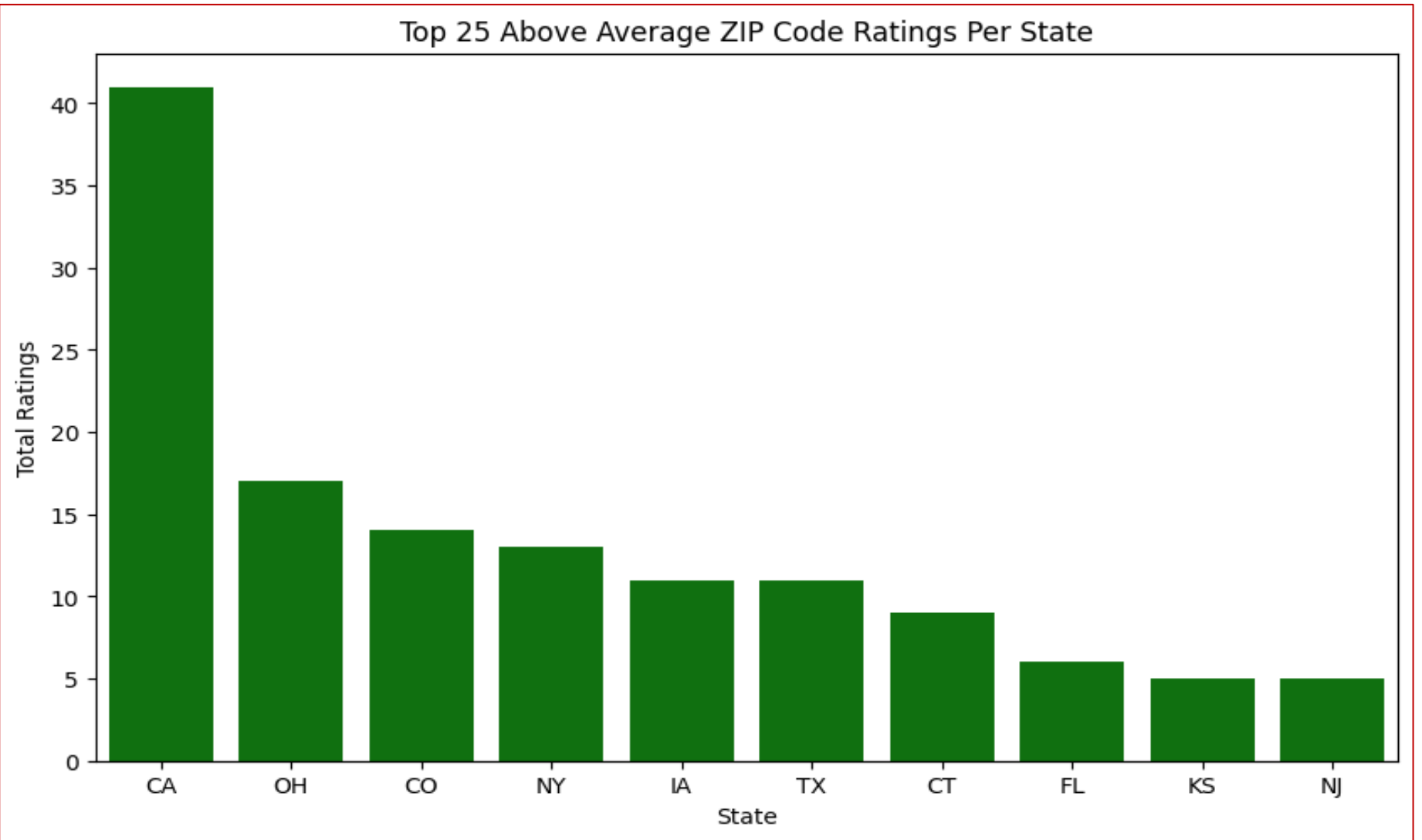
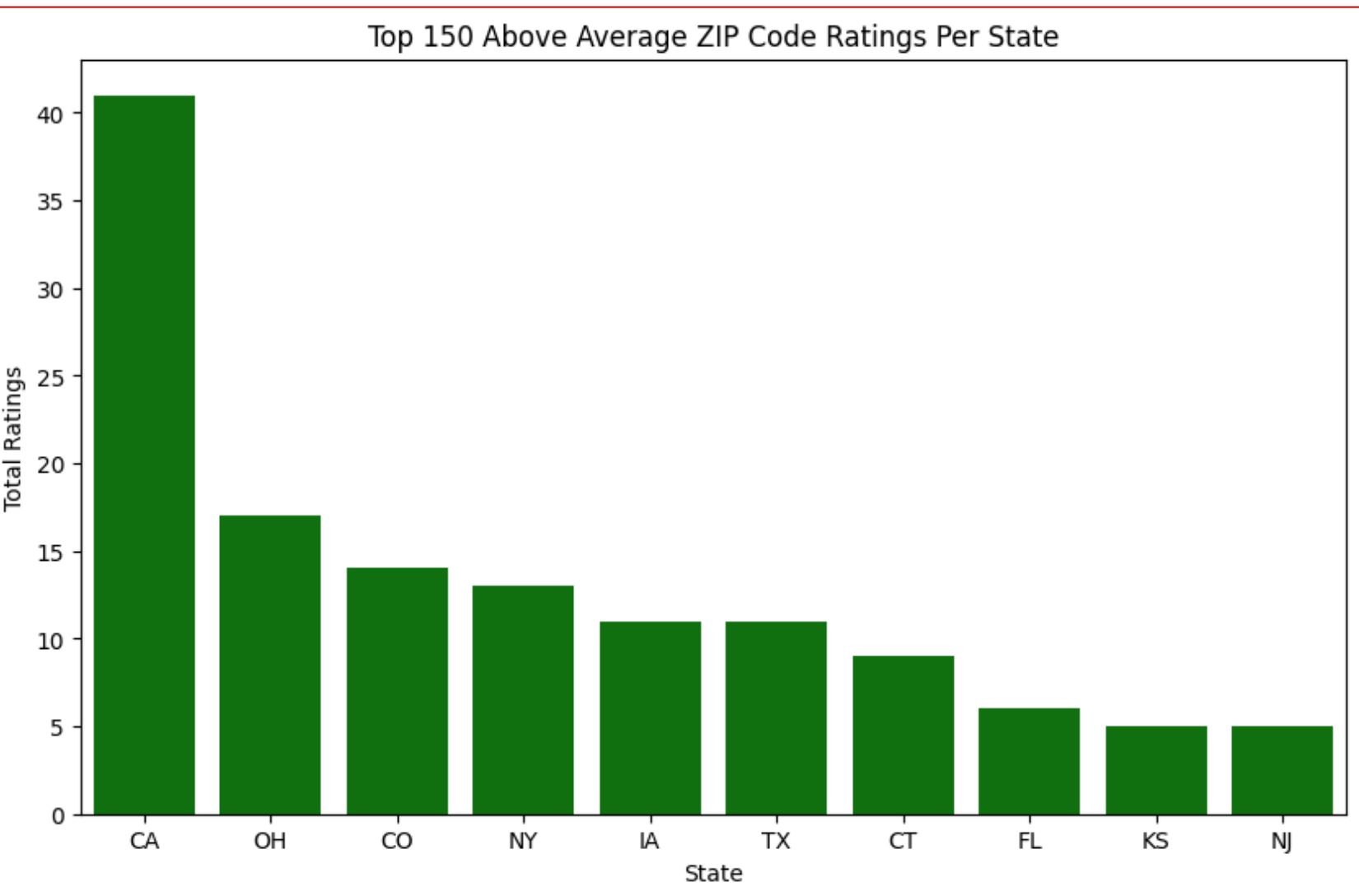
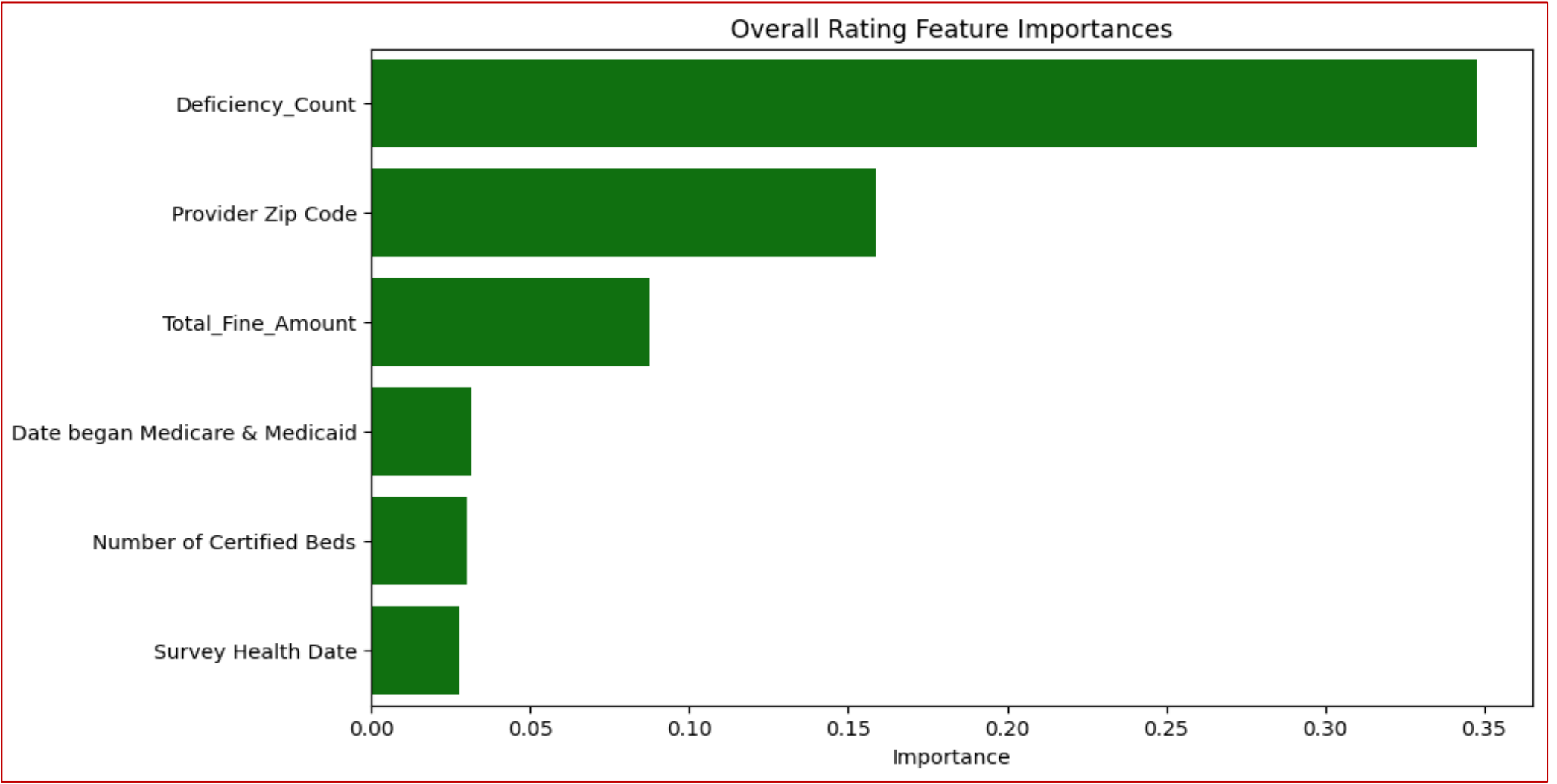
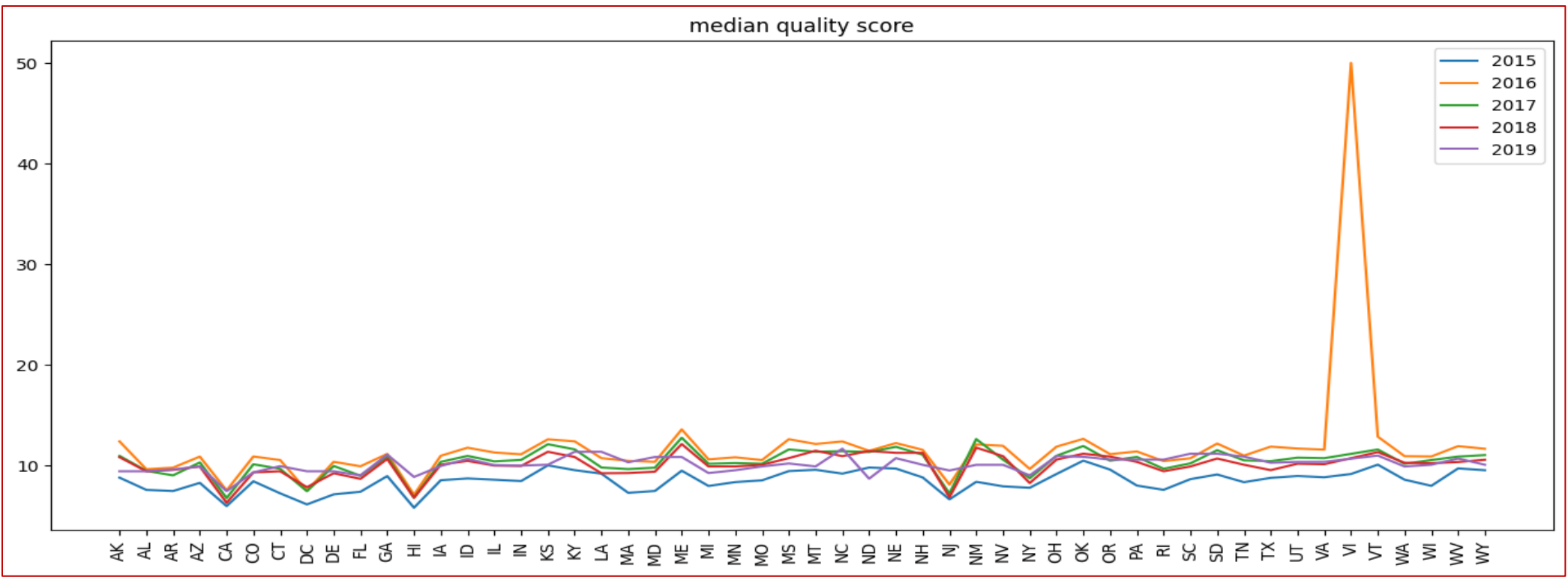
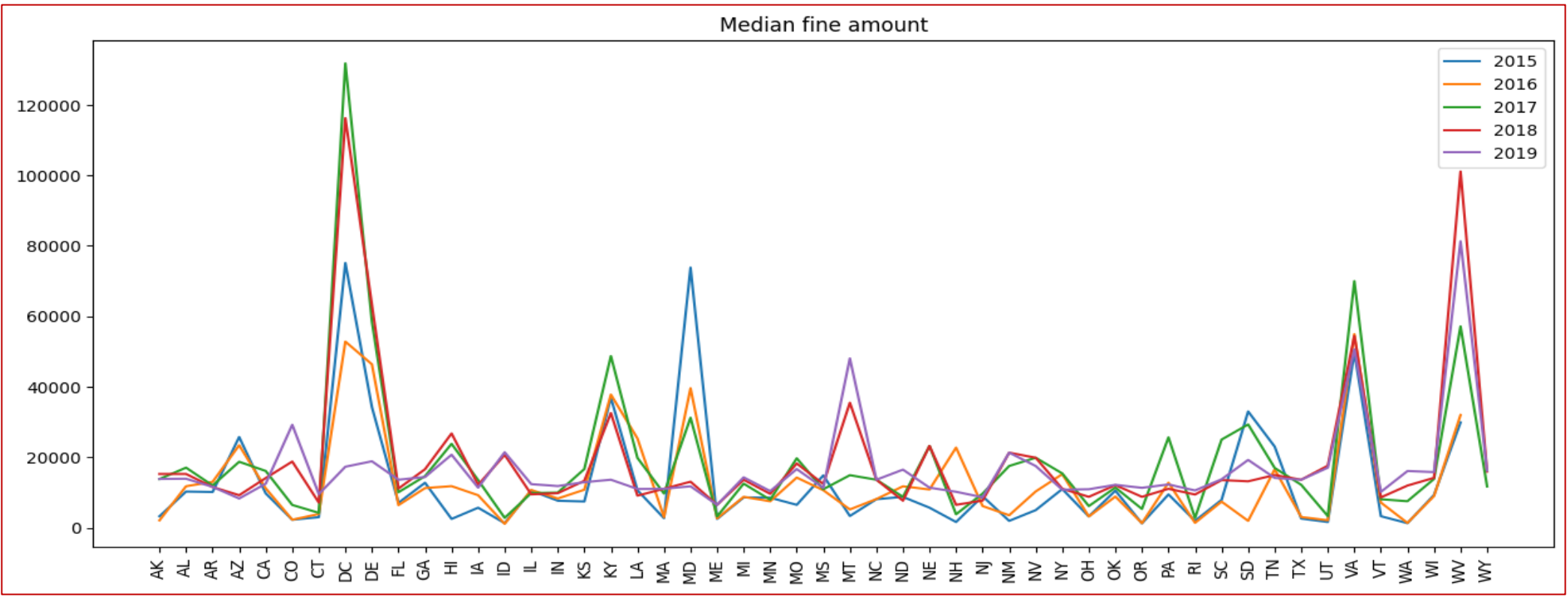
Continuing our analysis, we decided to find the feature importances that had the most effect on the Overall Rating, where we found that the top 3 features, Deficiency Count, Provider Zip Code, and Total Fine Amount, play a pivotal role.

Step 4:

To further our analysis on the state-by-state level, we investigated the specific states that have the most amount of above average Overall Score which is defined as above 3 while considering the feature importances.

Step 5:

From there we found that **California, New York, Ohio, and Colorado** were the strongest. Before determining if these states provided a good investment opportunity, we wanted to make sure that they were profitable.



3: How Profitable are Nursing homes as a Business?

Step 1:

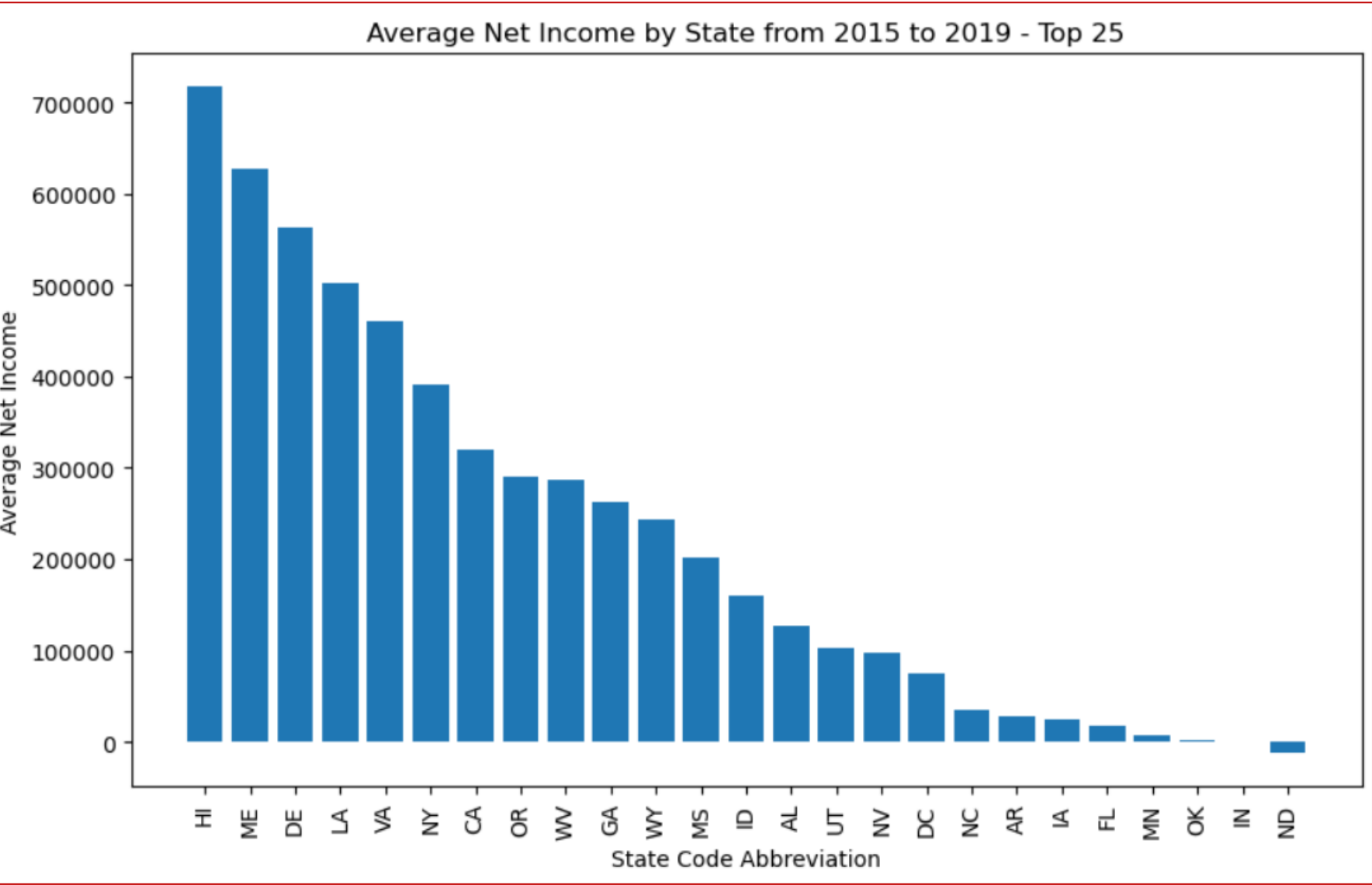
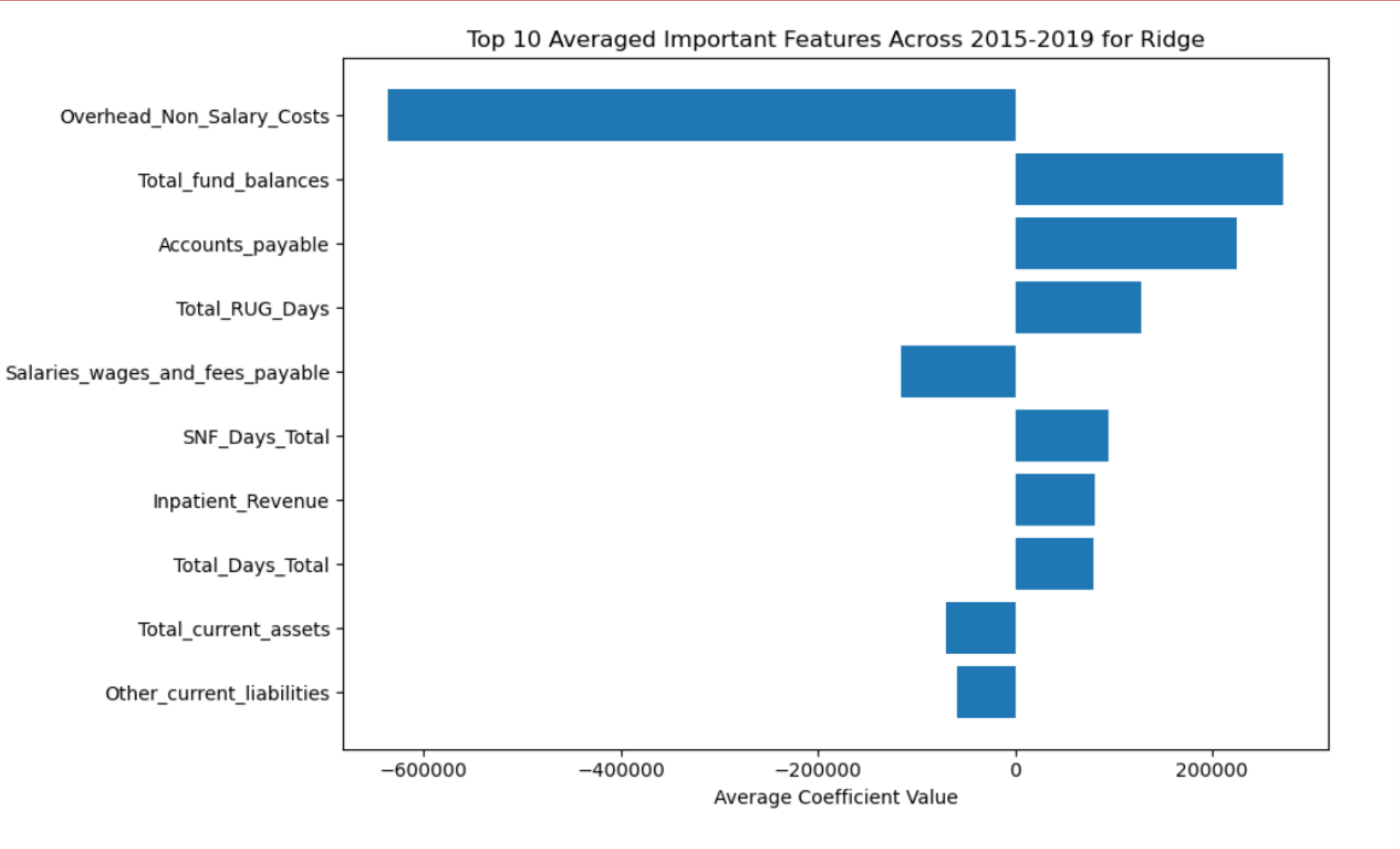
First, to provide a better recommendation on the specific nursing homes to invest in, we wanted to see what features impact Net Income the most. We found that **high non overhead salary costs** had a strong negative correlation while **high total fund balances and accounts payable balances** were positively correlated.

Step 2:

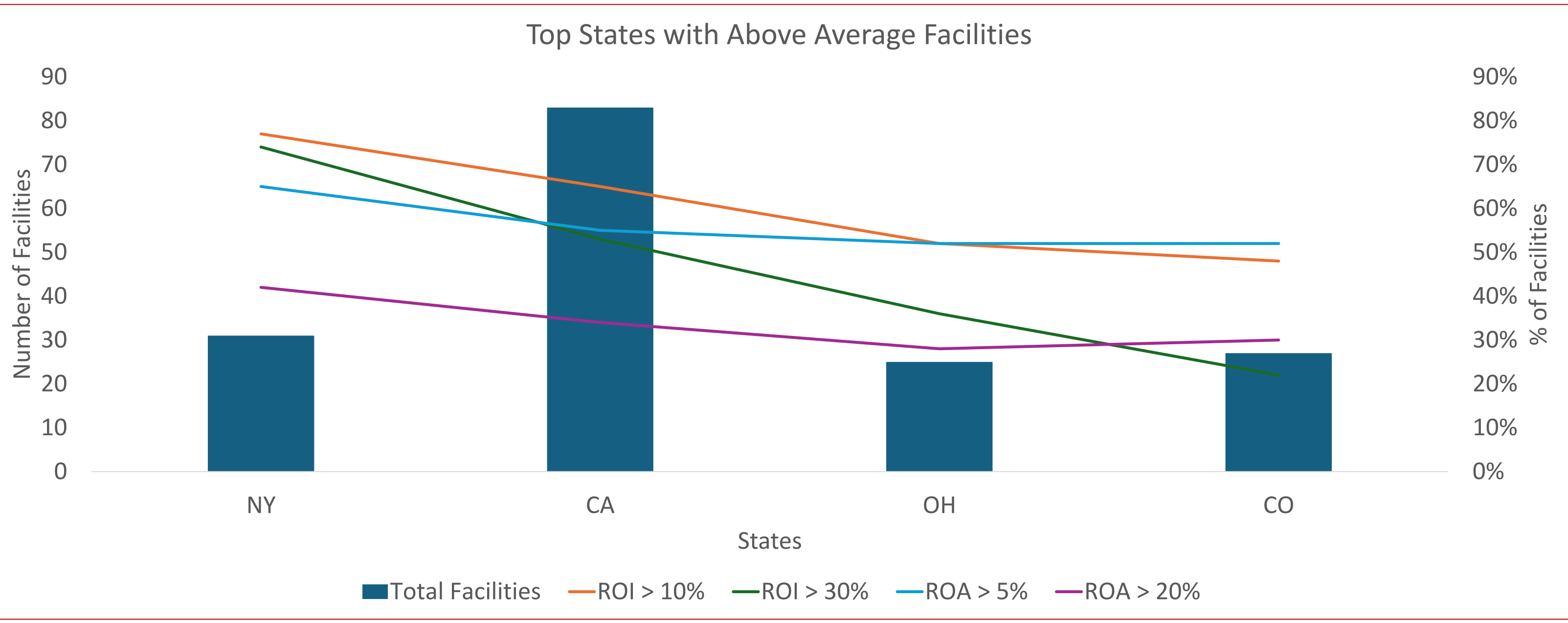
Continuing with the same years of data, we found that of the top 4 states we previously selected, **New York and California were 6th and 7th of the most profitable states on average.**

Step 3:

We decided to focus on these two states for our recommendations while also including Colorado and Ohio as comparisons.



4: What is the Expected Return of This Investment?



Step 1:

To determine the financial performance from nursing homes in the selected states, we focused on Return on Investment and Return on Assets. To do this, we used the Random Forest Regressor as the model in our analysis with the feature importances from the previous questions.

Step 2:

We found that New York was consistently better on average as an investment with these metrics when compared to the other top 3 states including California, so we decided to find the best Zip Codes for New York.

Step 3:

Specifically, we found that the Bronx and Queens zip codes or 10463 and 11354 provided the highest returns for investors which is where we recommend investing.

Further Analysis

We would like to have access to the 2022 and 2023 datasets as it would help us normalize the impact of COVID and do more predictive analytics for 2024 and 2025.

Additionally, we would like to have more data about turnover at an individual facility level.