Capstone Final Report:

State Education Funding and Graduation Rates

Problem Statement and Objectives:

This project investigates the impact of state education funding and teacher salaries on graduation rates across the United States. The objective is to identify significant factors influencing graduation rates and provide actionable insights for policymakers.

DATA

Description of the Dataset(s):

The primary dataset includes state-level education funding, teacher salaries, and graduation rates. Key variables include Total Budget, Total Teacher Salary, and Graduation Rate.

Preprocessing Steps:

The data preprocessing involved handling missing values, standardizing numeric features, and creating dummy variables for categorical features.

METHODOLOGY

Overview of the Modeling Techniques and Approaches Used:

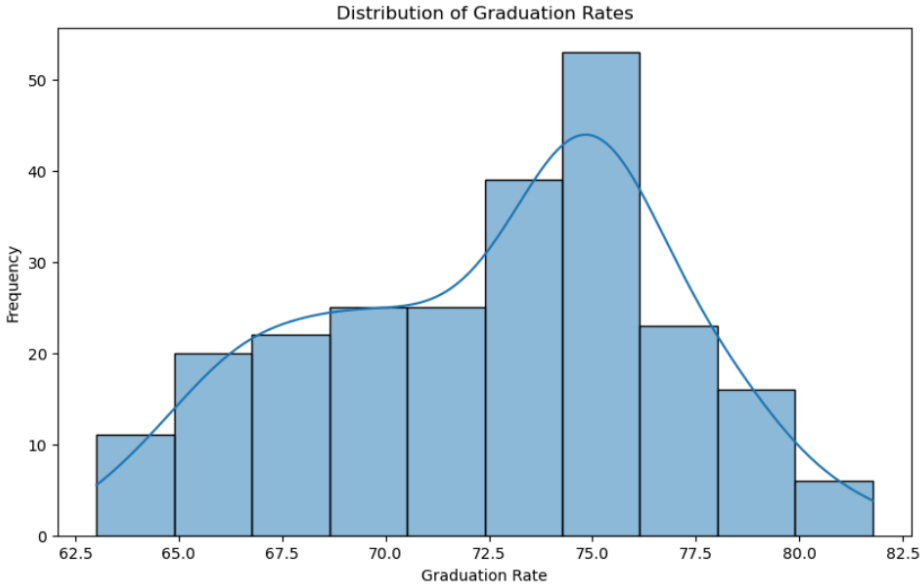
I applied Random Forest and Gradient Boosting models to predict graduation rates based on the provided features. GridSearchCV was used for hyperparameter tuning to enhance model performance.

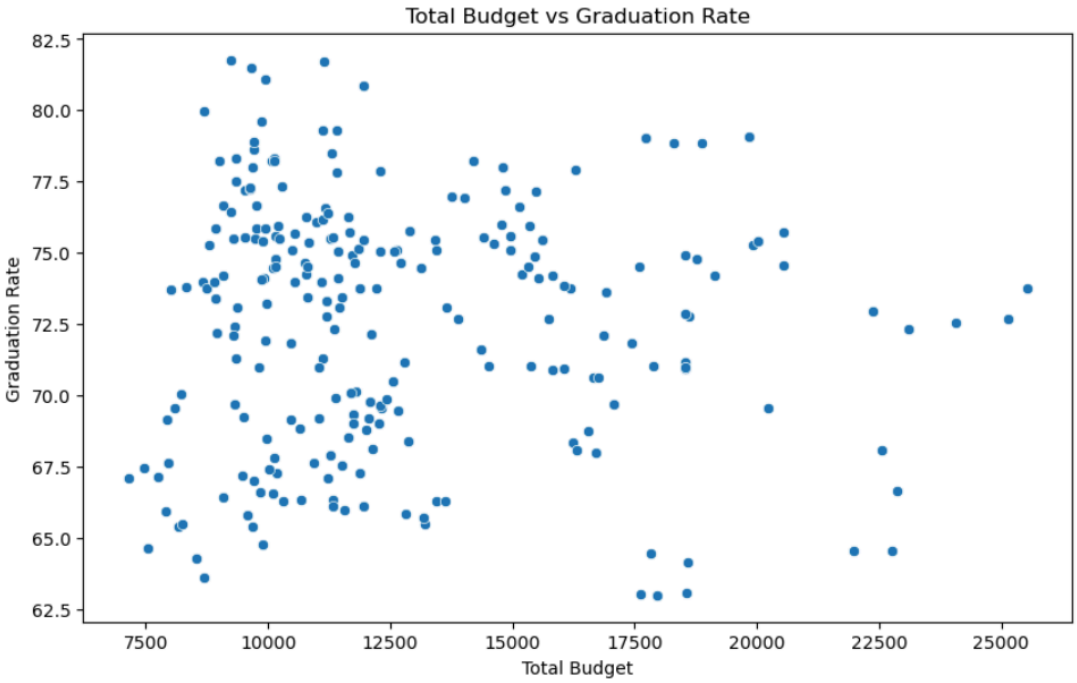
RESULTS

Summary of Key Findings with Supporting Figures:

1. Feature Importance:

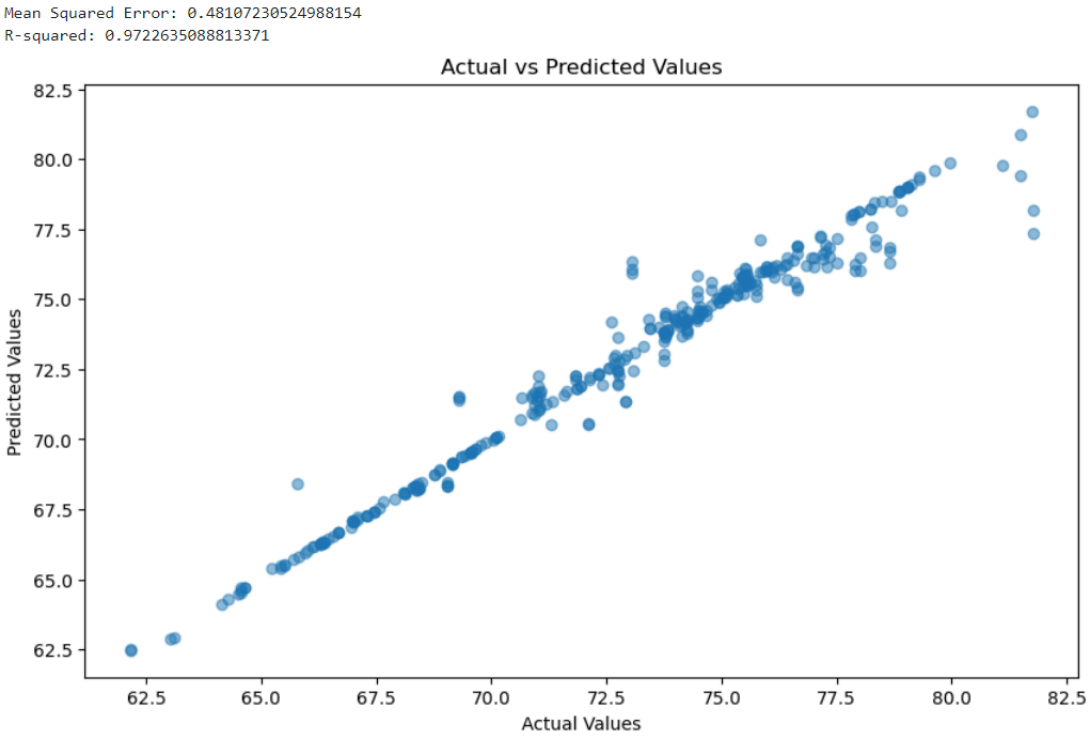
The analysis revealed that while certain factors like teacher salaries influence graduation rates, the expected strong correlation between state funding and graduation rates was not significan





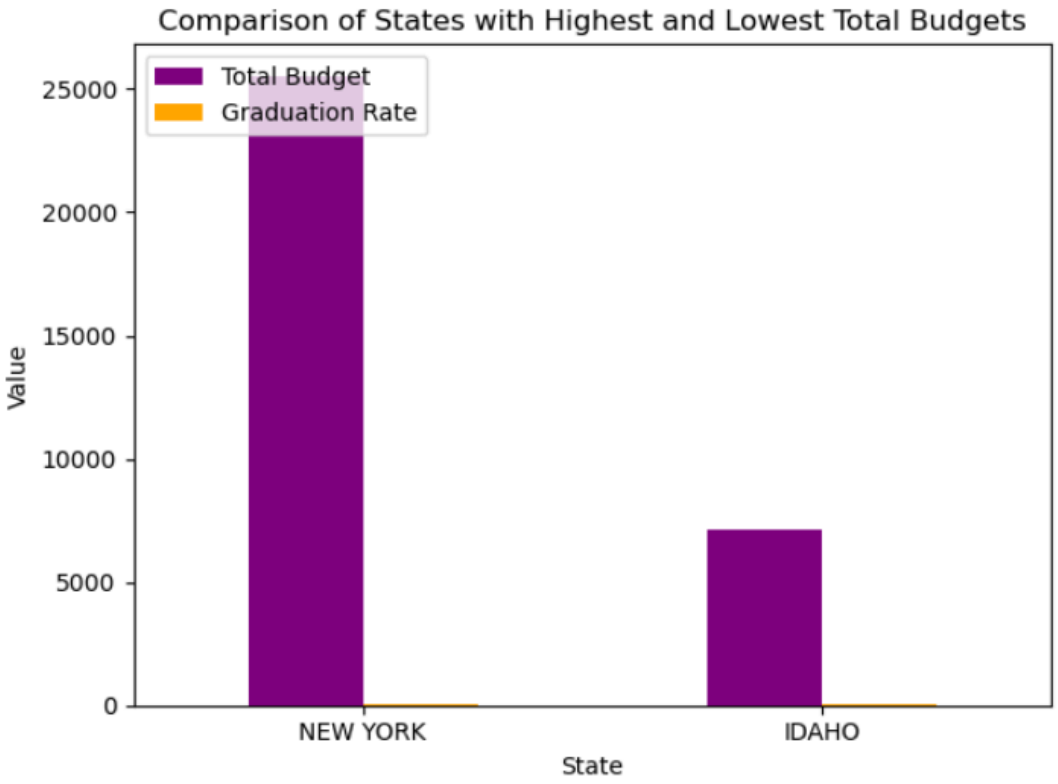
2. Model Performance:

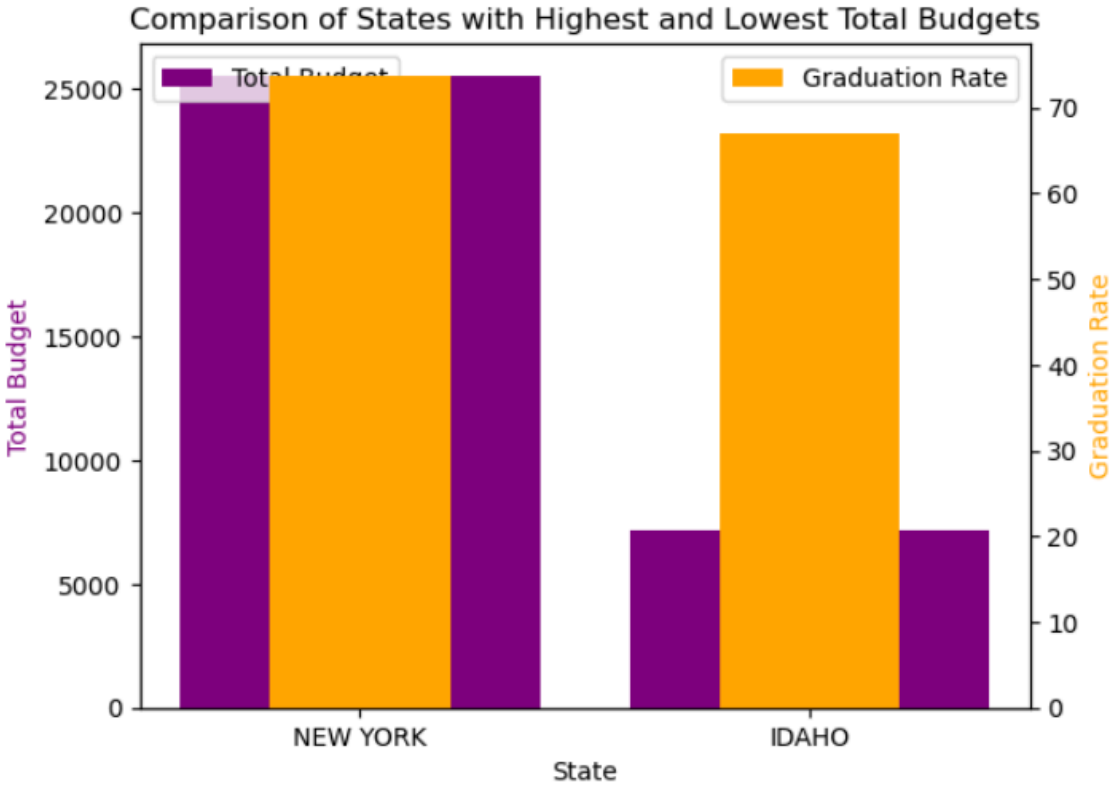
The Random Forest model demonstrated superior performance with a Mean Squared Error (MSE) of 0.481 and an R-squared value of 0.972. The Gradient Boosting model had an MSE of 0.619 and an R-squared value of 0.964.

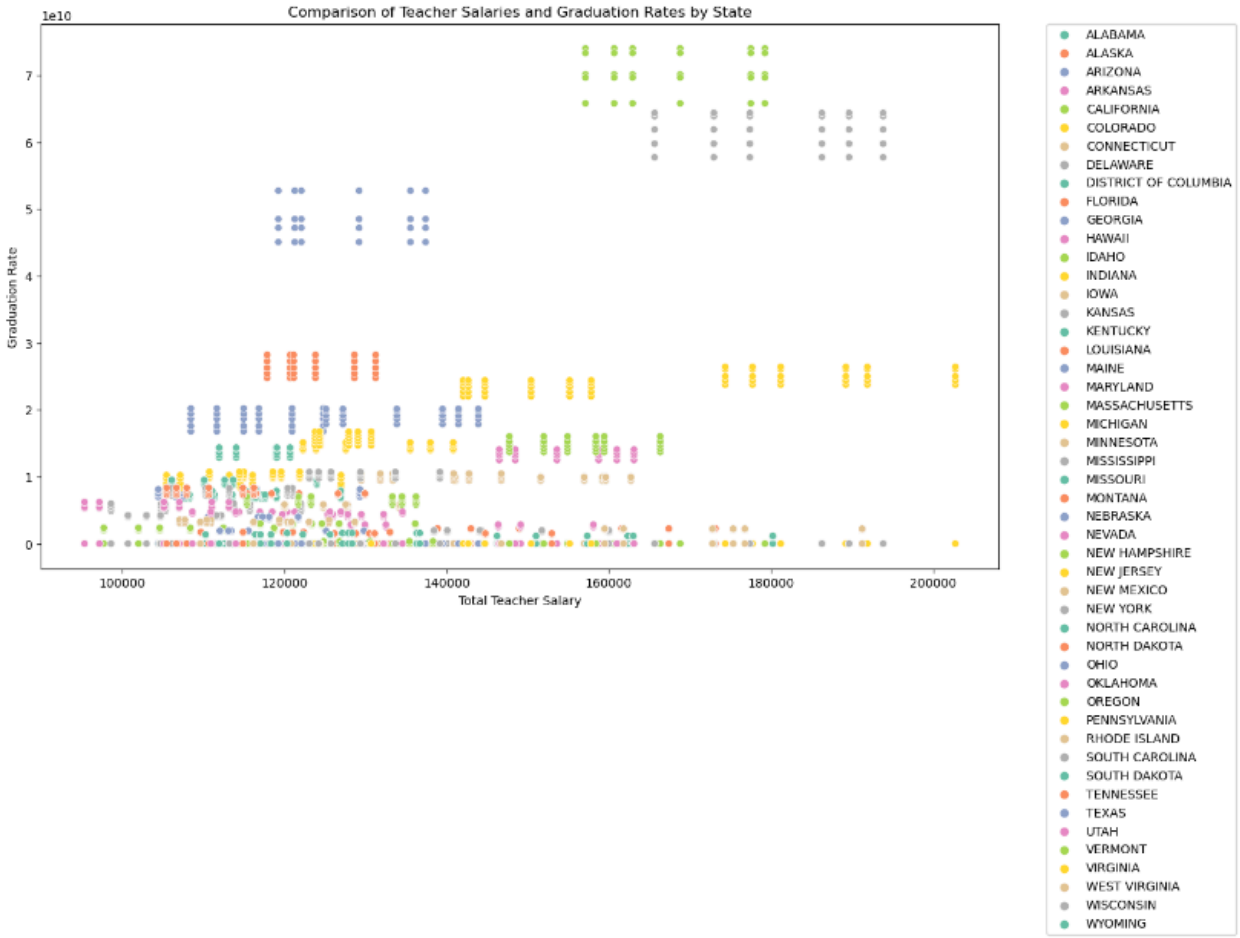


3. State Comparisons:

Visual comparisons showed that high funding does not necessarily correlate with high graduation rates.


Comparison of States with Highest and Lowest Total Budgets
Total Budget
Graduation Rate
25000
20000
15000
10000
5000
0
Value
NEW YORK
IDAHO
State


Comparison of States with Highest and Lowest Total Budgets
Graduation Rate
25000
20000
15000
10000
5000
0
Total Budget
70
60
50
40
30
20
10
0
Graduation Rate
NEW YORK
IDAHO
State



Interpretation of the Results and Potential Implications:

The findings challenge the conventional wisdom that increasing education funding alone will improve graduation rates. This suggests that other factors, such as the quality of teaching and socio-economic conditions, may play a critical role in shaping educational outcomes.

RECOMMENDATIONS

1. **Holistic Approach:** Policymakers should adopt a holistic approach that considers various factors beyond funding, such as teacher quality and socio-economic support.

2. **Targeted Interventions:** Focus on targeted interventions in states with lower graduation rates to address specific local challenges.
3. **Further Research:** Encourage further research to identify and understand other factors influencing graduation rates.

Conclusion:

This research has provided valuable insights into the multifaceted relationship between state funding and graduation rates, emphasizing the complexity and variance across different states. The findings suggest that while funding plays a significant role, it is not the sole determinant of educational outcomes. The interaction between funding levels and other educational policies, teacher quality, and socio-economic factors also significantly influences graduation rates.

Given the layered nature of educational success, future research should expand on the current study by incorporating a broader array of variables. These could include student-to-teacher ratios, access to technological resources, community support programs, and more detailed socioeconomic data. Furthermore, a longitudinal approach could help discern trends over time, offering a dynamic view of how changes in policy or economic conditions impact educational outcomes.

By deepening the understanding of these relationships, policymakers can tailor interventions more effectively, ensuring that every dollar spent has the maximum impact on student success. This study serves as a stepping stone towards a more nuanced understanding of what drives educational achievement and how we can best support it.