

2024

Analysis of SAT Performance in NYC Public Schools



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Introduction

This report presents an in-depth analysis of SAT performance across New York City (NYC) public schools. The Scholastic Assessment Test (SAT) is a standardized test widely used for college admissions in the United States. It assesses students' readiness for college, covering literacy, numeracy, and writing skills. This analysis focuses on identifying the top-performing schools in math, overall SAT scores, and exploring trends across different boroughs in NYC. Additionally, the impact of SAT scores on college admissions is discussed.

Data Overview

The dataset, `schools.csv`, contains information on various NYC public schools, including the average scores for math, reading, and writing sections of the SAT. Each section has a maximum score of 800, making the total maximum possible SAT score 2400.

Objectives

1. Identify NYC schools with the best math results.
2. Determine the top 10 performing schools based on combined SAT scores.
3. Identify the NYC borough with the largest standard deviation in combined SAT scores.
4. Analyse borough trends and provide additional insights into SAT performance.
5. Discuss the impact of SAT scores on college admissions.

Methodology

Data Processing

1. **Reading and Previewing the Data:** The dataset was loaded and previewed to understand its structure and content.

```
# Re-run this cell
import pandas as pd
import matplotlib.pyplot as plt

# Read in the data
schools = pd.read_csv("schools.csv")

# Preview the data
schools.head()
```

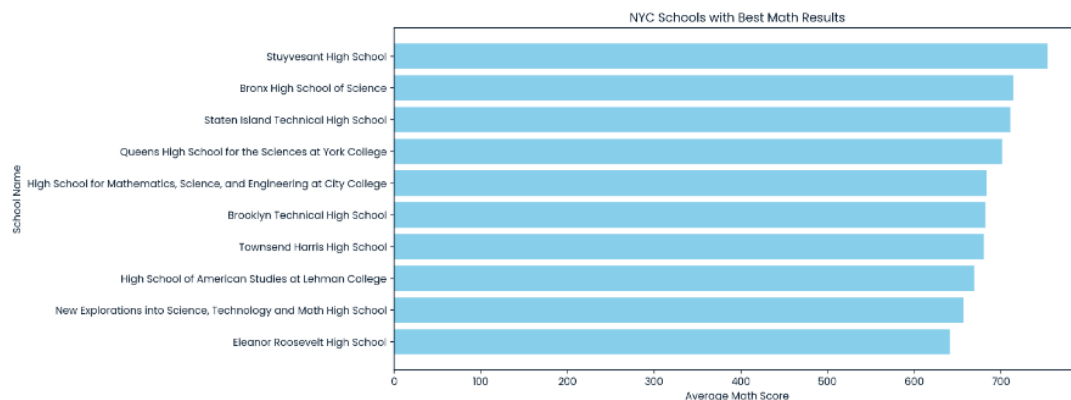
2. **Identifying Best Math Schools:** Schools with average math scores at least 80% of the maximum score (640) were identified.
3. **Calculating Total SAT Scores:** The total SAT score for each school was calculated by summing the average scores of math, reading, and writing sections.
4. **Determining Top 10 Performing Schools:** Schools were sorted by total SAT scores to identify the top 10 performers.
5. **Analysing Borough Trends:** The average and standard deviation of total SAT scores were calculated for each borough. The borough with the largest standard deviation was identified to understand performance variability.
6. **Additional Insights:** Further analysis included identifying schools with the highest reading and writing scores, and those with the lowest total SAT scores.

Visualizations

Best Math Schools

A bar chart was created to visualize the best-performing schools in math.

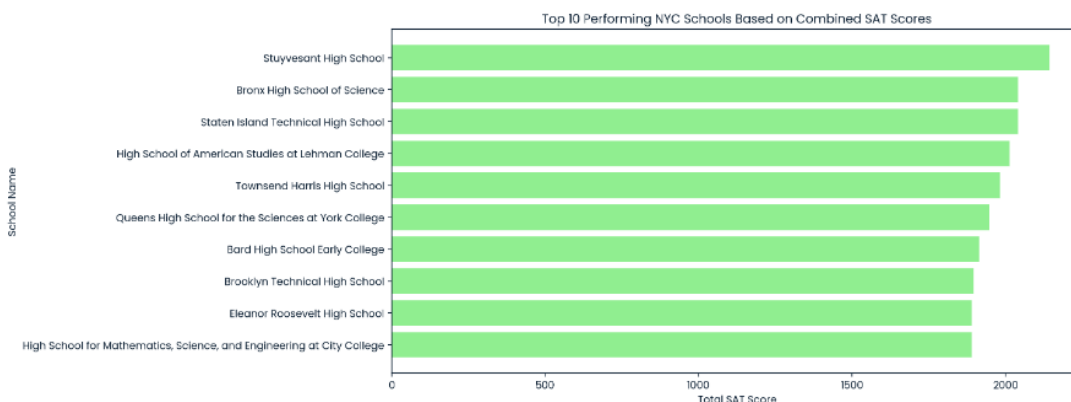
```
# Visualization for Best Math Schools
plt.figure(figsize=(12, 6))
plt.barh(best_math_schools['school_name'], best_math_schools['average_math'], color='skyblue')
plt.xlabel('Average Math Score')
plt.ylabel('School Name')
plt.title('NYC Schools with Best Math Results')
plt.gca().invert_yaxis()
plt.show()
```



Top 10 Performing Schools

A bar chart illustrating the top 10 schools based on total SAT scores.

```
# Visualization for Top 10 Performing Schools
plt.figure(figsize=(12, 6))
plt.barh(top_10_schools['school_name'], top_10_schools['total_SAT'], color='lightgreen')
plt.xlabel('Total SAT Score')
plt.ylabel('School Name')
plt.title('Top 10 Performing NYC Schools Based on Combined SAT Scores')
plt.gca().invert_yaxis()
plt.show()
```



Borough with Largest Standard Deviation in SAT Scores

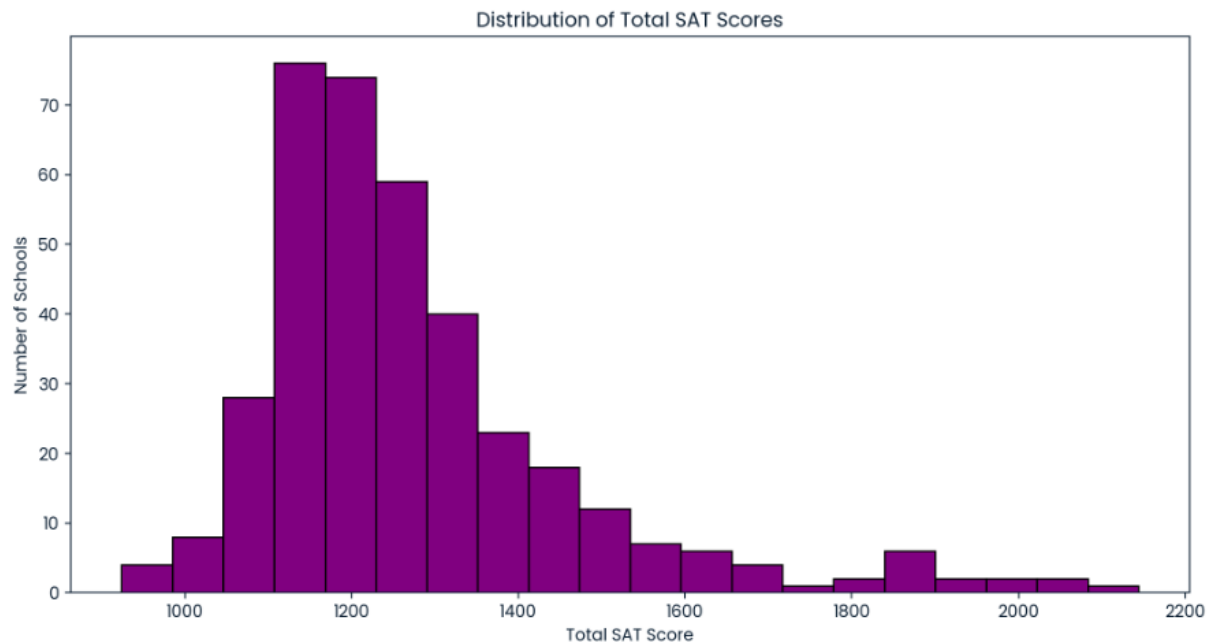
A bar chart showing the borough with the largest standard deviation in SAT scores.

```
# Visualization for Borough with Largest Standard Deviation in SAT Scores
plt.figure(figsize=(8, 6))
plt.bar(largest_std_dev['borough'], largest_std_dev['std_SAT'], color='salmon')
plt.xlabel('Borough')
plt.ylabel('Standard Deviation of Total SAT Score')
plt.title('Borough with Largest Standard Deviation in SAT Scores')
plt.show()
```

Distribution of SAT Scores

A histogram depicting the distribution of total SAT scores across all schools.

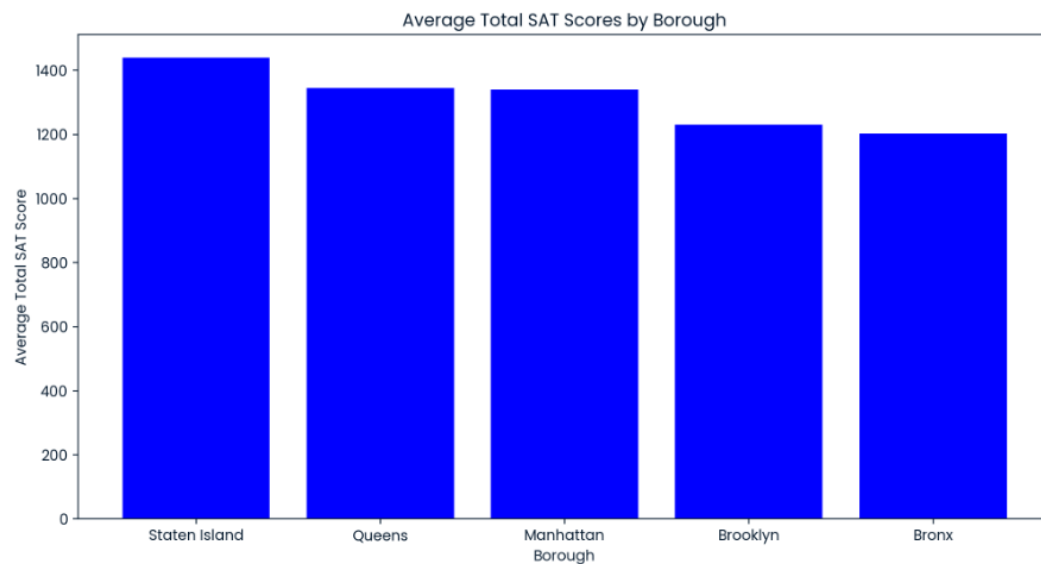
```
# Visualization of Distribution of SAT Scores
plt.figure(figsize=(12, 6))
plt.hist(schools['total_SAT'], bins=20, color='purple', edgecolor='black')
plt.xlabel('Total SAT Score')
plt.ylabel('Number of Schools')
plt.title('Distribution of Total SAT Scores')
plt.show()
```



SAT Scores by Borough

A bar chart showing the average total SAT scores by borough.

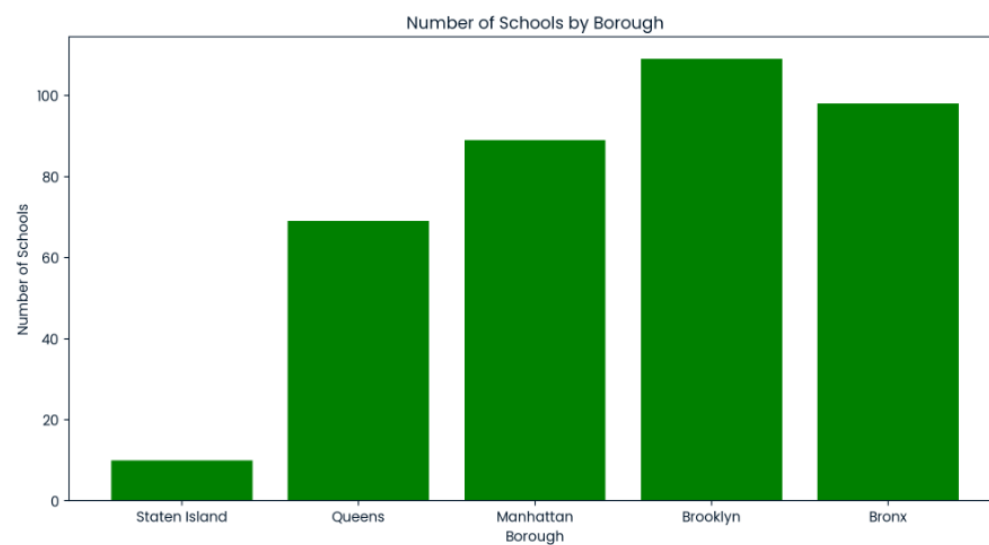
```
# Visualization of SAT Scores by Borough
plt.figure(figsize=(12, 6))
plt.bar(borough_analysis['borough'], borough_analysis['average_total_SAT'], color='blue')
plt.xlabel('Borough')
plt.ylabel('Average Total SAT Score')
plt.title('Average Total SAT Scores by Borough')
plt.show()
```



Number of Schools by Borough

A bar chart illustrating the number of schools in each borough.

```
# Visualization of Number of Schools by Borough
plt.figure(figsize=(12, 6))
plt.bar(borough_analysis['borough'], borough_analysis['num_schools'], color='green')
plt.xlabel('Borough')
plt.ylabel('Number of Schools')
plt.title('Number of Schools by Borough')
plt.show()
```



Results

Best Math Schools

The schools with the highest average math scores are:

1. Stuyvesant High School: 754
2. Bronx High School of Science: 714
3. Staten Island Technical High School: 711

Top 10 Performing Schools

The top 10 schools based on total SAT scores are:

1. Stuyvesant High School: 2144
2. Bronx High School of Science: 2041
3. Staten Island Technical High School: 2041

Borough with Largest Standard Deviation

Manhattan has the largest standard deviation in total SAT scores, indicating the highest variability in school performance within this borough.

Additional Insights

- **Best Reading and Writing Schools:** Stuyvesant High School, High School of American Studies at Lehman College, and Bronx High School of Science excel in both reading and writing.
- **Lowest SAT Schools:** Pan American International High School at Monroe and Multicultural High School have the lowest total SAT scores.

Borough Analysis

- **Highest Average SAT Score:** Staten Island
- **Most Schools:** Brooklyn
- **Lowest Average SAT Score:** Bronx

Impact of SAT Scores on College Admissions

SAT scores significantly influence college admissions by serving as a standardized measure for comparing students across different educational backgrounds. High SAT scores can enhance admission chances, qualify students for scholarships, and allow placement in advanced courses. Conversely, low SAT scores may necessitate remedial courses. Additionally, some colleges adopt test-optional policies to promote diversity and inclusion.

Borough Trends Analysis

The SAT performance analysis across different NYC boroughs reveals distinct trends and insights. Each borough exhibits unique characteristics in terms of average SAT scores, the number of schools, and variability in performance. This section delves into these aspects to provide a comprehensive understanding of how each borough fares in terms of SAT scores.

Average Total SAT Scores by Borough

Staten Island has the highest average total SAT score among all boroughs, indicating overall better performance of its schools in standardized testing. This suggests that schools in Staten Island may have better resources, teaching quality, or student preparedness.

Queens and **Manhattan** also show relatively high average SAT scores. The presence of specialized and highly competitive schools in these boroughs, such as Townsend Harris High School in Queens and Stuyvesant High School in Manhattan, contributes to these higher averages.

Brooklyn and **Bronx** have lower average SAT scores compared to the other boroughs. This could point to challenges such as larger class sizes, fewer resources, or socioeconomic factors impacting student performance.

Number of Schools by Borough

Brooklyn has the highest number of schools among the boroughs, reflecting its large and diverse student population. The sheer number of schools contributes to a wide range of SAT performance levels, from top-performing schools to those facing significant challenges.

Manhattan follows with a substantial number of schools, many of which are specialized or magnet schools known for their rigorous academic programs. This contributes to the higher variability in SAT scores observed in Manhattan.

Bronx also has a significant number of schools but, like Brooklyn, struggles with lower average SAT scores. This highlights the need for targeted interventions and support to improve student outcomes in these boroughs.

Queens and **Staten Island** have fewer schools compared to Brooklyn and Manhattan but demonstrate relatively strong average SAT performance. This indicates that these boroughs may benefit from more focused resource allocation and possibly smaller school sizes, contributing to better student performance.

Variability in SAT Scores

Manhattan has the largest standard deviation in total SAT scores, indicating the highest variability in performance among its schools. This can be attributed to the presence of both elite specialized high schools and schools that may struggle with fewer resources and support.

Brooklyn and **Bronx** also show notable variability, reflecting a wide range of educational outcomes within these boroughs. The diverse student populations and varying school qualities contribute to this trend.

Visualization of Borough Trends

The following visualizations provide a clear representation of these trends:

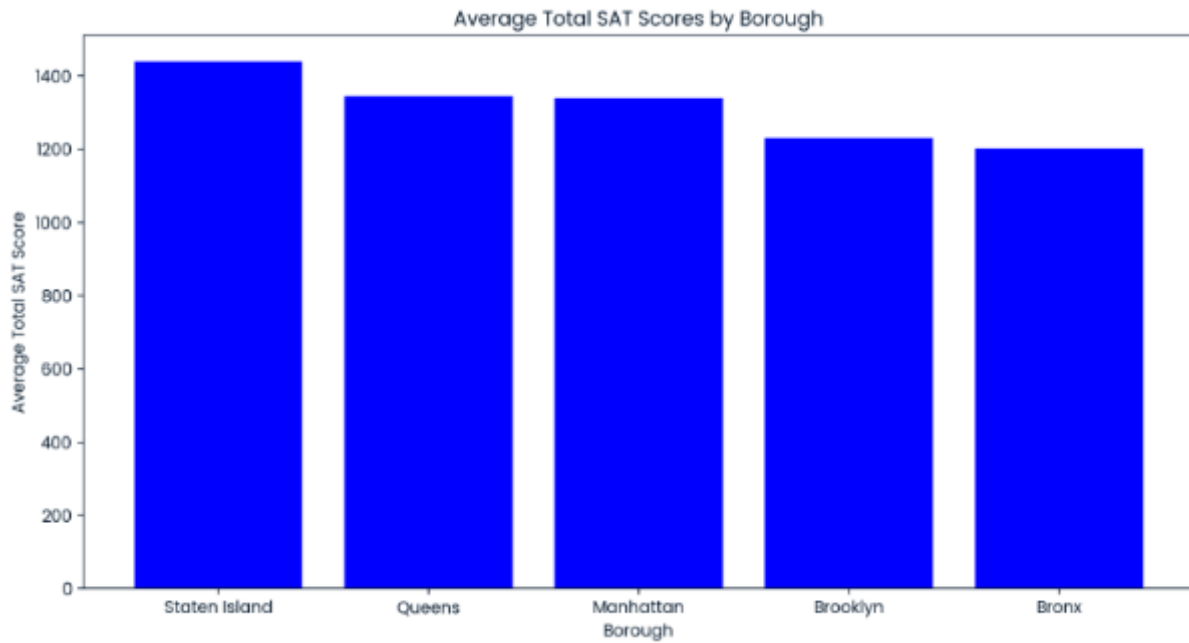


Figure 1: Average Total SAT Scores by Borough

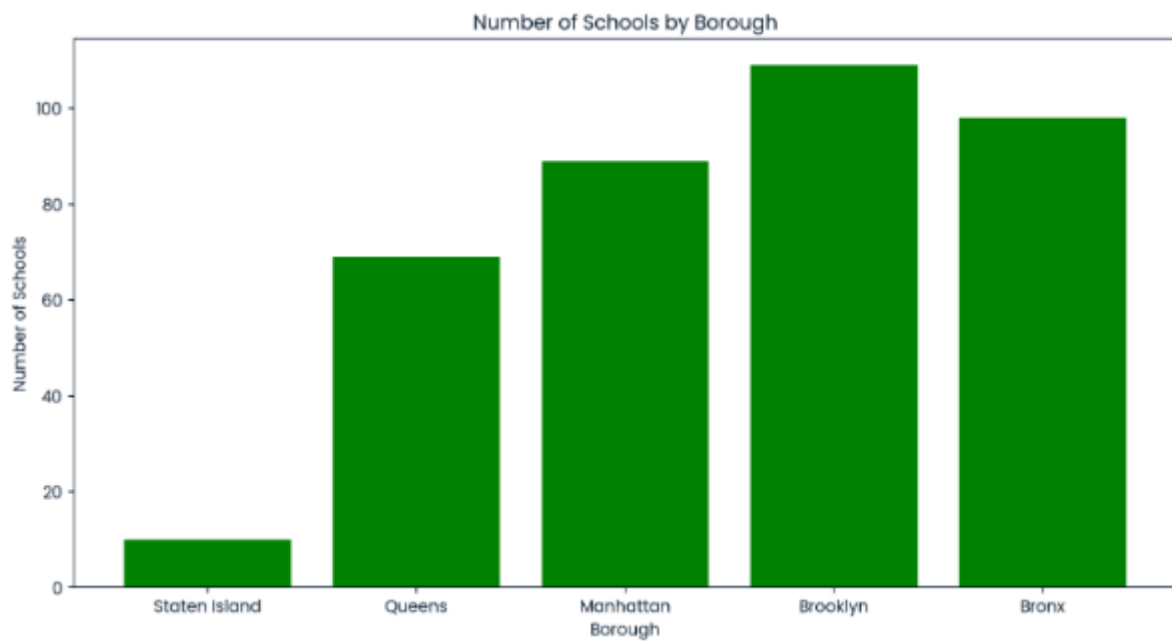


Figure 2: Number of Schools by Borough

Insights and Recommendations

The analysis of borough trends provides several key insights:

1. **Resource Allocation:** Boroughs with lower average SAT scores, such as Brooklyn and Bronx, may benefit from increased funding and resources to support underperforming schools. Targeted programs to address specific challenges in these areas can help improve student outcomes.
2. **Support for High Variability Boroughs:** Manhattan, with its high variability in SAT scores, needs targeted interventions for schools on the lower end of the performance spectrum. Sharing best practices from top-performing schools within the borough could help elevate overall performance.
3. **Focus on Student Preparedness:** Boroughs like Staten Island and Queens, which show strong average performance, can serve as models for student preparedness programs. Implementing similar strategies in other boroughs could help boost SAT scores across the city.
4. **Community and Parental Involvement:** Engaging the community and parents in the educational process is crucial. Programs that foster greater involvement can lead to better student support systems and improved academic performance.

By understanding and addressing the unique needs and challenges of each borough, stakeholders can work towards enhancing the overall quality of education and ensuring that all students have the opportunity to succeed in their SATs and subsequent college admissions processes.

Conclusion

The borough trends analysis underscores the importance of a nuanced approach to educational support and resource distribution in NYC. Recognizing the distinct characteristics and needs of each borough can inform more effective policies and interventions, ultimately leading to improved educational outcomes for all students.

This analysis provides valuable insights into SAT performance across NYC public schools, highlighting top-performing schools and borough trends. Understanding these patterns can aid policymakers, educators, and parents in making informed decisions to improve educational outcomes and support student success in college admissions.