Data-Driven Routes: Citi bike Program Analysis

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Introduction

As New York's bike-sharing program thrives, we embark on a data-driven quest to enhance its journey. This analysis paper aims to address key aspects of the Citi Bike program in order to keep the program operating at peak performance. For this analysis, Citi Bike data from January 2023 and April 2023 was used to gain insight into how the program operates in different seasons.

By delving into the data, we will closely examine the impact of weather on ridership patterns, discern differences between member and public ride habits, and individual station activity. With these insights, the Citi Bike program can make informed decisions to improve station maintenance, enhance member satisfaction, and assess the success of its electric bike initiative after its fifth year in operation.

Analysis – Member vs Non-member Activity

The analysis of the Citi Bike data has provided valuable insights into user behavior within the program. It is evident that most users are members, utilizing the bikes primarily for shorter commutes with the average member ride time on classic bikes being 7.1 mins in January and only 7.3 mins in April. However, as the weather warms up, we observe an increase in casual users who embark on slightly longer rides on casual bikes as the average ride time increases from 9.8 mins in January to 13.1 mins in April. Ride trends on electric bikes follow the same trends as rides on the classic bikes. The end station map reveals an interesting trend, wherein casual riders tend to return bikes to stations located farther from Manhattan compared to members. With these findings in mind, causal use riders seem to be putting slightly more wear and tear on the bikes than members.

While conducting a thorough examination of the data, one concerning aspect that emerged was the presence of "Null End Station" data, requiring further investigation to grasp its significance. Are bikes simply not being returned -or is there another explanation for this phenomenon?

Analysis – Deeper Dive into the Electric Bikes in the Program

The data analysis highlights a crucial need for information on the total number of electric and classic bikes in circulation. This knowledge is essential to determine whether people genuinely prefer classic bikes over electric ones or, if there is a scarcity of electric bikes at each station, which is influencing user choices. Riders do exhibit a slight preference for electric bikes when the weather is colder with members using the electric bikes for 19% of their rides in January and only 15% in April. While the current data suggests that adding more electric bikes may not yield significant benefits, it is imperative to recognize that this snapshot may not encapsulate the entire narrative. A little extra research found that:

“Electric **bikes require more maintenance than regular bikes due to their additional components, such as motors, batteries, and electrical systems. Regular maintenance is essential to prolong the bike’s lifespan. Have the motor checked every six months and get the bike serviced after 1,000 miles.” (Source :** <https://www.godownsize.com/electric-bikes-high-maintenance/>**) .**

When considering the maintenance needs for electric and classic bikes, strategic planning becomes paramount. Electric bike maintenance should be prioritized during the summer months, as data indicates increased usage during adverse weather conditions. On the other hand, classic bike maintenance should be focused on the winter months, coinciding with their peak usage as the weather warms.

Our findings emphasize the significance of central Manhattan stations, which experience the highest levels of usage from both members and casual users. A well-structured rotation system for maintenance, coupled with the temporary utilization of bikes from less frequented stations, can ensure seamless and efficient operations. Understanding the factors driving the popularity of these stations can further enhance the overall efficiency and accessibility of the Citi Bike program.

It is also worth noting that because people tend to be checking bikes in and out of stations that are all centrally located and not riding them for a great duration, people may have found that paying extra for an electric bike has not been worth the few extra dollars as it only decreased the average ride time by a couple minutes. In areas that are more spread out and where people are going to be riding uphill or over a long distance the electric bike holds obvious benefits but for short commutes the electric bike does not hold much benefit over a classic bike.

Conclusion

As we conclude this analysis, the data from member and non-member use of the bikes suggests that gathering Member-ID and Bike-ID information once would provide deeper insight into improving the program. Collecting Member-ID would help to more accurately assess the current membership base and their habits. Additionally, gathering Bike-ID information might provide more insight into the issue of the null data and it would give the program more insight into the wear and tear of each of their individual bikes.

Based on lack of data it is difficult to say if people are happy with the electric bike program or not; even though we cannot come to a conclusion on user satisfaction, the data suggests caution in adding more e-bikes due to their higher maintenance costs. Batteries' regular wear and tear necessitate replacements and charging stations, making summer months an opportune time for their maintenance. It would be best to structure classic bike maintenance for the winter months when people have a slight preference for the electric bike.

Considering the findings, implementing the recommendations outlined in this paper holds the potential to elevate the Citi Bike program to new heights of efficiency and user satisfaction. By focusing on strategic maintenance, optimizing station locations, and exploring avenues to enhance membership, New York's bike-sharing program can continue to thrive, offering a sustainable and accessible transportation option for the city's residents.