Cyclistic bike-share analysis

How Does a Bike-Share Navigate Speedy Success?

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Scenario

You are a junior data analyst working in the marketing analyst team at Cyclistic, a bike-share company in Chicago. The director of marketing believes the company's future success depends on maximizing the number of annual memberships. Therefore, your team wants to understand how casual riders and annual members use Cyclistic bikes differently. From these insights, your team will design a new marketing strategy to convert casual riders into annual members. But first, Cyclistic executives must approve your recommendations, so they must be backed up with compelling data insights and professional data visualizations.

Characters and teams

Cyclistic: A bike-share program that features more than 5,800 bicycles and 600 docking stations. Cyclistic sets itself apart by also offering reclining bikes, hand tricycles, and cargo bikes, making bike-share more inclusive to people with disabilities and riders who can't use a standard two-wheeled bike. The majority of riders opt for traditional bikes; about 8% of riders use the assistive options. Cyclistic users are more likely to ride for leisure, but about 30% use them to commute to work each day.

About the company

In 2016, Cyclistic launched a successful bike-share offering. Since then, the program has grown to a fleet of 5,824 bicycles that are geotracked and locked into a network of 692 stations across Chicago. The bikes can be unlocked from one station and returned to any other station in the system anytime.

Until now, Cyclistic's marketing strategy relied on building general awareness and appealing to broad consumer segments. One approach that helped make these things possible was the flexibility of its pricing plans: single-ride passes, full-day passes, and annual memberships. Customers who purchase single-ride or full-day passes are referred to as casual riders. Customers who purchase annual memberships are Cyclistic members.

Cyclistic's finance analysts have concluded that annual members are much more profitable than casual riders. Although the pricing flexibility helps Cyclistic attract more customers.

Ask

Exploring User Behavior: Annual Members vs. Casual Riders - A Comparative Analysis of Cyclistic Bike Trips to discover how annual members and casuals use Cyclistic bikes differently.

Prepare

Data Source: Ride data

Type of Data: Time-series data

Format: CSV file

Collection Period: August 2022 to July 2023

Description: This data source provides a comprehensive daily history of how different user types utilize our bicycle rental services. It includes detailed information on ride dates, bicycle types used, and the geographical coordinates of both the starting and ending points of each ride. The data was meticulously recorded and collected from our internal system, which serves as a valuable resource for understanding user preferences.

Process

During the data analysis, several data cleaning and manipulation steps were taken to ensure the accuracy and relevance of the dataset. Here's a description of the cleaning and data manipulation processes applied:

1. Exclusion of Zero-Distance Rides:
   To conduct accurate distance analysis, rides that have both the start and end stations at the same location were excluded. These rides result in a zero-distance value, which could potentially interfere with distance-related calculations. Therefore, all such rides were removed from the dataset.

2. Calculation of Ride Length:
   A new variable named "ride_length" was created to measure the duration of each ride. This variable is calculated as the time difference between the "ended_at" and "started_at" timestamps. However, during the analysis, it was observed that the dataset contained negative values and zero values for ride lengths. These anomalies were considered input errors and were subsequently removed from the data frame to ensure the accuracy of ride duration analysis.

3. Time of Day Categorization:
   To analyze ride trends based on the time of day, a new variable called "time_of_day" was declared. It categorizes rides into four distinct time periods: "Night," "Morning," "Afternoon," and "Evening." Each time period is defined by specific hours, with "Night" spanning from midnight (00:00) to 6:00, "Morning" from 6:00 to 12:00, "Afternoon" from 12:00 to 18:00, and "Evening" from 18:00 to 23:59.

4. Seasonal Categorization:
   The dataset includes a variable called "seasons," which was used to categorize rides based on the season during which they occurred. The default setup for determining seasons follows the traditional seasonal divisions:

Winter: December, January, February
Spring: March, April, May
Summer: June, July, August
Autumn: September, October, November

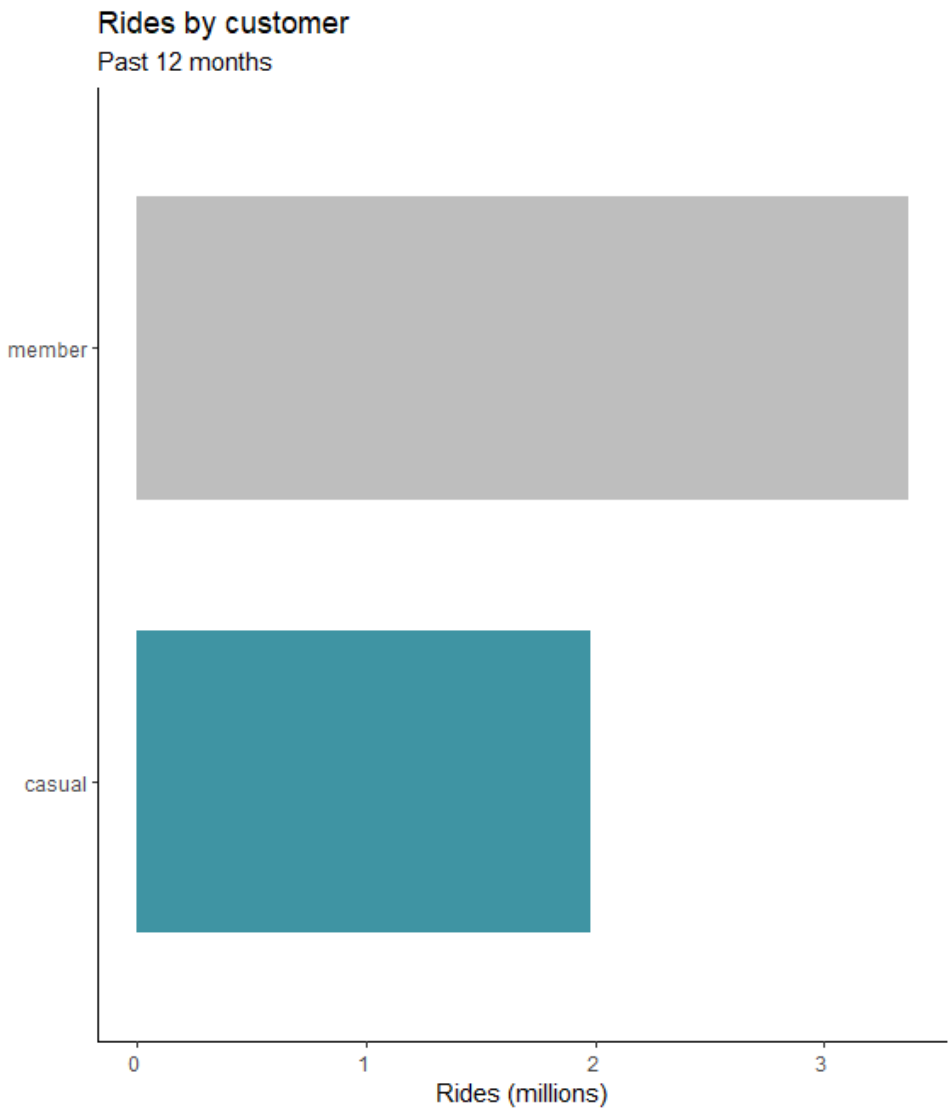
5. Station Coordinate Averaging:
   Minor variations in latitude and longitude coordinates for station locations were observed. To create a cleaner and more straightforward representation of popular ride starting and ending locations, the coordinates for each station were determined as the mean latitude and longitude values. This process helps to reduce the impact of minor fluctuations in station coordinates when visualizing popular locations.

These data cleaning and manipulation steps help ensure that the dataset is free of anomalies, provides accurate ride duration information, and categorizes rides in a meaningful way for further analysis, including distance, time of day, and seasonal trends.

Analyze

Rides by cyclist type:

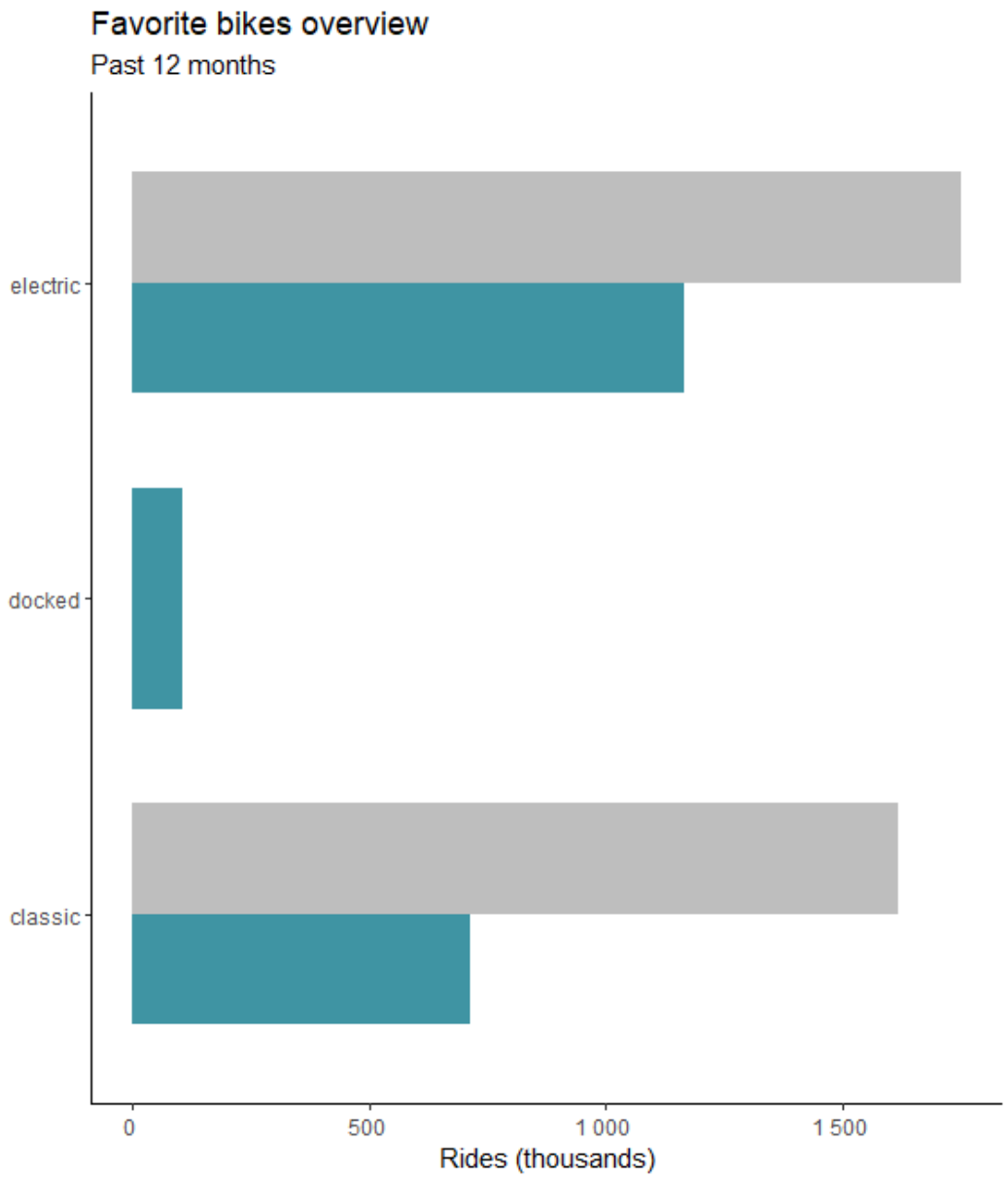
- Members accounted for the majority of rides, representing 63% of the total.
- Casual users made up the remaining 37% of rides.
- The difference in the number of rides between annual members and casual users was more than one million, indicating a clear preference for the service among annual members.



Favorite Bicycle Types:

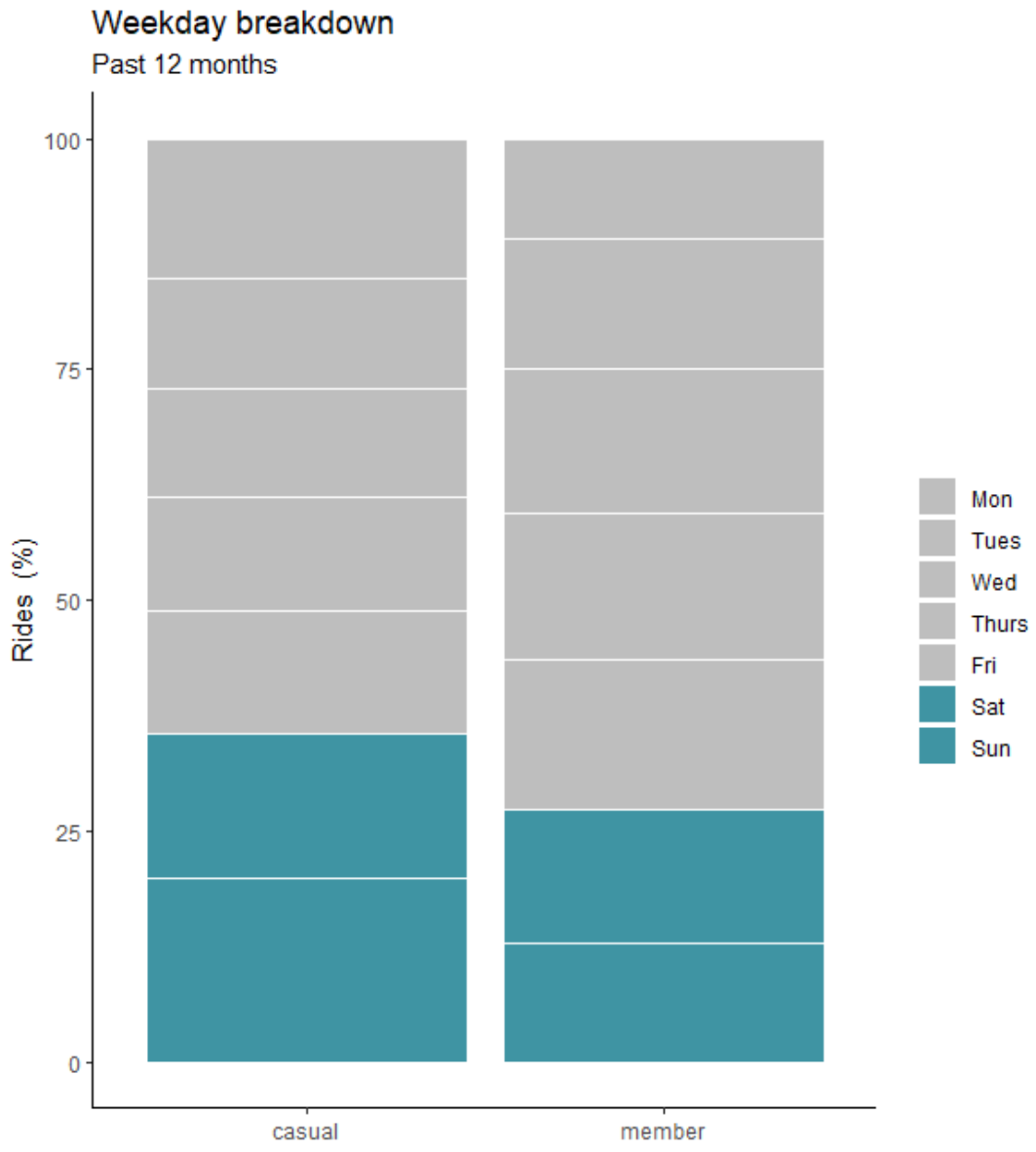
- Electric bicycles were the preferred choice for both annual members and casual users.
- Annual members preferred electric bicycles at a rate of 52%.
- Casual users also favored electric bicycles, with a preference rate of 59%.
- Classic bicycles were the second choice, with 48% preference among annual members and 36% among casual users.

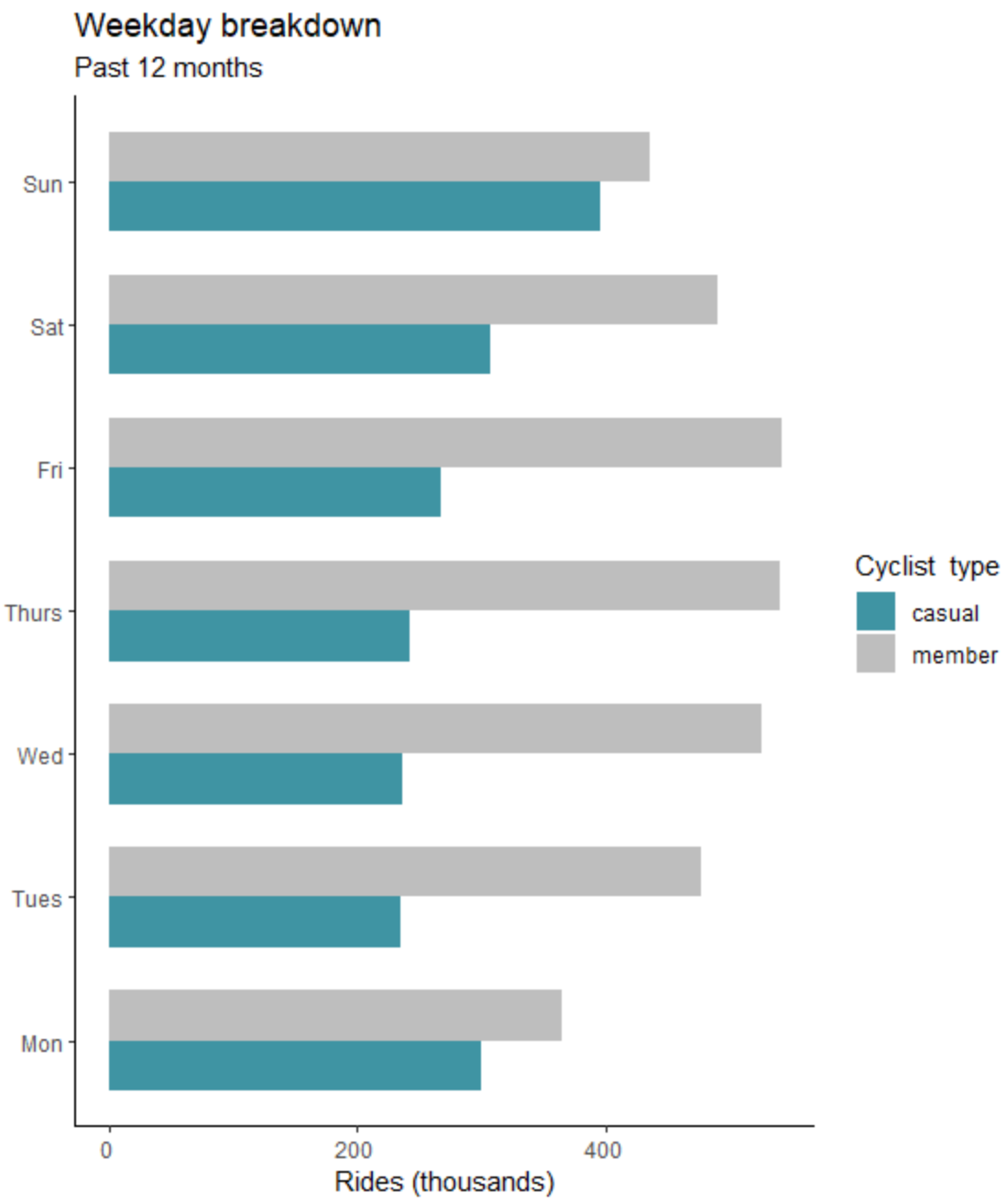
Docked devices were used exclusively by casual users, making up 5% of their preferences.



Weekday Usage:

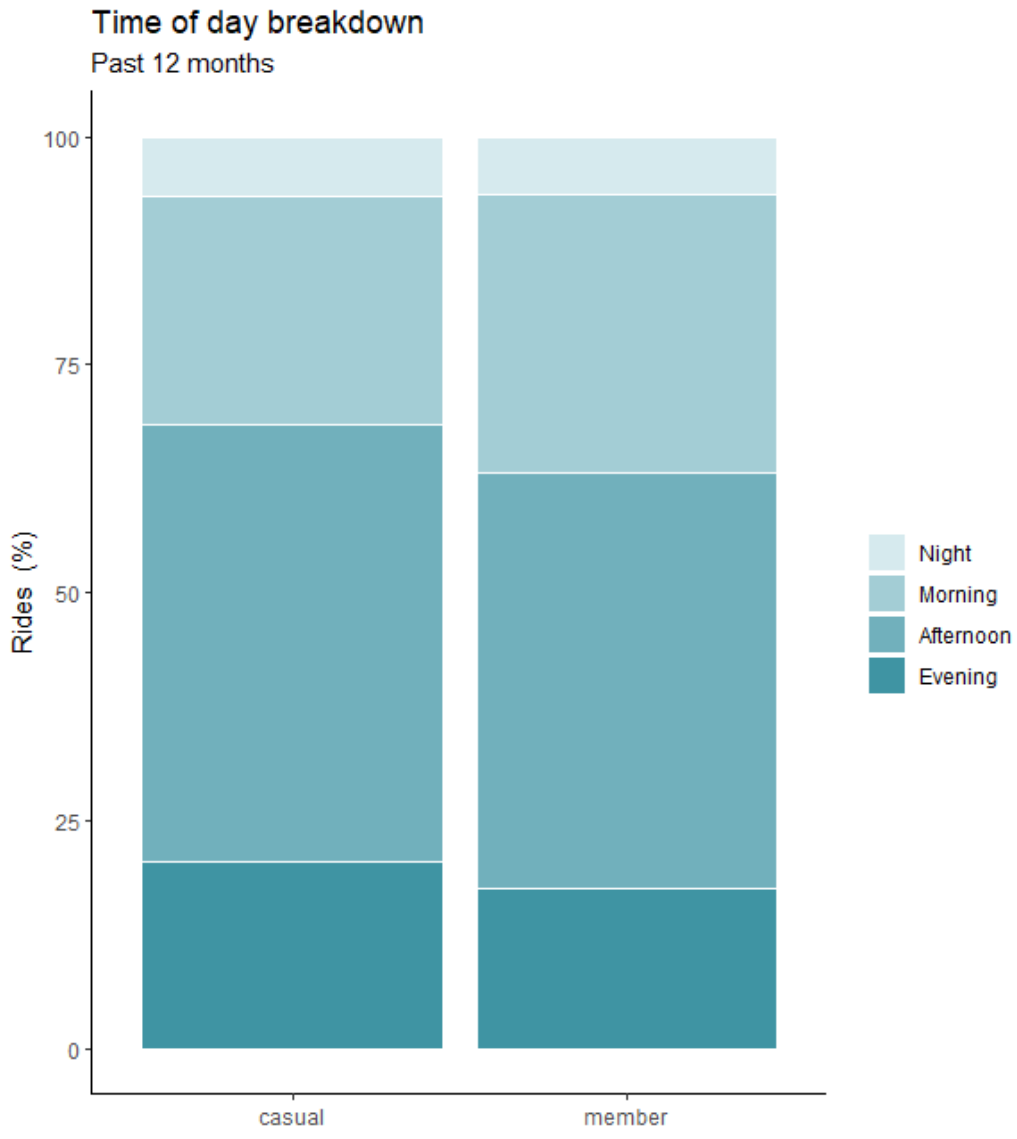
- Casual users showed a significant increase in rides during weekends, with an additional 95,977 rides taken.
- In contrast, annual members had a decrease of 26,641 rides during the weekdays (Monday, Tuesday, Thursday, Wednesday, and Friday).




Weekday breakdown
Past 12 months
Sun
Sat
Fri
Thurs
Wed
Tues
Mon
0
200
400
Rides (thousands)
Cyclist type
casual
member

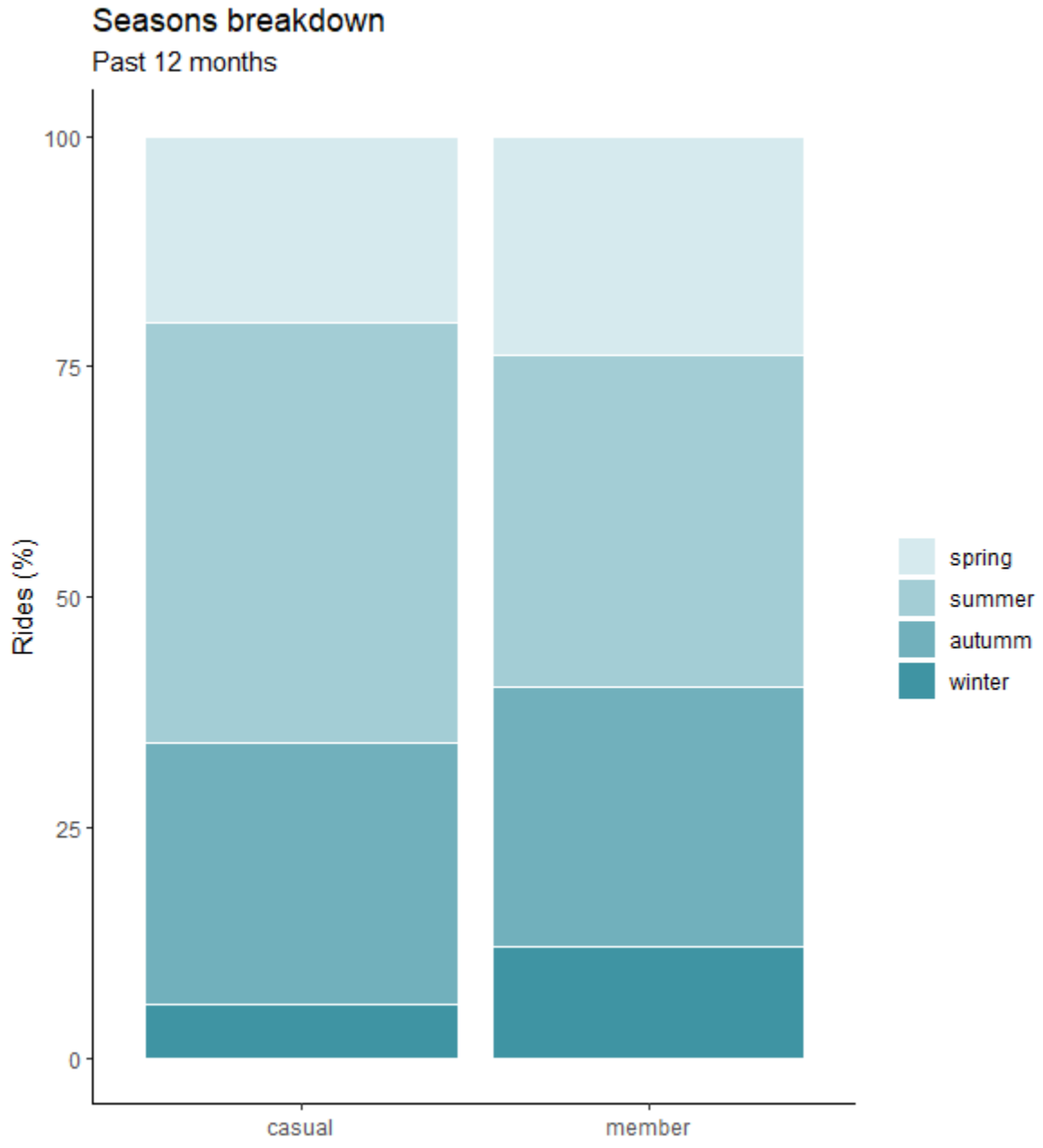
Time of Day Usage:

- Afternoons were the most popular time of day for both members and casual users.
- Casual users used the service the most in the afternoon, accounting for 48.01% of their rides.
- Members also favored the afternoon, with 45.63% of their rides occurring during this time.



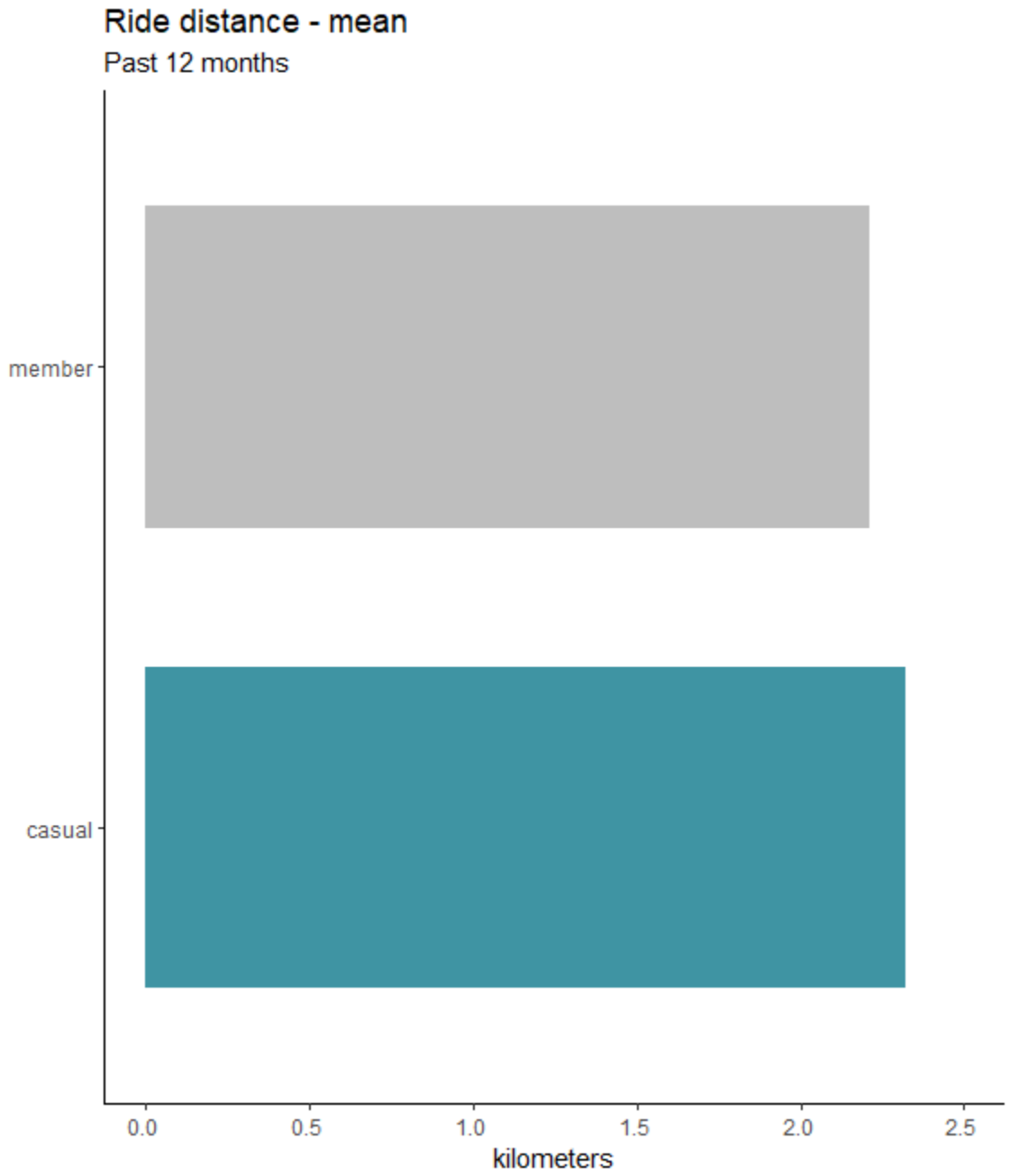
Seasonal Trends:

- Casual users displayed a significant increase in rides during the summer 45.61%, with August being the peak month for them 16.62%
- For annual members, ride usage remained relatively constant throughout the year, with an increase during the summer 36.16%



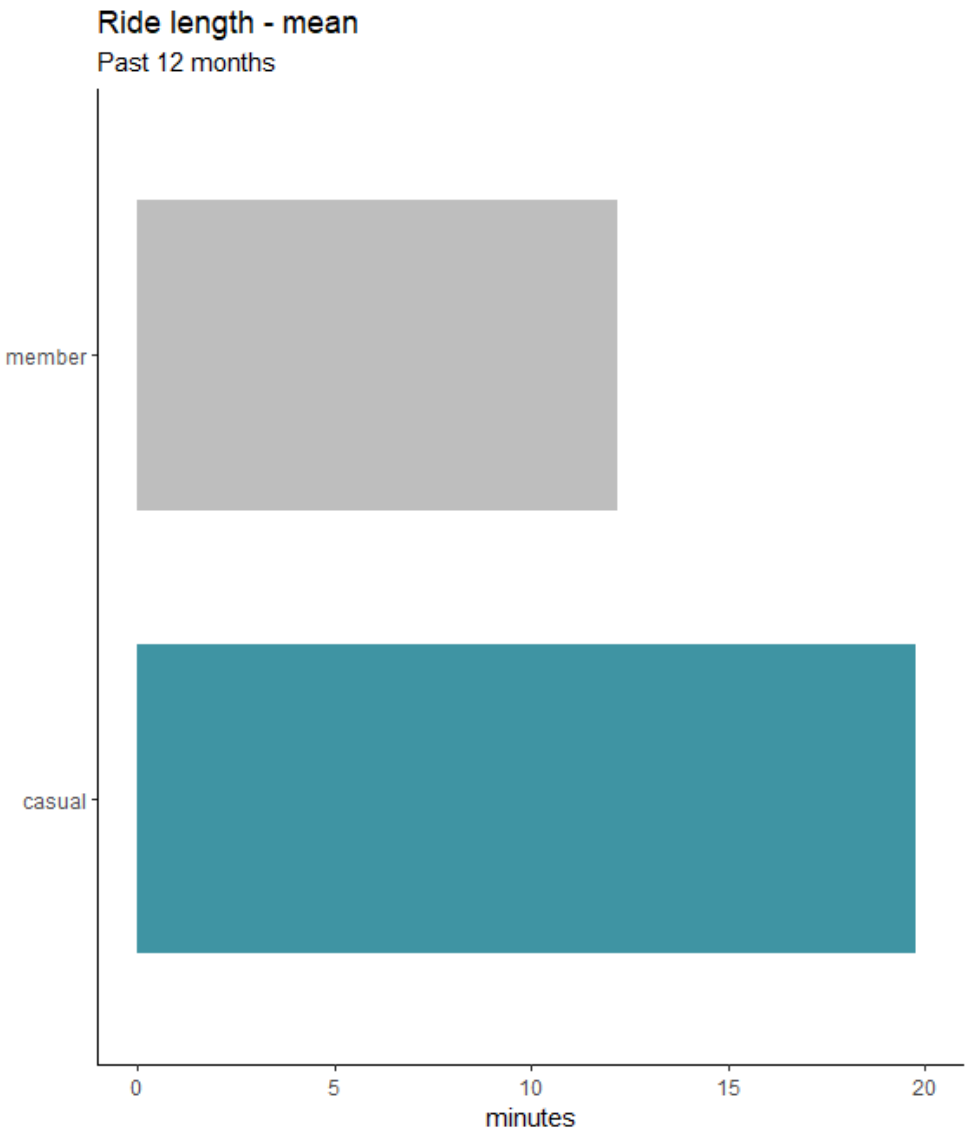
Distance:

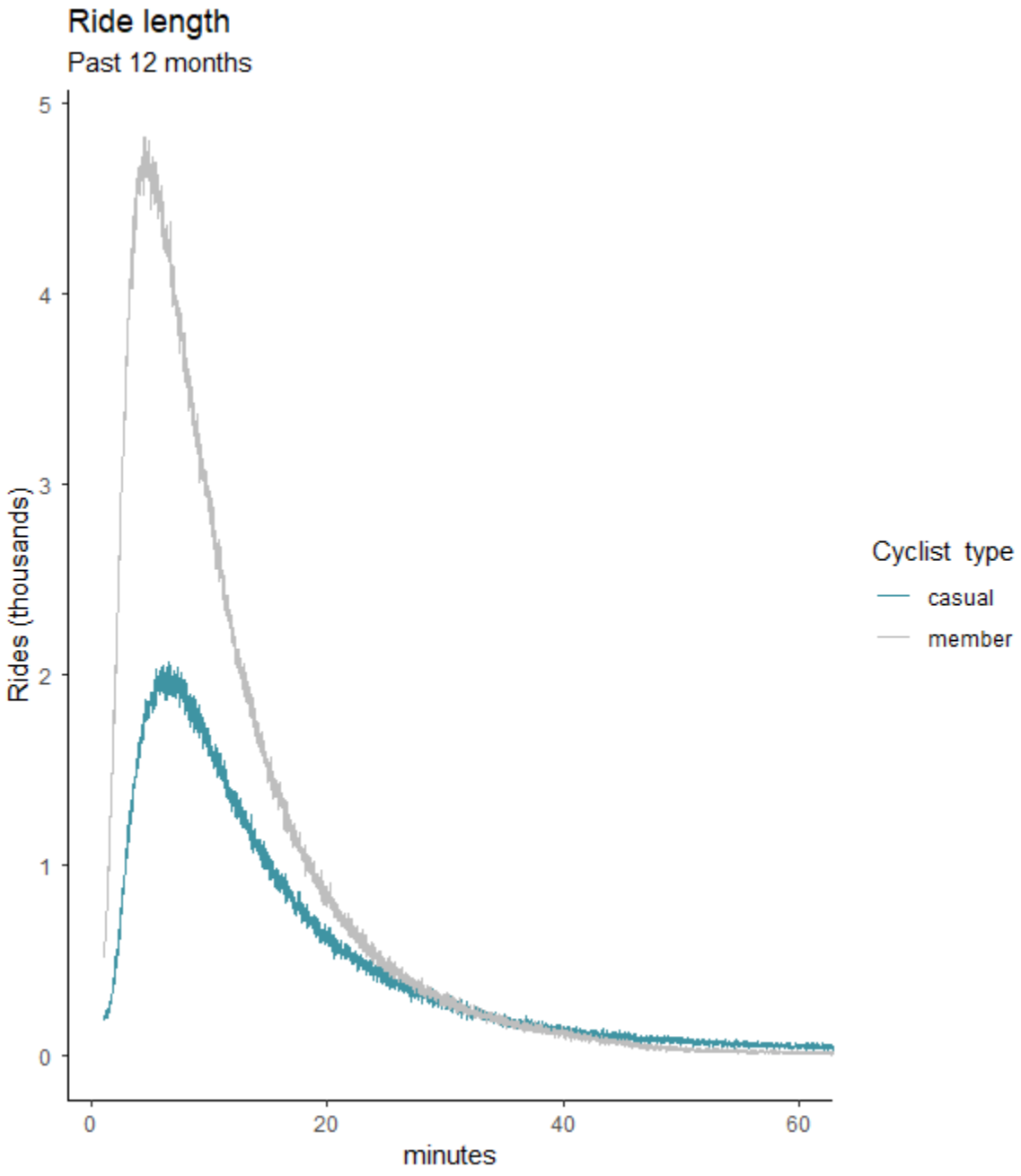
- On average, both casual users and members completed rides with an average distance of approximately 2.3 kilometers.
- For members, the average ride distance was slightly shorter at 2.2 kilometers.



Ride Length:

- Casual users had an average ride duration of 19.74 minutes.
- Members, on the other hand, had shorter average ride durations, with an average of 12.2 minutes.
- Notably, casual users tend to have substantially longer rides, with a clear distinction emerging when the ride duration exceeds 40 minutes. This suggests that casual riders often opt for more extended journeys compared to annual members.




Ride length
Past 12 months
Rides (thousands)
5
4
3
2
1
0
0
20
40
60
minutes
Cyclist type
casual
member

Most popular start stations

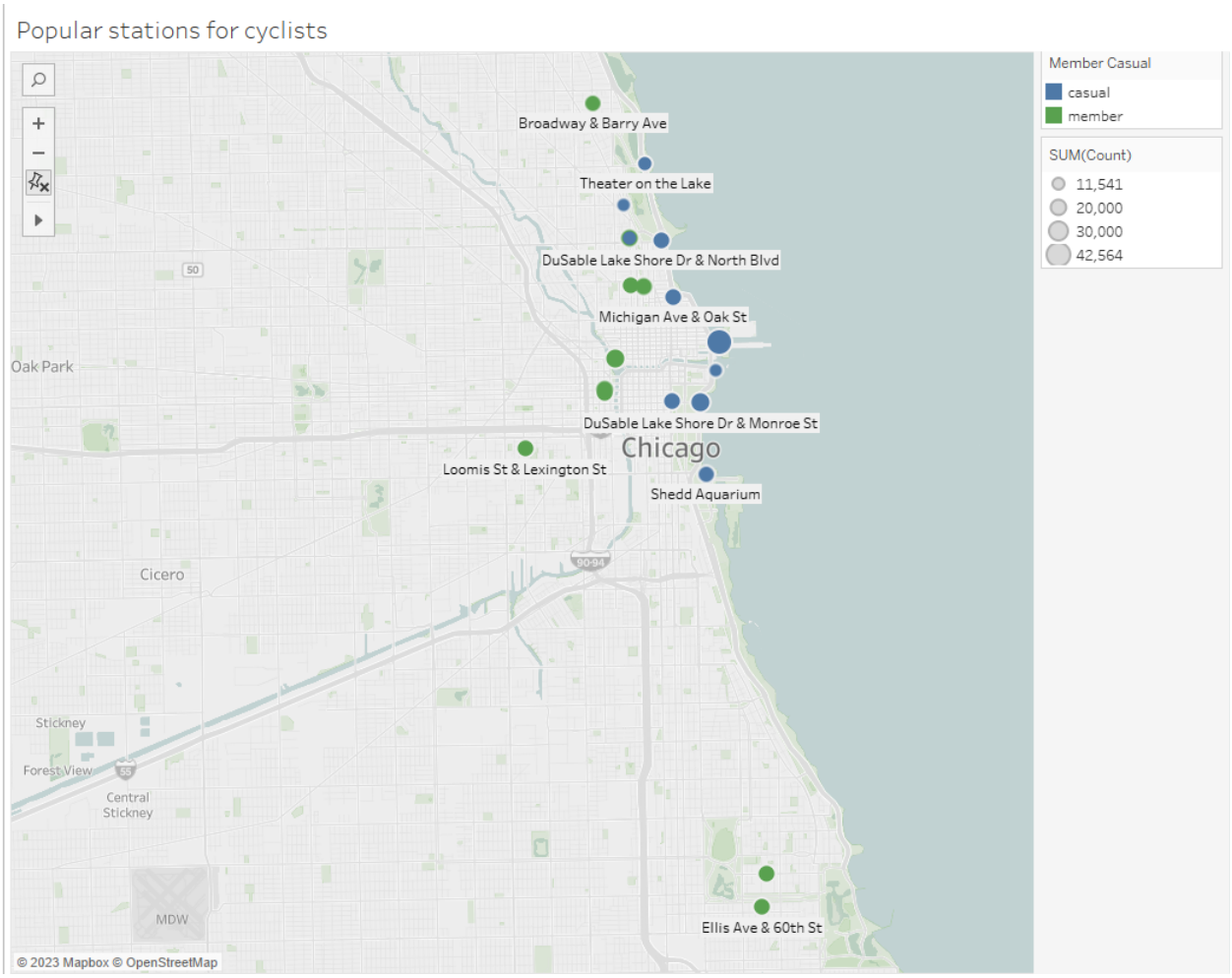
For Members:

The most popular start station for members is "Kingsbury St & Kinzie St" with 24,551 rides.
The second most popular start station is "Clark St & Elm St" with 22,991 rides.
"Clinton St & Washington Blvd" takes the third spot with 22,436 rides.
"Wells St & Concord Ln" is the fourth most popular start station among members with 20,928 rides.
The fifth spot is held by "University Ave & 57th St" with 19,991 rides.

For Casual Riders:

The top choice for casual riders is "Streeter Dr & Grand Ave," where 42,564 rides originated.
"DuSable Lake Shore Dr & Monroe St" follows as the second most popular start station for casual riders with 25,033 rides.
"Michigan Ave & Oak St" ranks third with 19,804 rides.
"Millennium Park" comes in fourth with 19,517 rides.
"DuSable Lake Shore Dr & North Blvd" rounds out the top five for casual riders with 19,125 rides.

Cyclist bike-share



Share

The analysis of annual members and casual riders' usage patterns at Cyclistic has revealed several key differences that can be leveraged to design a new marketing strategy for converting casual riders into annual members.

Insights:

Usage Patterns:

Annual members tend to use the service more consistently throughout the week, while casual riders exhibit a preference for weekends.
Both groups favor afternoon rides, but casual riders take longer rides in terms of time.

Bicycle Preferences:

Electric bicycles are popular among both user groups.
Annual members show a higher preference for classic bicycles, while casual riders occasionally use docked devices.

Start Stations:

The choice of start stations varies between the two groups, with distinct stations being more popular among annual members and casual riders.

Ride Length:

Casual riders take longer rides, especially when the ride duration exceeds 40 minutes, indicating a preference for more extended journeys.

Act

Top Three Recommendations:

Targeted Marketing Campaigns:

- Create marketing campaigns that focus on converting casual riders into annual members.
- Emphasize the cost savings, convenience, and benefits of annual memberships.
- Tailor promotions to target casual riders on weekends.

Bicycle Fleet Optimization:

- Ensure that popular start stations are well-stocked with electric and classic bicycles to enhance the user experience.

Enhanced User Experience:

- Concentrate on delivering a positive user experience during peak afternoon hours, considering station maintenance, bike availability, and user convenience.

Next Steps:

- Gather user feedback to gain deeper insights into the motivations and barriers for casual riders to become annual members.
- Implement and monitor the impact of the recommended marketing campaigns and track conversion rates.
- Consider expanding the analysis by collecting additional data, such as survey responses, to further tailor the marketing strategy.
- These insights and recommendations, backed by compelling data analysis and professional data visualizations, provide a strong foundation for a new marketing strategy aimed at maximizing annual memberships and ensuring Cyclistic's future success.