Data Analysis Capstone Project

Chicago Cyclistic Case Study for Google Analytics Professional Certificate

Introduction

As a junior aspiring Data Analyst, I have completed a Capstone project for the Google Analytics Professional Certificate. I have performed extensive data analysis for a fictional bike-share company, Cyclistic, to help them attract more customers. In this scenario, I was a part of the Cyclistic's marketing analytics team and worked to help my company achieve its business goals.

Real data from the City of Chicago's Divvy bicycle-sharing service has been provided by Lyft Bikes and Scooters, LLC (Bikeshare) to use for educational purposes. According to Wikipedia

> "Divvy is the bicycle sharing system in the Chicago metropolitan area, currently serving the cities of Chicago and Evanston. The system is owned by the Chicago Department of Transportation and has been operated by Lyft since 2019. As of Sept 2021, Divvy operated 16,500 bicycles and over 800 stations, covering 190 square miles"

I used Cyclistic's historical trip data (from Divvy) to analyze trends from the year 2023. Because Cyclistic is a fictional company, I was restricted from real communication with the executive team. As a result, several assumptions left out of the fictional data analysis scenario provided by the Certificate course have been made by me within this analysis. These assumptions are noted within the report.

The Divvy bike-sharing company was actively providing services throughout the project, so I checked their website, and prices, and even listened to bloggers' comments for real-time information.

This document presents six phases of data analysis: Ask, Prepare, Process, Analyze, Share, and Act. Supporting documents from R Markdown, Excel, and PowerPoint are linked within the document.

About Cyclistic

Cyclistic is a successful bike-share company based in Chicago. Bikes can be unlocked from one station and locked back into any other station within the system at any time by users. Cyclistic users are more likely to ride for leisure, but about 30% use bikes to commute to work each day.

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, so the company's future success depends on maximizing the number of annual memberships. Lily Moreno, the marketing director, believes there is a solid opportunity to convert casual riders into members.

Data Discrepancies

Some differences were present between the scenario description provided by the Certificate course and the Divvy data. Divvy's bicycle-sharing service, according to the 2023 dataset for analysis, their website, and my phone call to customer service, does not offer reclining bikes, hand tricycles, and cargo bikes as

stated in the course materials. Additionally, the description from the course material states Cyclistic has 692 docking stations. However, Divvy data shows 964 unique docking station names in January 2023 and 1100 docking station names in December 2023. Likely, the course material information was taken from an older 2016 set of data. This is good evidence of a well-growing business.

Within the Cyclistic's data, three types of bikes: classic, electric, and docked bikes were included. The "docked bike" type in the data was a mystery because the Divvy website and customer service stated that they do not have "docked bikes". An in-depth look into the "docked" bike type is provided in the Analysis Phase.

Ask Phase

Business Goal and Task

The goal of this analysis was to find marketing strategies for increasing the number of annual memberships by convincing casual riders to become Cyclistic members.

This task was completed by finding differences and trends in bike use between members and casual riders in terms of the number of trips, trip duration, and price. Additionally, an investigation into how digital media can help in marketing tactics was conducted.

Stakeholders

Lily Moreno: The director of marketing and my manager.

Cyclistic's Executive Team: The executive team will decide whether to approve the recommended marketing program.

Question To Be Answered:

1. What is the distinction between annual members' and casual rider's bike trips behavior?
2. What marketing strategy will convince casual riders to buy an annual membership?
3. Discover how digital media can help in marketing tactics.

Prepare Phase

Data Origin & Credibility

Link to Divvy datasets provided by course material

The course material provides access to a huge number of datasets as CSV files from 2013 up to March 2024. I started this project in April 2024 and found that the last available dataset was for March 2024. New data is continuously being added. I have used the data from January to December 2023 because it is easier to see trends by looking at the whole year's data.

I uploaded 2023 data from the following monthly zip files: 202301-divvy-tripdata.zip to 202312-divvy-tripdata.zip. All the files were unzipped and saved in external storage on my local machine.

A note from the course material:

> "The datasets have a different name because Cyclistic is a fictional company. For this case study, the datasets are appropriate and will enable you to answer the business questions. The data has been made available by Motivate International Inc. under this license (see link below). This is public data that you can use to explore how different customer types are using Cyclistic's bikes."
>
> [License]

After my observations, the data cleaning process, and checking the Data License Agreement I can state that the data appeared to be reliable, original, comprehensive, current, and cited properly. It does not have any personal or credit card information.

Data Limitations

The data doesn't include any demographic information and it does not give the actual number of annual members or casual riders. Therefore, it is impossible to check, for example, how often, on average, one rider takes a bike trip in a week, and compare this between all kinds of bike users or to find a proportion between permanent and occasional casual users. This data could help more accurately filter the data to make analytic conclusions and clarify how to reach business goals and tasks in the future.

Process Phase

Appropriate file-naming conventions to organize and name all project folders, and subfolders for .csv, .xlsx, .Rmd, .RData and .pptx files were used.

The tools used for data cleaning & analysis were Excel and RStudio Desktop.

Twelve months of the combined dataset contains 5,380,725 rows (after data cleaning) and 13 columns. Due to the large dataset, I may have encountered limitations in the free version of my RStudio. So, instead of combining all 12 months' datasets and then doing a data cleaning process at once, I chose to analyze each month separately. I did all data cleaning steps for each month in RStudio, then saved the cleaned and modified dataset with relevant columns for analysis as 12 .RData files. The R Markdown template that I created helped me to do this process quickly and smoothly. Additionally, I was able to separately analyze clean data using Excel for several months and added useful information to the analysis.

[Link to R Markdown 1]

This is a brief description of the data cleaning process: (use the link to see all codes & comments in the R Markdown document as a reference)

1. After uploading the original "2023(01-12)-divvy-tripdata.csv" I found and corrected two datasets (for March & April) with two identical problems:
    a. Varying number of characters in "ride_id" column
    b. "started_at" & "ended_at" columns were formatted as "chr" and should have been "dttm"

2. Electric bikes can be parked in two different ways. According to the Divvy Bikes website, “you can either dock or lock your e-bike (not both at once). Dock at any Divvy station or use the cable to lock at any e-station or the 500+ Divvy-approved public bike racks for no additional cost”. Bikes that were not either docked or locked had missing values in the “start & end_stations_name” columns. All rows with missing values in the “start & end_stations_name” columns were deleted except if the rideable_type was “electric_bike”.
3. I excluded rides with trip durations of less than 2 minutes and more than 12 hours. Rides under two minutes are likely to be mistakenly unlocked and are likely not potential annual members. Rides with trip durations of over 12 hours suggest bike were lost or stolen. This became clear in the Analysis Phase from a line chart for prices (including for 12 hours of ride) and trip duration percentiles.
4. To verify the data was clean I used the function skim_without_charts() which reveals the extent of data cleanness and compared it to the following criteria:
    a. Number of rows = n_unique for ride_id column - no duplicates;
    b. Same number of characters (16) in ride_id column;
    c. Whitespace and empty cells: 0 in each column;
    d. Completeness: complete_rate = 1 (no missing values in any column);
    e. Column names: Correct;
    f. Character length variation in columns 2-4 is normal for this data type;
5. Next, I exported January, April, and August datasets as clean data for further investigation in Excel. These datasets were chosen because they include the first, middle, and last month of so-called “docked bikes”.
6. After analysis using Excel Pivot Table, I decided to delete all rows with “docked_bikes”. This decision will be explained in the Analysis Phase.
7. In RStudio, I added “ride_length” and “day_of_week” columns for all the months and kept columns that are relevant to the analysis. The 12 datasets was now cleaned, modified, and saved as an .RData objects.

Analysis Phase

Linked below is the analysis performed in R Studio.

[Link to R Markdown 2]

I analyzed the data from least to most important so that at the end of this analysis we could see a clear picture and could concentrate on the most critical differences in bike usage between annual members (Members) and casual riders (Casuals). This approach made it easier to conclude the new marketing strategy and achieve the business goal.

Docked Bike Data Discrepancy

The "docked bike" was present in datasets from January to August 2023. Since September 2023, docked bikes have been removed from monthly datasets and, apparently, from service entirely. I did not have access to internal company information to know conclusively what a docked bike is. I chose three months: January 2023, April 2023, and August 2023 to investigate. I created a bar and corresponding pie chart for each month as shown below in Figures 1-3. Excel Pivot Tables were used to make the initial data observation and to analyze the "docked bikes" behavior, or so to speak its origin. My hypotheses and subsequent analysis are below.

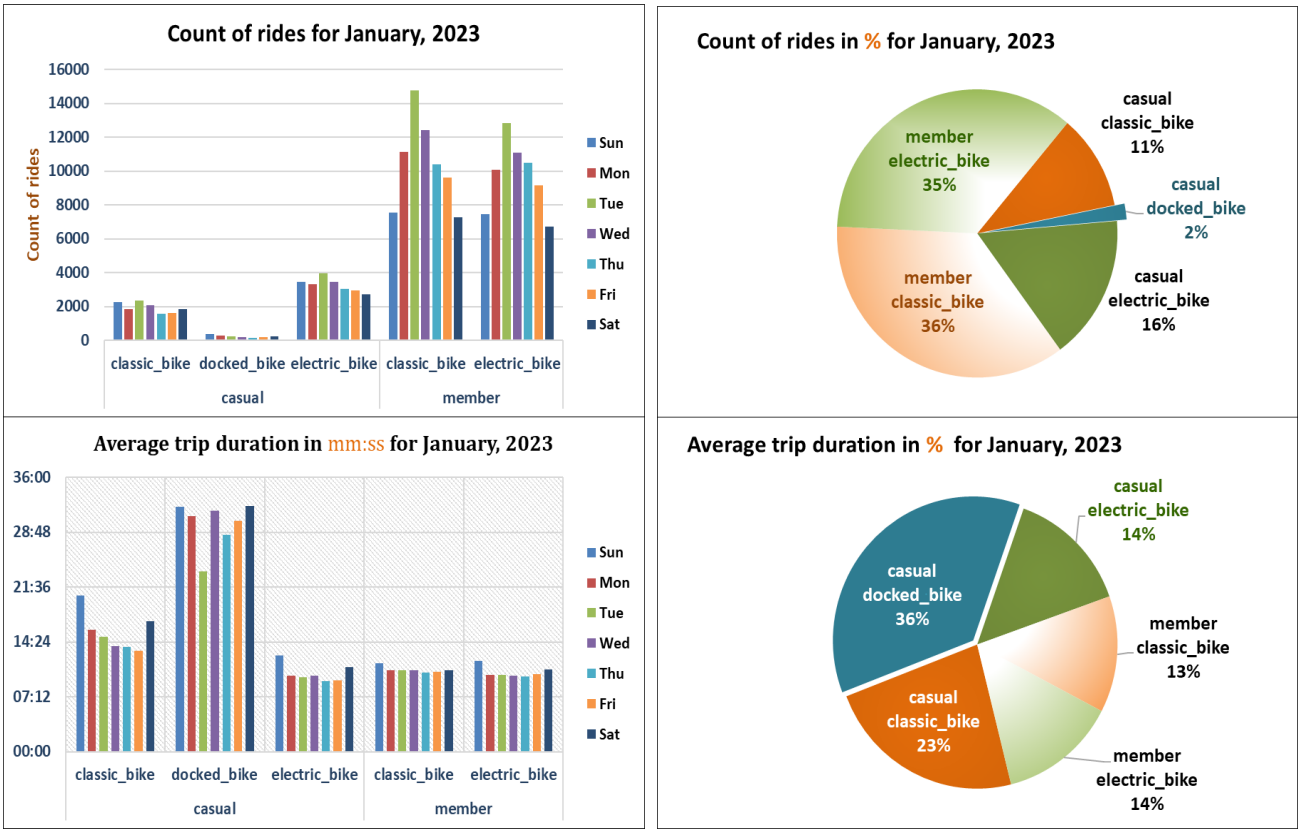

Figure 1 Docked Bike Data Investigation for January 2023

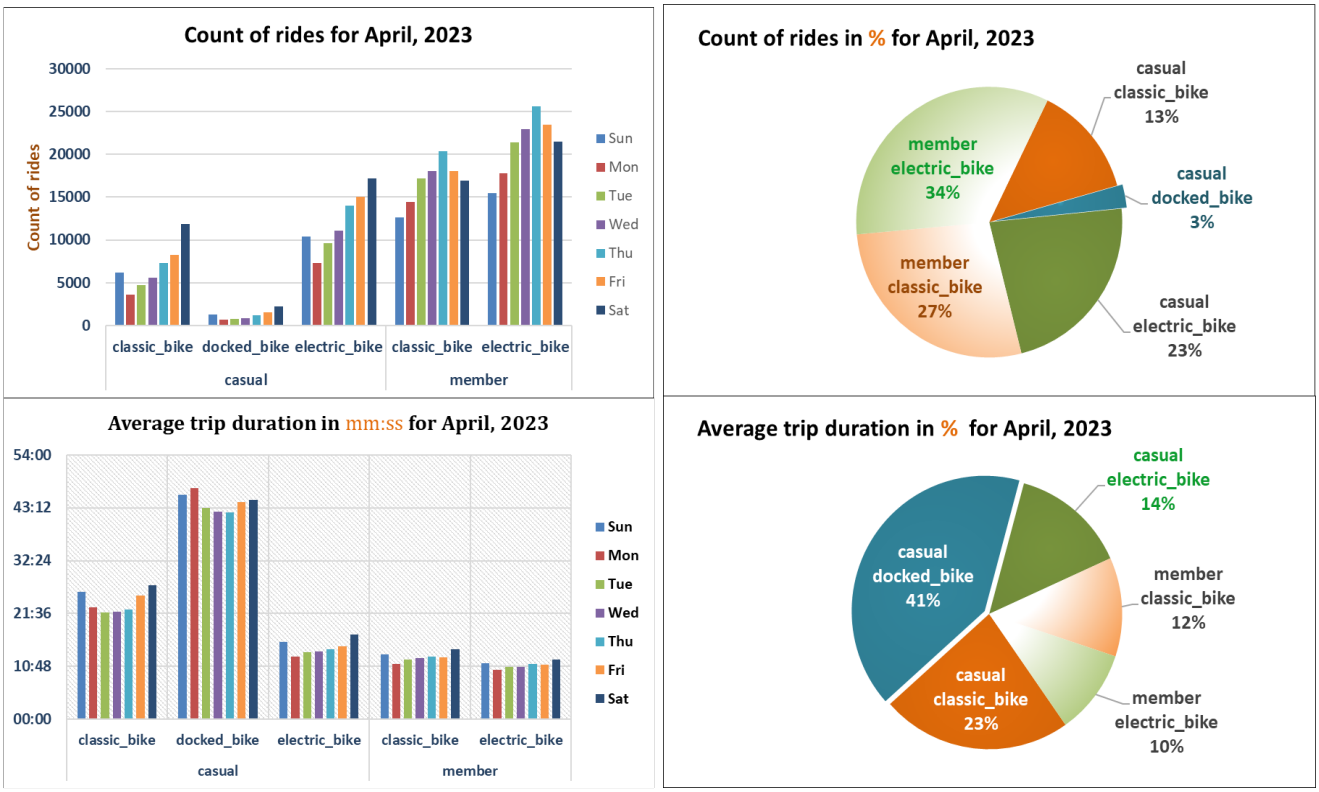

Figure 2 Docked Bike Data Investigation for April 2023

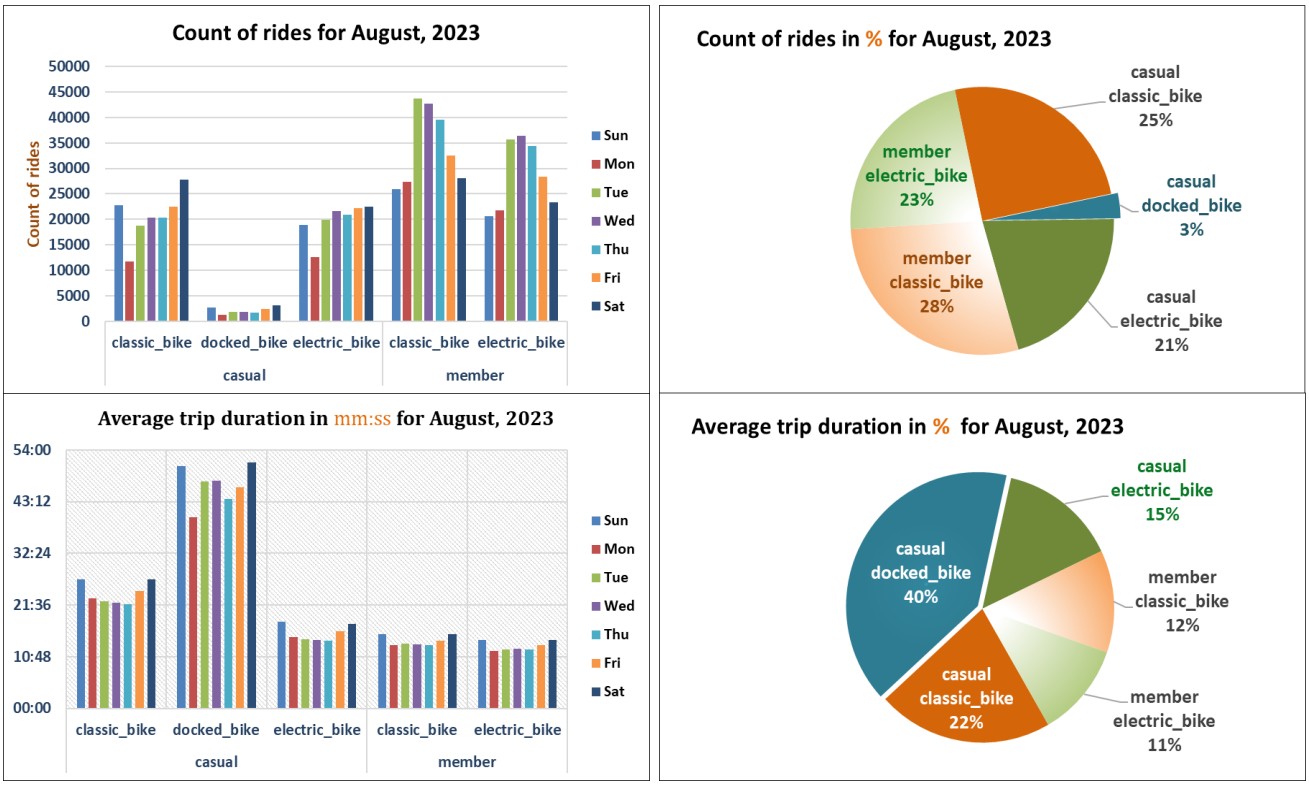

Figure 3 Docked Bike Data Investigation for August 2023

Hypothesis 1

The first hypothesis was that docked bikes are another name for classic bikes. However, docked bikes showed very different behavior in the charts compared to other bike ride types. The pie charts show docked bikes with the smallest total count of rides (2-3%) and with the highest average trip duration for docked bikes. This suggests that docked bikes are unique kinds of bikes and different from classic bikes. Based on these findings, I concluded that docked bikes are not another name for classic bikes as initially hypothesized.

Hypothesis 2

The second hypothesis investigated was that docked bikes are reclining bikes, hand tricycles, and/or cargo bikes, making bike-share more inclusive to people with disabilities and riders who can't use a standard two-wheeled bike. According to the Cyclistic company description provided by the course material:

> "Cyclistic sets itself apart by offering reclining bikes, hand tricycles, and cargo bikes. It makes bike-share more inclusive to people with disabilities and riders who can't use a standard two-wheeled bike. Most riders opt for traditional bikes; about 8% of riders use the assistive options"

If this is true, then this is a clear explanation of a very small count of trips and longer trip duration. There are fewer number of these types of individuals, and they typically ride at a slower pace which can be reflected in longer trip duration. However, the data set and my own investigations into the Divvy program did not have any evidence to be able to conclude this.

Hypothesis 3

Divvy offers a large discount for people in households receiving SNAP, WIC, LIHEAP, FAFSA, or public housing assistance. With significantly smaller prices these individuals take advantage of it and can go on longer trips. This scenario is less likely, but these can be classified as a separate group of users as well.

Since this group of individuals are outliers, I removed them from the dataset as not relevant to our analysis. These charts can help to make a better business decision if Cyclistic wants to offer the "docked bikes" service again.

Analysis-Driven Data Trim

One of the criteria used to trim and clean data was trip duration. Rides that were under 2 minutes were likely mistakenly unlocked. Casual riders who potentially will buy a membership are generally making longer trips. These extremely short-ride customers are not good candidates for annual membership and therefore are excluded from this analysis. Rides over 12 hours were likely lost, stolen, or improperly parked and therefore excluded from the analysis. According to globalaffairs.org, over 200 bikes are stolen in Chicago every month. I hypothesized that some of the long-duration rides are due to improper parking based on Divvy customer reviews. Some customers stated that if a bike is parked improperly, riders were overcharged because it was treated the same as a bike that was not returned.

Analyzing the trip duration percentiles allowed me to see what percentage of bike users fall below 2 minutes and up to the 12-hour range. Figure 4 and Table 1 show the percentiles of rides categorized by trip duration.

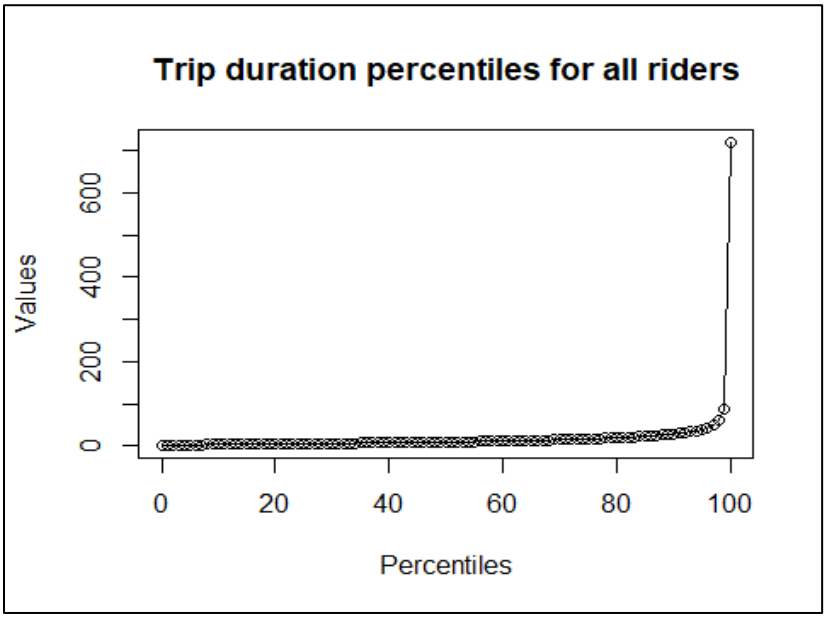

Figure 4 Trip Duration Percentiles for 2023 Riders

Table 1 Upper and Lower Range of Percentiles for Trip Duration Generated by R Studio

Lower Range

	Percentile	Minutes
1.5%	0.015	0 mins
2%	0.020	1 mins
2.5%	0.025	1 mins
3%	0.030	1 mins
3.5%	0.035	1 mins
4%	0.040	2 mins

Upper Range

	Percentile	Minutes
97%	0.970	75.1
97.5%	0.975	81.4
98%	0.980	89.7
98.5%	0.985	101.1
99%	0.990	118.5
99.5%	0.995	153.2
100%	1.000	719.4

Less than 4% of the data included casual riders whose trips were less than 2 minutes. All of the rides were shorter than 12 hours. Table 1 shows that 100% of the data was at or under 719.4 minutes (approximately 12 hours).

I used this percentile analysis to conclude that the range from 2 minutes to 12 hours is reasonable.

Member vs Casual Rider Breakdown

Figure 5 shows that the number of trips for Annuals was almost double that for Members. The data doesn't include a personal ID column but a trip ID ("ride_id" column). As a result, I could not directly compare the actual number of customers and their proportion between categories. For the purpose of this project, I made the assumption that the proportion of trip count approximately reflects the ratio of the number of customers between types of riders.

Figure 6 shows a further breakdown of the typical rider. The ratio of Casuals to Members between classic bike users was approximately ½ and between electric bike users approximately 2/3.

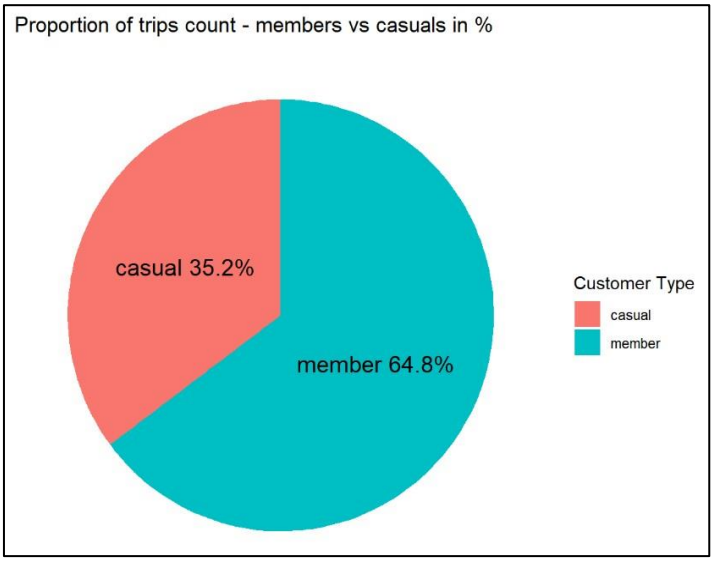

Figure 5 Ratio of Cyclistic Customers in 2023

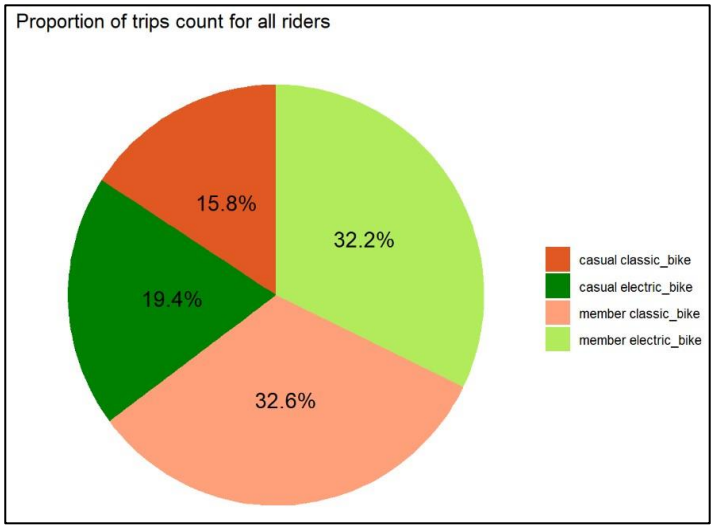

Figure 6 Types of Trips for 2023

Later in this analysis, we will see other comparisons of typical riders, but this difference impacted most numbers and chart appearances.

Typical Week Analysis

The question I wanted to answer was can we find a better marketing strategy based on the difference in how many trips are on each day of the week? Figures 7 and 8 show the breakdown of the number of trips and duration of the trips throughout the week for Causals and Members.

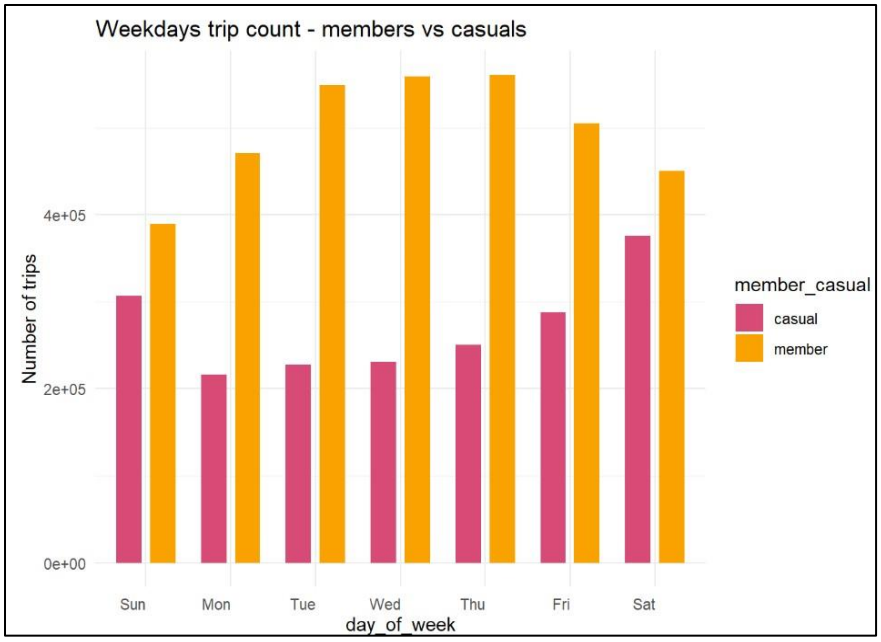

Figure 7 Number of Trips Throughout the Week For 2023

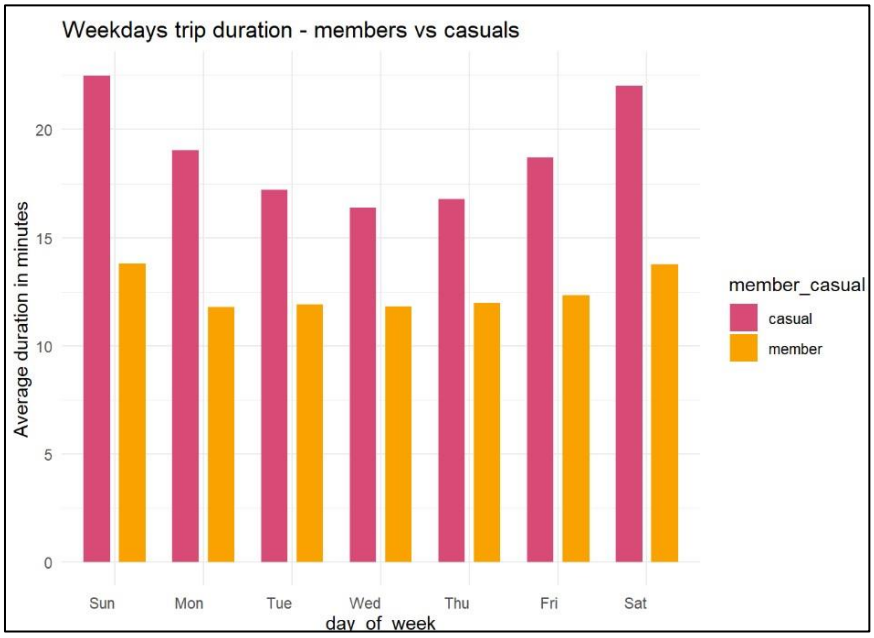

Figure 8 Duration of Trips Throughout the Weeks of 2023

As shown in Figure 7, from Monday to Friday Members have roughly double the number of trips compared to Casuals. The bar pattern for Members reflects that most of them are likely commuters to work or school during the week. Casual bike riders likely used bikes for leisure. Casual trips increased on the weekends and Fridays.

Figure 8 shows that the weekday average trip duration is greater for Casuals which is appropriate for this type of user. Normally, Casuals are not hurrying to work, and ride longer than Members, increasing the number of minutes on weekends as expected.

These two charts prove evidence that both categories of riders still look very active on any day of the week. The difference in trip number can be explained as the difference in the number of Members and Casuals. Remember that there are double the number of Members compared to Casual riders. Also, the consistency of these chart's patterns suggests that casual riders are using bikes as a lifestyle which is a good opportunity to convert them to annual members. This is also supported by the individual month bar charts that are shown in Figures 1-3 because they show day by day data as well.

An option to increase the profitability of Cyclistic may be to increase the prices on certain days based on demand. However, changing prices during the week may discourage Casuals from riding. People want to choose when they want to ride. We may encounter the following risks: losing customers, not converting casual riders to become members, and disappointing riders. A deeper analysis is required for this option. We need to look for win-win marketing that will lead to success.

Hourly Analysis

I have not provided charts for hours of the day because Cyclistic's aim is to convert casual riders to members. The purpose of an hourly analysis would be to determine the best pricing schedule for different times of the day. However, changing the price at certain hours may make the typical leisurely riders feel rushed and may risk customer loss. We need to look for other marketing strategies that encourage customers to sign up for annual membership instead of turning current customers away.

Monthly Analysis

Monthly trends were likely to give us clues about what typical ridership looks like. The next two charts show that the average trip duration for each month of the year was much longer for casual riders than for those who bought an annual membership. So, casual riders like to ride much longer than members. This was likely due to casual riders using the bikes for leisure, cardio, and a healthy lifestyle. I have not accounted for the differences based on trip count at this moment but have discussed this later when looking at the same categories of bike users, showing us a better picture of typical ridership.

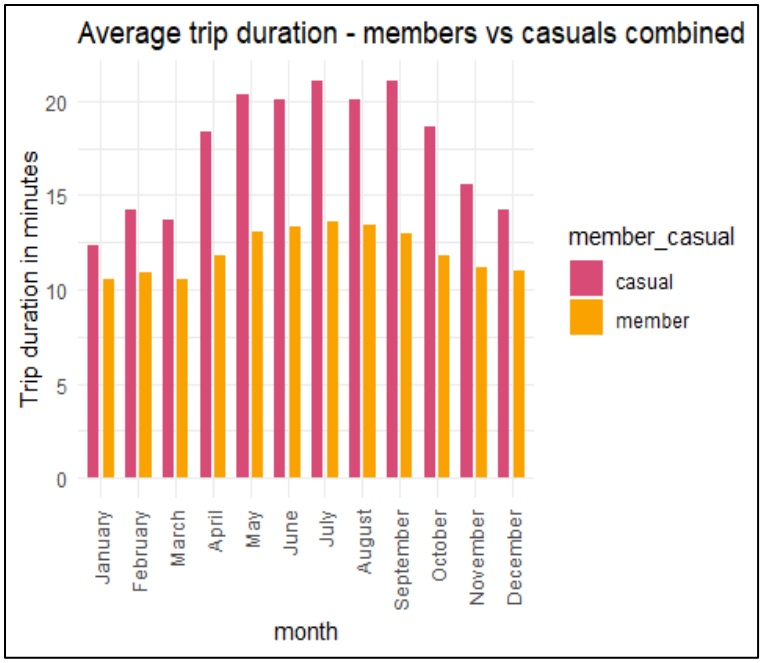

Figure 9 Month by Month Breakdown of Trip Duration for Casuals and Members

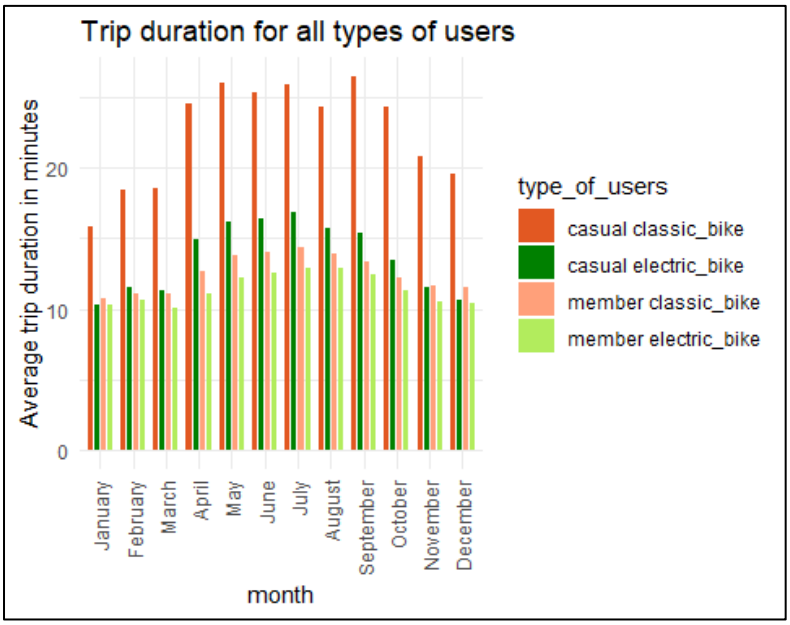

Figure 10 Month by Month Breakdown of All Rider Types

By looking at differences in bike ride usage patterns, I aggregated months into two groups and named them “winter season” and “bike season”. Bike season included 7 months from April to October and typically had longer trip durations. Cold season included the remaining 5 months from November through March. Later this division helped concentrate information from the data visualization charts.

But now, let us compare between same types of users…

Classic Bike Users

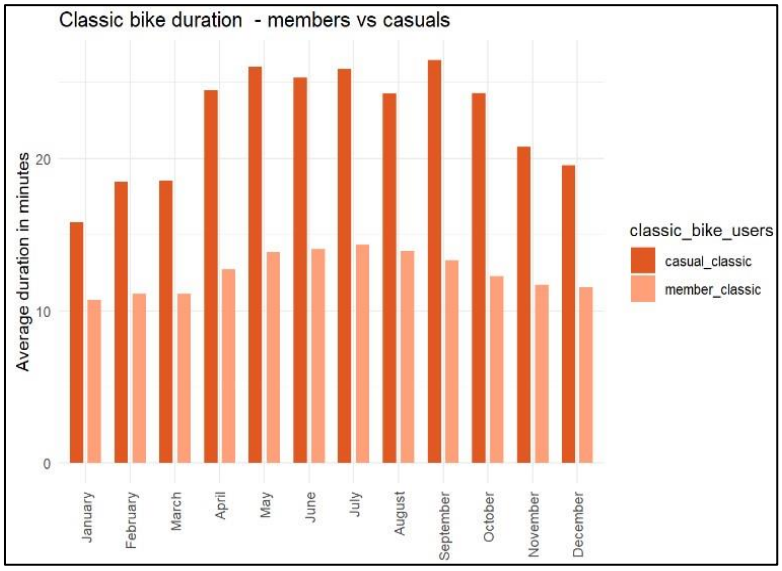

Figure 11 Average Trip Duration for Classic Bike Riders

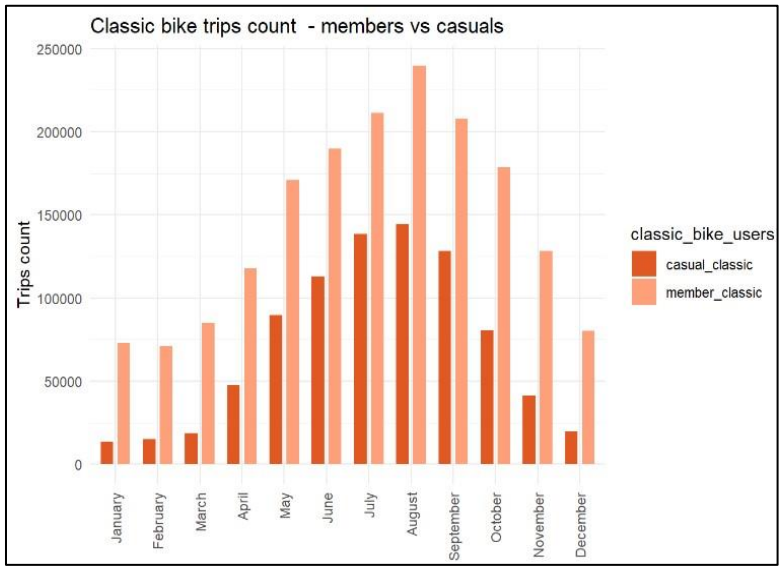

Figure 12 Monthly Trip Count for Classic Bike Riders

When analyzing classic bike trips separately, we can see a mostly normal distribution of the average trip duration and trip count between cold and warm seasons. From April to October the average trip duration was close to 25 minutes for casuals. Members had an average of 10–15-minute trips for a whole year. This supports the hypothesis that members are commuters to work or school as the distance to the workplace is consistent for most people.

A significant difference in the trip counts and similar distribution in both Causals and Members in Figure 12 brings two conclusions. First, during the cold season members do not always use bikes to commute. Second, members also use bikes for leisure, cardio, and a healthy lifestyle during the warm season.

The number of trips for Casuals during the cold season dramatically falls also supporting the conclusion that these riders are likely mostly leisure riders.

Therefore, it is very unlikely that offering a complimentary month of a full membership during the winter months will attract many casual riders. This offering can be effective in converting casuals into members in April and May as the season for riders picks up.

Electric Bike Users

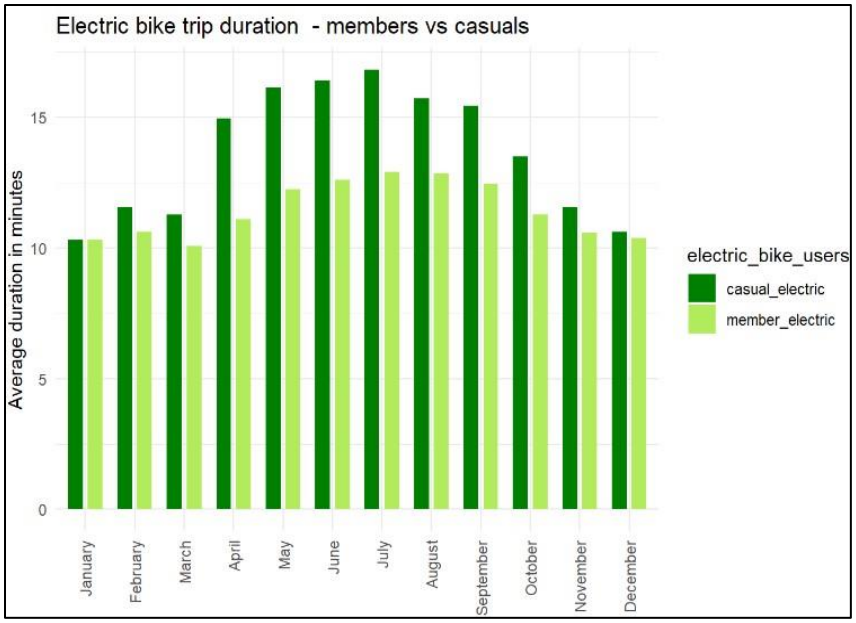

Figure 13 Average Trip Duration for Electric Bike Riders

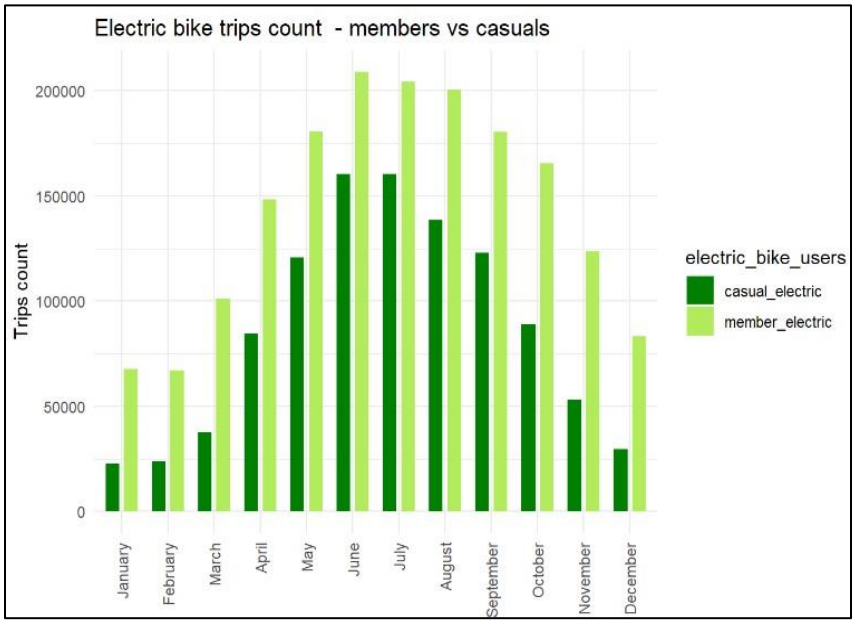

Figure 14 Monthly Trip Count for Electric Bike Riders

Figures 13 and 14 for electric bike users are very similar to the classic bikes mentioned above. The maximum trip counts are close between classic and electric bikes when looking at Causals or Members separately. The maximum trip count for casual riders of classic bikes was under 250,000 which for casual riders of electric bikes, it was just over 200,000.

The difference in trip duration for the same type of bike between Members and Casuals: A smaller difference for electric bikes (Figure 13) than for classic bikes (Figure 11).

Casual electric bike users had an average trip duration of 11-18 minutes while classic bike users ranged from 16-27 minutes. The difference in trip duration between casual classic and electric bike users is likely driven by bike speed and price. Prices are further discussed later in this report.

Count of trips on electric bikes is even greater than on classic ones for casual customers. This means that targeting this larger casual electric bike user crowd with marketing techniques to encourage them to become members may have the largest payoff.

Naturally, the necessity of going to work is urging us to find a convenient and cheaper way to do that. Members as commuters choose bike use over personal and public transportation or have both as an option because it is a convenient and cheaper option. What then will urge casual users to buy an annual membership? If the use of a bike is for leisure, cardio, entertainment, and a healthy lifestyle then a longer "free single rides" for members as currently offered to classic bike users and overall better prices per minute will attract casual riders. This will work because it complies with the nature of casuals. Lowering the price for member riders will likely attract more casual riders as well and therefore will not necessarily affect the company's profit. More riders means that there are more potential Members which would be a win-win situation for everyone.

With the large number of casual users for the majority of the year and a large number of casual users during all days of the week, it is likely that many casual riders are frequent or repeat riders. Frequent riders are more likely to become members.

Bike Ride Pricing Analysis

At this point we need to know the real benefits and prices for Members and Casuals. Without this, I could only give very general suggestions for new marketing strategies. The benefits and 2024 prices can be found at divvybikes.com which is open to the public. In a real-world situation, I would have access to current and historical information about usage, prices, etc. Despite not being the same as the prices of 2023, I will apply 2024 prices to 2023 data for further analysis.

For casuals:	**Single Ride**	**Day Pass**
	$1 + $0.18/min	**$18.10/day**
Classic prices	$1 unlock + $0.18/min	**3 hours free**, >$0.18/min
E-bike prices	$1 unlock + $0.44/min	Free unlocks + $0.44/min

For members:	**$143.90/year**
	45 min free, > $0.18/min
Classic prices	Free unlocks + $0.29/min
E-bike prices	Free unlocks + $0.18/min

The full pricing table and graphs have been copied from Excel to a PDF file, which is linked here.

Users can either purchase a membership, a Day Pass, or a Single Ride. For classic bikes, members and casuals have an unlimited number of "free single rides" during the day. Members have "free single ride" is up to 45 minutes long and will be charged per minute beyond that time if the bike is not locked. The "Day Pass" is purchased by casuals for classic bikes and also includes unlimited "single free ride", each of which is up to 3 hours. Beyond 3 hours, the casual user will be charged per minute.

The Day Pass was priced at $18.10 and includes a "free unlock" for classic and electric bikes. Without the Day Pass it cost $1 to unlock. The price per minute is $0.44 for an electric bike for casuals.

For electric bikes, the Day Pass does not include a "single free ride". It therefore does not benefit the customer in most cases because they are charged $18.10 and an additional $0.44 per every minute they ride. The customer would need to unlock the bike at least 19 times during the day to make purchasing the Day Pass more cost-effective. I even called Divvy customer service to clarify this which they confirmed. Divvy%20Prices.pdf

Trip Duration Percentiles Investigation

Let's delve into other aspects of pricing and bike ride time duration. Because the price of a trip was dependent on how long a trip is, it was important to know how long most riders use their bikes for. R programming codes can show what percent of trip duration falls in a certain range. Figure 15 shows the percentiles of the average trip duration while other figures above show the day by day or monthly average trip durations.

Print the data frame for members

```
print(perc_member5)

##       Percentile Value
## 97%        0.970  37.5
## 97.5%      0.975  39.6
## 98%        0.980  42.0
## 98.5%      0.985  45.5
## 99%        0.990  52.1
## 99.5%      0.995  70.0
## 100%       1.000 718.1
```

Print the data frame for casuals

```
print(perc_casual2)

##       Percentile Value
## 97%        0.970  75.1
## 97.5%      0.975  81.4
## 98%        0.980  89.7
## 98.5%      0.985 101.1
## 99%        0.990 118.5
## 99.5%      0.995 153.2
## 100%       1.000 719.4
```

*Figure 15 Trip Duration Percentiles for Members and Casual Riders (**Value in minutes**)*

In Figure 15, the "value" means minutes. We can see that the majority of users very seldom cross their "free single ride" time limit. This limit for members is 45 minutes and for day pass Casual customers is 3 hours (180 minutes). 98% of Members use up to 42-minute rides and 99.5% of Casuals used up to 153.2 minutes.

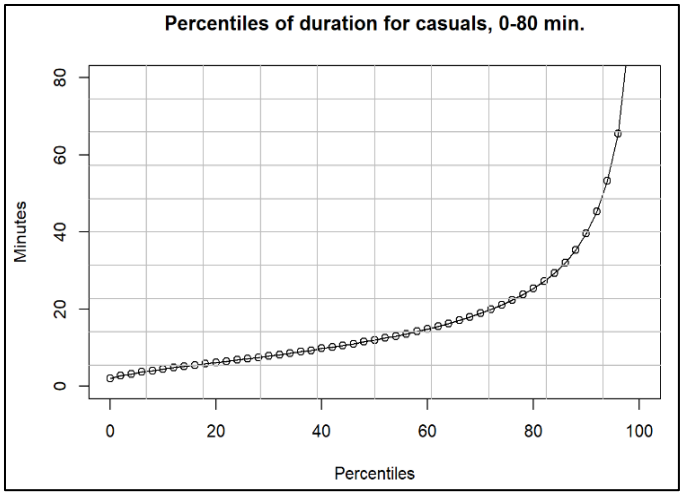

Figure 16 Percentile Graph of Average Trip Duration for Casual Riders

Figure 16 is a line chart of the percentile distribution of casual riders. It clearly shows that the majority of casual riders (98% - see Figure 15) are in the range of the trip duration that is below 90 minutes. I will return to this number a little bit later.

Price Investigation

Now, let us compare the actual prices with free single rides and price per minute for all types of riders. To do that I used current Divvy prices as shown on divvybikes.com/pricing. In a real-life company considering a price change, I would have more information from the company database.

It is important to note that the table and charts I created do not consider all the benefits of being a Member or using a day pass for Casuals. A rider can lock and unlock their bikes an unlimited number of times during the day to make sure they are not being charged for more than the “single free ride” time included in purchase price of the Day Pass or Membership. We do not have access to information about individual riders and how many times they use the bike during the day. We only have the trip duration of a single trip to analyze. Therefore, the pricing analysis below was limited to analyzing each trip separately.

Explanation of the structure of the next two charts:

Figure 17 Overall Graph of Cost Per Hour of All Ride Types

Figure 17 is a graph showing the price of each type of ride up to 12 hours of a single continuous trip. Later figures focus on the first four hours of the trip which represents a majority of all the riders. The prices at the end of the chart's lines show the cost for a 12-hour ride for reference (on the left)—which is impractical for most riders due to the high cost, but it useful to see the differences over a long period of time. As a reminder, all data is trimmed to the 2 – 720-minute range. The classic Single Ride line is not shown here.

I assumed that an average Member takes a bike ride 5 days a week. Refer to the link to the PDF file above for my calculations shown in the PDF file. This results in $0.55 a day for annual membership. If we were to assume Members take bike rides 7 days a week, this would result in less than $0.40 a day. The difference between $0.55 and $0.40 a day is not significant, but we should be precise.

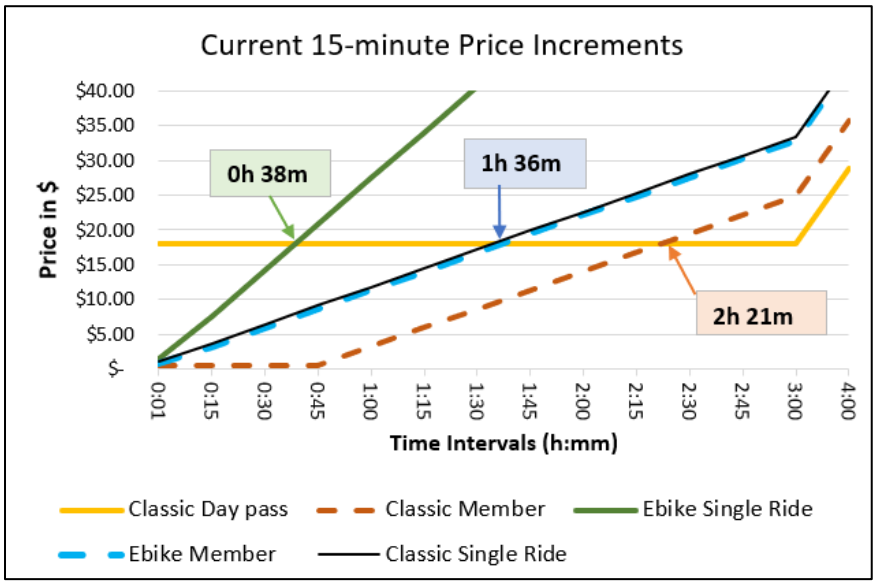

Figure 18 First 4 Hours Price Comparison of All Ride Types

Figure 18 has a 15-minute increment scale up to 3 hours. From 3 to 4 hours, there is a 1-hour increment. The reason for this was because of the lack of space on the x-axis for all the necessary 15-minute increments. Due to changing the increment value, the lines have an abnormal bend up at the 3-hour mark. Refer to Figure 17 for a better visualization of the price in the 3-to-4-hour period. The 4th-hour point is for reference of further lines' positions.

Analysis based on Figure 18

The yellow line before it slopes up shows 3 hours of "free ride" for a Day Pass. The thin black line for Classic Single Ride overlaps the blue dash line for E-bike Member. If the thin black line overlaps the blue dashed line, this suggests that the price for both is almost the same. The prices are very similar because the price per minute is the same and Members only pay an additional $0.55 per day of use while the Classic Single Ride only requires $1.00 to unlock the bike. The difference on $0.45 is nearly not visible. As a customer, it is difficult to see that being a member riding an electric bike is slightly cheaper than being a Casual user buying the Classic Single Ride. The upfront cost of being a member is $143.90 while to unlock the electric bike is only $1 in a Classic Single Ride.

According to the percentile table in Figure 15, 98% of trip duration for casual riders is below 90 minutes (1 hour & 30 min). Will casual riders prefer to buy a Day Pass or use Classic Single Ride? For example, if we need to make 2 bike trips for 30 minutes, it will cost us $11.80 + $2 for 2 unlocks for Classic Single Ride which is less than $18.10 with a Day Pass. (Refer to the link with a PDF copy with a table for prices).

The text boxes with time stamps in Figure 18 show where each line crosses the yellow Classic Day Pass line. Up to these times, the type of trip crossing the yellow line is cheaper than a Day Pass. After these time points, Classic Day Pass is cheaper than other types of rides. This is not fair for Members because their benefits should be more than Casual customers in all respects.

Up to this time, I found that some benefits of being a Casual user are better than Members' ones with these current prices. Also, the Cyclistic's website (Chicago Divvy website) does not emphasize enough advantages of buying an annual membership. For example, the full membership price is $143.90 which is the equivalent of eight Day Passes. These types of advantages should pop out as the first advertisement on their website and phone app.

As was shown in the analysis based on trip count and average trip duration, casual riders appeared to be frequent and very active bike users. The first way to attract Casual riders to become Members is to change the price to offer more benefits for members.

Some suggested changes to make the membership more attractive would be changing the Day Pass from 3 hours of a free ride to 2 hours. Because 98% of the trip duration for casual riders is below 90 minutes, this will not hurt users significantly. You could then also increase "free single ride" time for members' classic bikes to 1 hour from 45 minutes. Figure 19 shows price change suggestions that make buying an annual membership the better and cheaper choice. These pricing suggestions are for reference only and are based on keeping the annual membership the same $143.90 per year.

Before		After	
Day Pass	$ 18.10	Day Pass	$ 20.00
Classic Single Rid.	$ 0.18	Classic Single Rid.	$ 0.20
Classic (Casual)	$ 0.18	Classic Day Pass	$ 0.18
Classic Member	$ 0.18	Classic Member	$ 0.16
Ebike Single Ride	$ 0.44	Ebike Single Ride	$ 0.44
Ebike Member	$ 0.18	Ebike Member	$ 0.16

Figure 19 Current Prices and Suggested Prices

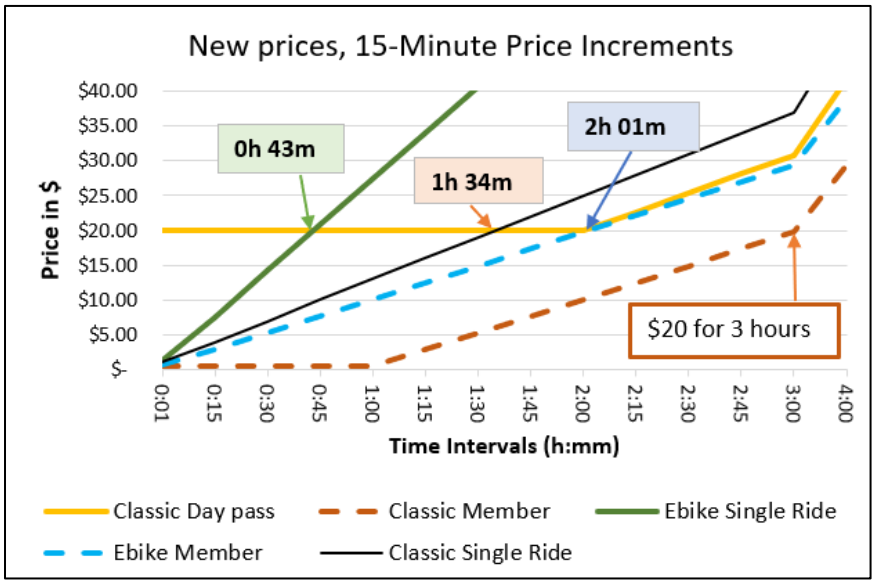

Figure 20 First 4 Hours Price Comparison of All Ride Types with Suggested Prices

Figure 20 shows the price comparison for the first 4 hours of a trip with the new prices. Being a member is now always more beneficial than purchasing a Day Pass or any of the other options available to Casual riders. Both the blue and dark orange members' dashed lines are lower than the Casual rider's lines.

The new prices make it easier to see the difference in prices between members and casual riders. Having slightly different prices for Causals and Members will have the same psychological effect as people viewing something that costs $0.99 versus $1.00. It encourages us to evaluate the benefit of the freedom of everyday bike rides which is important for casual riders. Otherwise, these benefits are hidden by the same price ($0.18 in this case).

Cold And Bike Season Analysis

As was mentioned before, I divided the year into two parts: cold season and bike season. As a reminder, the cold season is from November to March and the bike season is from April to October. Two compact graphs that represent the most riders' activity in these two seasons are in Figures 21 and 22. Looking at the small number of trips during the cold season, it is doubtful that many riders will take advantage of any promotions during that period.

The trip count and average trip duration in Figures 21 and 22 for members are very close for both types of bikes and in each season most likely because they are commuters.

We also see that casuals use electric bikes more frequently than classic bikes. It therefore is a good idea to target Casual electric bike riders with promotions and advertisements for membership.

Comparing average trip durations in Figure 22 to percentiles, the range of 15.8-to-25.3-minute trip durations of Casual riders during bike season falls between 60 to 80% of their trips. To entice this range of customers, I would offer free single rides for electric bikes on some holidays and/or weekends for Members. This would attract casuals to buy an annual membership. Also, Members should have some customer appreciation days, competitions, and so forth to encourage repeated membership.

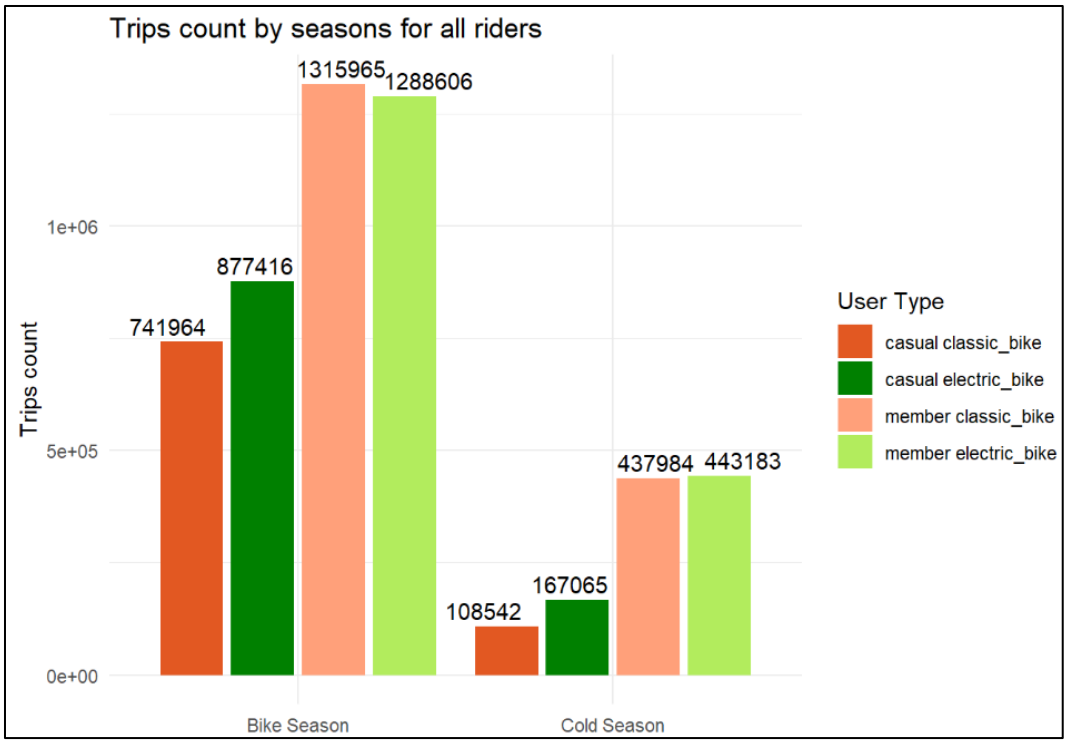

Figure 21 Bike Season and Cold Season Comparison of Trip Counts

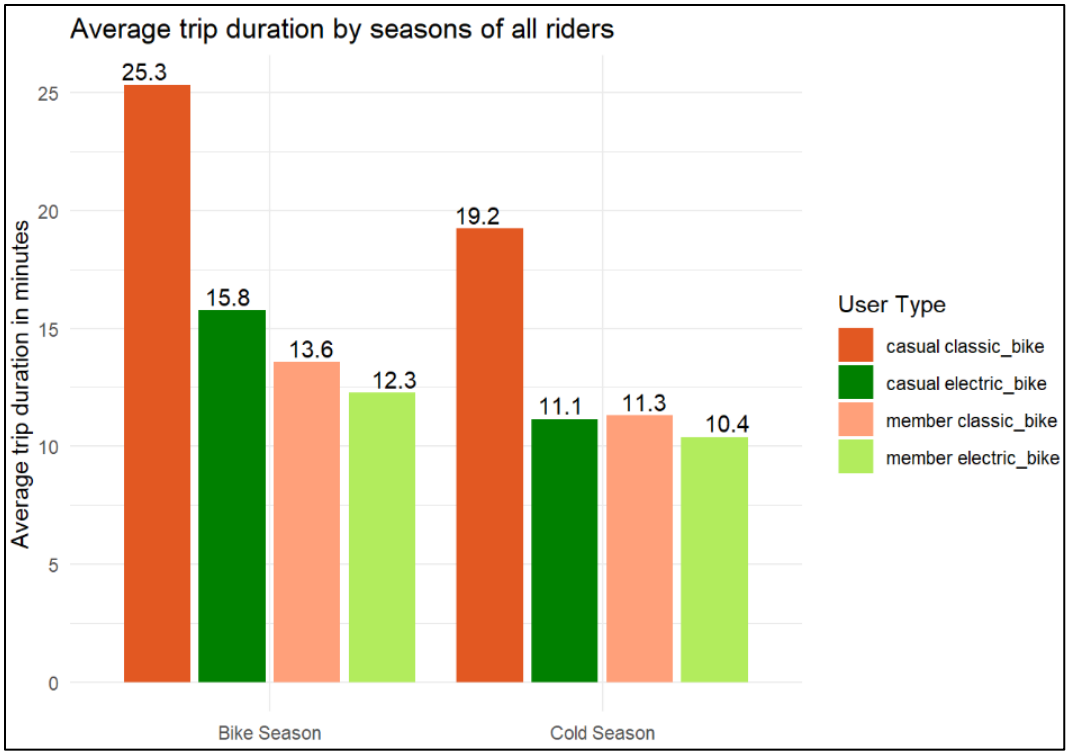

Figure 22 Bike Season and Cold Season Comparison of Average Trip Durations

Share Phase

Link to PowerPoint Presentation of Share and Act phase

Current analysis shows that casual riders are very active, especially on weekends, and during warm seasons of the year. The consistency of these chart's patterns shows that casual riders like to ride much longer than members, mainly for leisure, cardio, and a healthy lifestyle. This provides a good opportunity to convert them to annual members.

This 12-month combined dataset contained 5,380,725 rows that represent the number of trips taken in 2023. This was not necessarily the number of customers, but it is evidence of the fact that the Cyclistic's bike-sharing service is well-known. The analysis here substantiates the opportunity of converting Casuals into Members will be more profitable than creating a marketing campaign that targets all-new customers.

Pricing

The analysis of current prices shows evidence of unreasonable prices for the Day Pass for the electric bike. Currently, the same price per minute of use applies for Classic Single Ride and E-bike Members, which, in some respects, makes a membership not as beneficial even though these are different types of bikes.

To set up the correct leverage of prices, review the current prices and compare them with those suggested after detailed observation of the related charts from the analysis above. It is recommended to keep the annual membership price the same at $143.90 unless other market analysis suggests otherwise.

Before		After	
Day Pass	$ 18.10	Day Pass	$ 20.00
Classic Single Rid.	$ 0.18	Classic Single Rid.	$ 0.20
Classic (Casual)	$ 0.18	Classic Day Pass	$ 0.18
Classic Member	$ 0.18	Classic Member	$ 0.16
Ebike Single Ride	$ 0.44	Ebike Single Ride	$ 0.44
Ebike Member	$ 0.18	Ebike Member	$ 0.16

Figure 23 Current Prices (Per Minute) and Suggested Prices for Optimized Advantages for Memberships

Customers should be able to see the advantage for members in prices between membership and casual riding at first glance. The psychology of seeing a lower price works like the difference of seeing 99¢ versus $1.00 and encourages the customer to strongly consider the lower price. Lower prices prompt us to evaluate the benefit of the freedom of everyday bike use which is important for casual riders. Otherwise, these benefits are hidden by the same price offered to both members and casual riders ($0.18 in this case).

An option to increase the profits of Cyclistic would be to increase prices based on the time of day. However, if the bike usage is dictated by the nature of riders (commute vs. leisure), then, there is no good reason to change the price between workdays and weekends or increase the prices during rush

hour. Those using bikes during these increased-price hours or days can feel rushed and not be able to enjoy the biking experience as much. Such marketing strategies risks customer loss, may not convince the casuals to become members, and will only disappoint riders because it ruins the nature of leisure.

Length of "Free Single Rides"

I decreased the "free single ride" time for a Day Pass to 2 hours instead of the current 3 hours because the vast majority of causals riders only ride for that amount of time. However, it is also true that 98% of casual riders have trip durations of up to 90 minutes. It, therefore, is also reasonable to change a Day Pass to 90 minutes of "free single ride". Again, for 98% of casuals, it will be not overly coercive but a gentle prompt to become a member.

If members also use bikes for leisure, exercise, entertainment, and a healthy lifestyle, then increasing "free single ride" time to 1 hour for classic bikes and providing better prices per minute for members will attract casual riders. This approach will work because it aligns with the nature of casual riders. By becoming members, they can enjoy more freedom every day by taking as many bike trips as they want on the same day. This approach should not harm Cyclistic's profit but should encourage membership as was mentioned above resulting in a win-win situation.

Advertisements

Digital media can help in marketing tactics. The Cyclistic's website and phone's app should include advertisement pop-ups, interstitials, and banner ads. The following advertisement messages may be successful in drawing Casuals towards a membership:

- Annual memberships cost the same as only 8 Day Passes.
- With the new prices, members can have a single ride of classic bikes for 3 hours at the same price that Day Pass users pay for just 2 hours. (See Figure 20)
- New pricing adjustments showing off advantages for members.
- Details of the benefits for members such as the health benefits of riding bikes, spending time outdoors, and staying healthy.
- Posters at the docking stations encouraging membership.

Complimentary Month

Offering a complimentary free month as part of the membership can be effective in converting Casuals into Members especially in April and May because people are seeking to ride bikes during the warmer months and are more likely to pay attention to promotions during that period. The number of trips for casuals during the cold season dramatically falls. It is very unlikely that offering a complimentary month of full membership in the winter months or even in March would attract many casual riders to become members.

Free Ride Days and Other Membership Perks

I would offer free single rides for electric bikes on some holidays or weekends for members, in such a way that attracts casuals to buy an annual membership. Overall, all members should have customer appreciation days, competitions, and activities that make bike rides fun and encourage repeat membership.

Act Phase

The following actions are recommended based on this analysis:

1. Review and adjust prices for annual members and casual riders so that it is more beneficial and attractive to buy an annual membership.
2. Review and adjust the "free single ride" time for annual members and casual riders for the same reason as mentioned above.
3. Provide member appreciation days, competitions, and activities that make bike rides fun.
4. Offer Casuals complimentary months of membership in April or May.
5. Offer free single rides for electric bikes on some holidays or weekends for members, in such a way that attracts casuals to buy an annual membership.
6. Re-design the company's website and phone app to better advertise new Cyclistic membership prices and benefits. Make ads on Instagram, Facebook, or similar platforms.
7. Conduct further analysis of members and causals to determine more marketing strategies. Suggested areas for further exploration are:
    a. Add an encrypted customer ID to datasets that allow a deeper analysis without access to personal information.
    b. Provide more information to analysts about reclining bikes, hand tricycles, and cargo bikes to find a way to continue this service.