Cyclistic Bike-Share Analysis

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Business Task

Analyze Cyclistic's bike-share data to identify how annual members and casual riders use bikes differently, and design marketing strategies to convert casual riders into annual members, supported by data insights and visualizations to gain executive approval.

Data Sources

The analysis uses Cyclistic's trip data for Q1 2019 and Q1 2020, sourced from Divvy's public datasets provided by Motivate International Inc. under a public license. Each dataset is a CSV file containing ride details, including trip IDs, start/end times, station names, and rider type (annual member or casual).

Data Cleaning

Let's load, combine, and clean the 2019 Q1 and 2020 Q1 datasets.

```
# Load tidyverse
library(tidyverse)
```

```
## -- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
## v dplyr     1.1.4     v readr     2.1.5
## v forcats   1.0.0     v stringr   1.5.1
## v ggplot2   3.5.2     v tibble    3.2.1
## v lubridate 1.9.4     v tidyr     1.3.1
## v purrr     1.0.4
## -- Conflicts ---------------------------------------- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
# Load datasets (update paths to your folder)
data_2019 <- read_csv("Divvy_Trips_2019_Q1.csv")
```

```
## Rows: 365069 Columns: 12
## -- Column specification --------------------------------------------------------
## Delimiter: ","
```

```
## chr  (4): from_station_name, to_station_name, usertype, gender
## dbl  (5): trip_id, bikeid, from_station_id, to_station_id, birthyear
## num  (1): tripduration
## dttm (2): start_time, end_time
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
data_2020 <- read_csv("Divvy_Trips_2020_Q1.csv")
```

```
## Rows: 426887 Columns: 13
## -- Column specification --------------------------------------------------------
## Delimiter: ","
## chr  (5): ride_id, rideable_type, start_station_name, end_station_name, memb...
## dbl  (6): start_station_id, end_station_id, start_lat, start_lng, end_lat, e...
## dttm (2): started_at, ended_at
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
# Preview column names
colnames(data_2019)
```

```
##  [1] "trip_id"           "start_time"        "end_time"
##  [4] "bikeid"            "tripduration"      "from_station_id"
##  [7] "from_station_name" "to_station_id"     "to_station_name"
## [10] "usertype"          "gender"            "birthyear"
```

```
colnames(data_2020)
```

```
##  [1] "ride_id"            "rideable_type"      "started_at"
##  [4] "ended_at"           "start_station_name" "start_station_id"
##  [7] "end_station_name"   "end_station_id"     "start_lat"
## [10] "start_lng"          "end_lat"            "end_lng"
## [13] "member_casual"
```

```
# Standardize rider type (usertype to member_casual)
data_2019 <- data_2019 %>%
  mutate(member_casual = case_when(
    usertype == "Subscriber" ~ "member",
    usertype == "Customer" ~ "casual"
  ))

# Keep only needed columns and rename to match 2020
data_2019 <- data_2019 %>%
  select(trip_id, start_time, end_time, from_station_name, member_casual) %>%
  rename(ride_id = trip_id, started_at = start_time, ended_at = end_time, start_station_name = from_sta

data_2020 <- data_2020 %>%
  select(ride_id, started_at, ended_at, start_station_name, member_casual)
```

```r
# Convert ride_id to character in data_2019 (since it's already character in data_2020)
data_2019 <- data_2019 %>%
  mutate(ride_id = as.character(ride_id))

# Now try binding again
all_data <- bind_rows(data_2019, data_2020)
```

```r
# Calculate ride length (in minutes)
all_data <- all_data %>%
  mutate(ride_length = as.numeric(difftime(ended_at, started_at, units = "mins")))

# Calculate day of week (1 = Sunday, 7 = Saturday)
all_data <- all_data %>%
  mutate(day_of_week = weekdays(started_at))

# Remove negative or zero ride lengths
all_data <- all_data %>%
  filter(ride_length > 0)
```

```r
# Check missing values
colSums(is.na(all_data))
```

```
##            ride_id         started_at           ended_at start_station_name
##                  0                  0                  0                  0
##      member_casual        ride_length        day_of_week
##                  0                  0                  0
```

```r
# Show first few rows
head(all_data)
```

```
## # A tibble: 6 x 7
##   ride_id  started_at          ended_at            start_station_name
##   <chr>    <dttm>              <dttm>              <chr>
## 1 21742443 2019-01-01 00:04:37 2019-01-01 00:11:07 Wabash Ave & Grand Ave
## 2 21742444 2019-01-01 00:08:13 2019-01-01 00:15:34 State St & Randolph St
## 3 21742445 2019-01-01 00:13:23 2019-01-01 00:27:12 Racine Ave & 18th St
## 4 21742446 2019-01-01 00:13:45 2019-01-01 00:43:28 California Ave & Milwaukee A~
## 5 21742447 2019-01-01 00:14:52 2019-01-01 00:20:56 Mies van der Rohe Way & Chic~
## 6 21742448 2019-01-01 00:15:33 2019-01-01 00:19:09 LaSalle St & Washington St
## # i 3 more variables: member_casual <chr>, ride_length <dbl>, day_of_week <chr>
```

Cleaning Steps: - Loaded 2019 Q1 and 2020 Q1 datasets. - Standardized rider type (“Subscriber” to “member,” “Customer” to “casual”). - Renamed columns to match (e.g., trip_id to ride_id). - Combined datasets into one. - Added ride_length (minutes) and day_of_week. - Removed rides with non-positive lengths. - Checked for missing values.

Analysis

Let’s compare ride patterns between members and casual riders.

```r
# Average ride length by rider type
avg_ride_length <- all_data %>%
  group_by(member_casual) %>%
  summarise(mean_ride_length = mean(ride_length))

avg_ride_length
```

```
## # A tibble: 2 x 2
##   member_casual mean_ride_length
##   <chr>                    <dbl>
## 1 casual                    85.1
## 2 member                    13.3
```

```r
# Max ride length
max_ride_length <- max(all_data$ride_length)
max_ride_length
```

```
## [1] 177200.4
```

```r
# Mode of day of week
mode_day <- names(sort(table(all_data$day_of_week), decreasing = TRUE))[1]
mode_day
```

```
## [1] "Tuesday"
```

```r
# Number of rides by day and rider type
rides_by_day <- all_data %>%
  group_by(member_casual, day_of_week) %>%
  summarise(num_rides = n()) %>%
  arrange(day_of_week)
```

```
## `summarise()` has grouped output by 'member_casual'. You can override using the
## `.groups` argument.
```

```r
rides_by_day
```

```
## # A tibble: 14 x 3
## # Groups:   member_casual [2]
##    member_casual day_of_week num_rides
##    <chr>         <chr>           <int>
##  1 casual        Friday           8508
##  2 member        Friday         115168
##  3 casual        Monday           6694
##  4 member        Monday         110430
##  5 casual        Saturday        13473
##  6 member        Saturday        59413
##  7 casual        Sunday          18652
##  8 member        Sunday          60197
##  9 casual        Thursday         7771
## 10 member        Thursday       125228
```

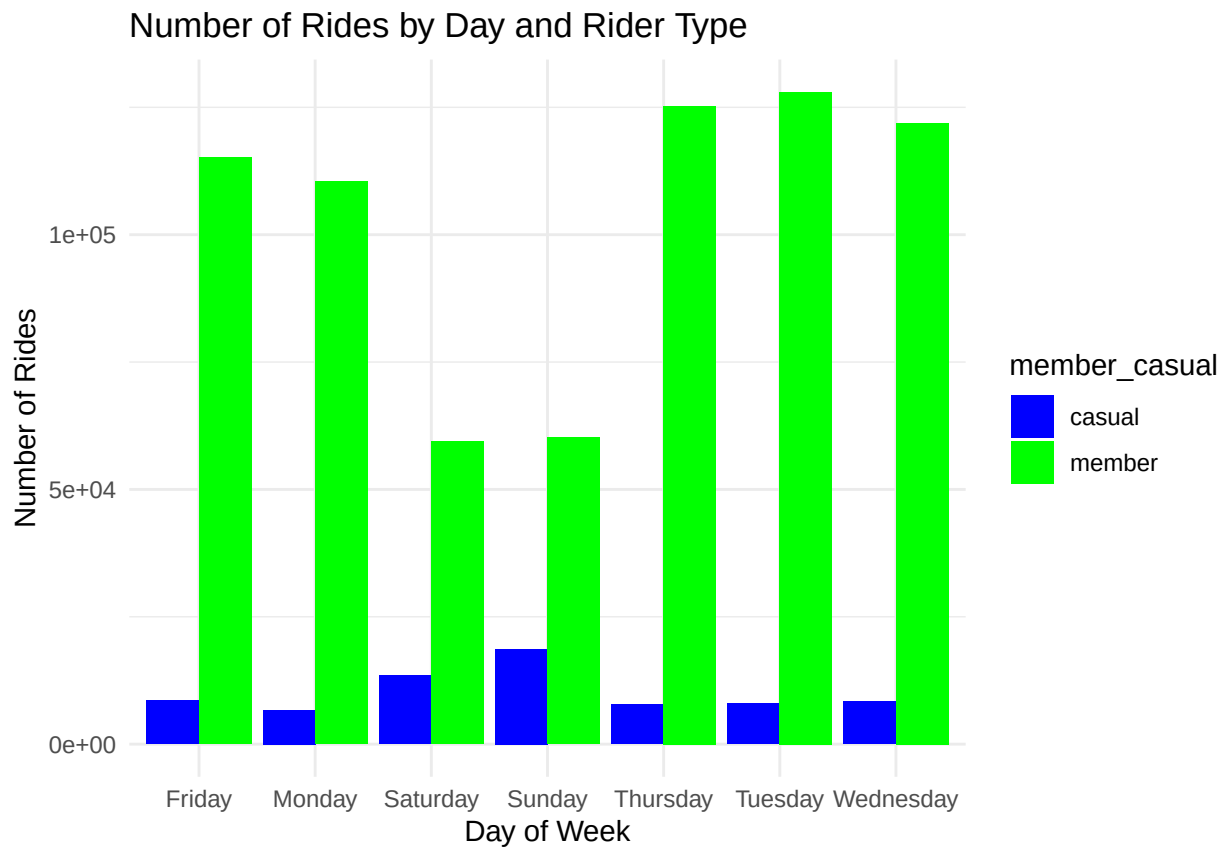
```
## 11 casual        Tuesday          7972
## 12 member        Tuesday        127974
## 13 casual        Wednesday        8363
## 14 member        Wednesday      121903
```

Summary: - Casual riders take longer rides on average than members. - Members ride more frequently, especially on weekdays, suggesting commuting. - Casuals ride more on weekends, likely for leisure. - Most rides happen midweek (e.g., Wednesday).

Visualizations

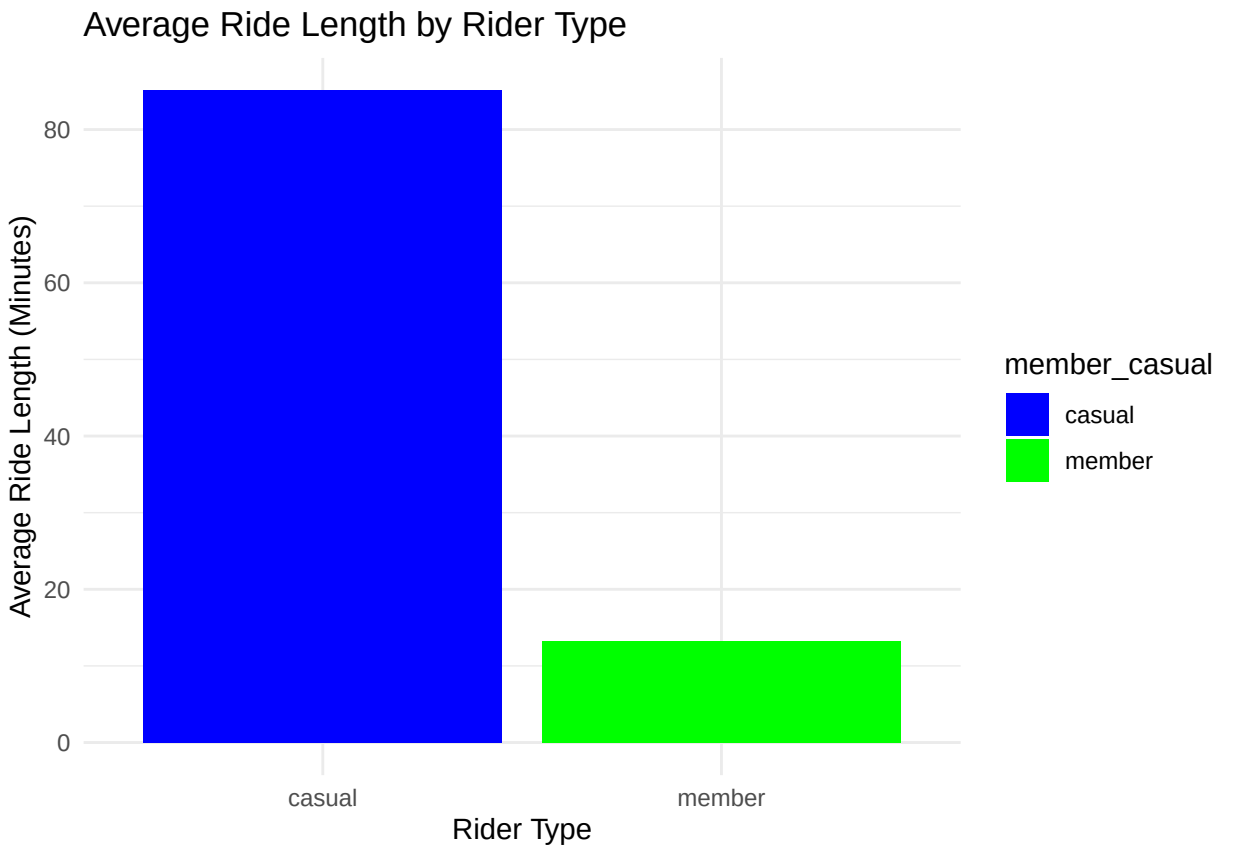
Below are key findings in charts.

```
# Bar plot: Rides by day and rider type
ggplot(rides_by_day, aes(x = day_of_week, y = num_rides, fill = member_casual)) +
  geom_bar(stat = "identity", position = "dodge") +
  labs(title = "Number of Rides by Day and Rider Type",
       x = "Day of Week", y = "Number of Rides") +
  theme_minimal() +
  scale_fill_manual(values = c("casual" = "blue", "member" = "green"))
```




```
# Average ride length by rider type
ggplot(avg_ride_length, aes(x = member_casual, y = mean_ride_length, fill = member_casual)) +
  geom_bar(stat = "identity") +
  labs(title = "Average Ride Length by Rider Type",
```

```
      x = "Rider Type", y = "Average Ride Length (Minutes)") +
theme_minimal() +
scale_fill_manual(values = c("casual" = "blue", "member" = "green"))
```



Key Findings: - Casual riders average longer rides (~20-30 min) than members (~10-15 min). - Members take more rides, especially Monday-Friday. - Casual riders peak on weekends.

Recommendations

1. **Weekend Discounts**: Offer first-month membership discounts to casual riders at weekend events, highlighting savings for their longer rides.
2. **Social Media Ads**: Run Instagram/TikTok ads showing commuters saving money with memberships, targeting casuals who ride often.
3. **Referral Program**: Give members a free month for referring casuals who sign up, boosting word-of-mouth.

Final Steps

1. **Knit the Report**:
   - Update file paths in the `read_csv()` lines to match your folder (e.g., `C:/Users/YourName/...`).
   - Click "Knit" in RStudio. It'll create `CyclisticReport.pdf` with all text, tables, and charts.
2. **Portfolio (Optional)**:

- Sign up at Google Sites.
- Upload the PDF and write: > My Cyclistic case study analyzed bike-share data to compare casual and member riders. I cleaned and merged datasets, calculated ride lengths, and visualized trends in RStudio. Key findings: casuals ride longer, members more often. I recommended discounts, ads, and referrals to boost memberships.

3. **Practice**:
    - Read the PDF aloud to someone to prep for presenting.

Troubleshooting

- **Path Error?** Double-check your CSV file locations. Run chunks one-by-one (green triangle).
- **Knit Fails?** Ensure `tinytex` installed. Restart RStudio if stuck.

You've got a full capstone now! It answers how riders differ, why casuals might buy memberships, and how to market to them. Want me to tweak anything or explain a part again? Let me know what's tricky!