How does a bike-share navigate speedy success?

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# Cyclistic Bike-Share Analysis Case Study

## STEP 1: COLLECT DATA

library(dplyr)

##   
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':  
##   
## filter, lag

## The following objects are masked from 'package:base':  
##   
## intersect, setdiff, setequal, union

# Set working directory to the folder containing the CSV files  
setwd("C:/Users/Admin/Desktop/case study 1")  
library(tidyverse)

## ── Attaching packages ─────────────────────────────────────── tidyverse 1.3.2  
## ──

## ✔ ggplot2 3.4.0 ✔ purrr 1.0.1  
## ✔ tibble 3.1.8 ✔ stringr 1.5.0  
## ✔ tidyr 1.3.0 ✔ forcats 1.0.0  
## ✔ readr 2.1.3   
## ── Conflicts ────────────────────────────────────────── tidyverse\_conflicts() ──  
## ✖ dplyr::filter() masks stats::filter()  
## ✖ dplyr::lag() masks stats::lag()

library(conflicted)

## Warning: package 'conflicted' was built under R version 4.2.3

library(lubridate)  
  
  
# Set dplyr::filter and dplyr::lag as the default choices  
conflict\_prefer("filter", "dplyr")

## [conflicted] Will prefer dplyr::filter over any other package.

conflict\_prefer("lag", "dplyr")

## [conflicted] Will prefer dplyr::lag over any other package.

# Set working directory to the folder containing the CSV files  
setwd("C:/Users/Admin/Desktop/case study 1")  
  
# Upload Divvy datasets (csv files) here  
q1\_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.

q1\_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.

## STEP 2: WRANGLE DATA AND COMBINE INTO A SINGLE FILE

# Compare column names each of the files  
# While the names don't have to be in the same order, they DO need to match perfectly before  
#we can use a command to join them into one file  
colnames(q1\_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(q1\_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"

# Rename columns to make them consistent with q1\_2020 (as this will be the supposed  
#going-forward table design for Divvy)  
q1\_2019 <- rename(q1\_2019  
 ,ride\_id = trip\_id  
 ,rideable\_type = bikeid  
 ,started\_at = start\_time  
 ,ended\_at = end\_time  
 ,start\_station\_name = from\_station\_name  
 ,start\_station\_id = from\_station\_id  
 ,end\_station\_name = to\_station\_name  
 ,end\_station\_id = to\_station\_id  
 ,member\_casual = usertype  
)  
  
# Inspect the dataframes and look for incongruencies  
str(q1\_2019)

## spc\_tbl\_ [365,069 × 12] (S3: spec\_tbl\_df/tbl\_df/tbl/data.frame)  
## $ ride\_id : num [1:365069] 21742443 21742444 21742445 21742446 21742447 ...  
## $ started\_at : POSIXct[1:365069], format: "2019-01-01 00:04:37" "2019-01-01 00:08:13" ...  
## $ ended\_at : POSIXct[1:365069], format: "2019-01-01 00:11:07" "2019-01-01 00:15:34" ...  
## $ rideable\_type : num [1:365069] 2167 4386 1524 252 1170 ...  
## $ tripduration : num [1:365069] 390 441 829 1783 364 ...  
## $ start\_station\_id : num [1:365069] 199 44 15 123 173 98 98 211 150 268 ...  
## $ start\_station\_name: chr [1:365069] "Wabash Ave & Grand Ave" "State St & Randolph St" "Racine Ave & 18th St" "California Ave & Milwaukee Ave" ...  
## $ end\_station\_id : num [1:365069] 84 624 644 176 35 49 49 142 148 141 ...  
## $ end\_station\_name : chr [1:365069] "Milwaukee Ave & Grand Ave" "Dearborn St & Van Buren St (\*)" "Western Ave & Fillmore St (\*)" "Clark St & Elm St" ...  
## $ member\_casual : chr [1:365069] "Subscriber" "Subscriber" "Subscriber" "Subscriber" ...  
## $ gender : chr [1:365069] "Male" "Female" "Female" "Male" ...  
## $ birthyear : num [1:365069] 1989 1990 1994 1993 1994 ...  
## - attr(\*, "spec")=  
## .. cols(  
## .. trip\_id = col\_double(),  
## .. start\_time = col\_datetime(format = ""),  
## .. end\_time = col\_datetime(format = ""),  
## .. bikeid = col\_double(),  
## .. tripduration = col\_number(),  
## .. from\_station\_id = col\_double(),  
## .. from\_station\_name = col\_character(),  
## .. to\_station\_id = col\_double(),  
## .. to\_station\_name = col\_character(),  
## .. usertype = col\_character(),  
## .. gender = col\_character(),  
## .. birthyear = col\_double()  
## .. )  
## - attr(\*, "problems")=<externalptr>

str(q1\_2020)

## spc\_tbl\_ [426,887 × 13] (S3: spec\_tbl\_df/tbl\_df/tbl/data.frame)  
## $ ride\_id : chr [1:426887] "EACB19130B0CDA4A" "8FED874C809DC021" "789F3C21E472CA96" "C9A388DAC6ABF313" ...  
## $ rideable\_type : chr [1:426887] "docked\_bike" "docked\_bike" "docked\_bike" "docked\_bike" ...  
## $ started\_at : POSIXct[1:426887], format: "2020-01-21 20:06:59" "2020-01-30 14:22:39" ...  
## $ ended\_at : POSIXct[1:426887], format: "2020-01-21 20:14:30" "2020-01-30 14:26:22" ...  
## $ start\_station\_name: chr [1:426887] "Western Ave & Leland Ave" "Clark St & Montrose Ave" "Broadway & Belmont Ave" "Clark St & Randolph St" ...  
## $ start\_station\_id : num [1:426887] 239 234 296 51 66 212 96 96 212 38 ...  
## $ end\_station\_name : chr [1:426887] "Clark St & Leland Ave" "Southport Ave & Irving Park Rd" "Wilton Ave & Belmont Ave" "Fairbanks Ct & Grand Ave" ...  
## $ end\_station\_id : num [1:426887] 326 318 117 24 212 96 212 212 96 100 ...  
## $ start\_lat : num [1:426887] 42 42 41.9 41.9 41.9 ...  
## $ start\_lng : num [1:426887] -87.7 -87.7 -87.6 -87.6 -87.6 ...  
## $ end\_lat : num [1:426887] 42 42 41.9 41.9 41.9 ...  
## $ end\_lng : num [1:426887] -87.7 -87.7 -87.7 -87.6 -87.6 ...  
## $ member\_casual : chr [1:426887] "member" "member" "member" "member" ...  
## - attr(\*, "spec")=  
## .. cols(  
## .. ride\_id = col\_character(),  
## .. rideable\_type = col\_character(),  
## .. started\_at = col\_datetime(format = ""),  
## .. ended\_at = col\_datetime(format = ""),  
## .. start\_station\_name = col\_character(),  
## .. start\_station\_id = col\_double(),  
## .. end\_station\_name = col\_character(),  
## .. end\_station\_id = col\_double(),  
## .. start\_lat = col\_double(),  
## .. start\_lng = col\_double(),  
## .. end\_lat = col\_double(),  
## .. end\_lng = col\_double(),  
## .. member\_casual = col\_character()  
## .. )  
## - attr(\*, "problems")=<externalptr>

q1\_2019 <- mutate(q1\_2019, ride\_id = as.character(ride\_id)  
 ,rideable\_type = as.character(rideable\_type))  
  
  
# Stack individual quarter's data frames into one big data frame  
all\_trips <- bind\_rows(q1\_2019, q1\_2020)  
  
# Remove lat, long, birthyear, and gender fields as this data was dropped beginning in 2020  
all\_trips <- all\_trips %>%  
 select(-c(start\_lat, start\_lng, end\_lat, end\_lng, birthyear, gender, "tripduration"))

## # STEP 3: CLEAN UP AND ADD DATA TO PREPARE FOR ANALYSIS

# Inspect the new table that has been created  
colnames(all\_trips) #List of column names

## [1] "ride\_id" "started\_at" "ended\_at"   
## [4] "rideable\_type" "start\_station\_id" "start\_station\_name"  
## [7] "end\_station\_id" "end\_station\_name" "member\_casual"

nrow(all\_trips) #How many rows are in data frame?

## [1] 791956

dim(all\_trips) #Dimensions of the data frame?

## [1] 791956 9

head(all\_trips) #See the first 6 rows of data frame. Also tail(all\_trips)

## # A tibble: 6 × 9  
## ride\_id started\_at ended\_at rideable\_type start…¹ start…²  
## <chr> <dttm> <dttm> <chr> <dbl> <chr>   
## 1 21742443 2019-01-01 00:04:37 2019-01-01 00:11:07 2167 199 Wabash…  
## 2 21742444 2019-01-01 00:08:13 2019-01-01 00:15:34 4386 44 State …  
## 3 21742445 2019-01-01 00:13:23 2019-01-01 00:27:12 1524 15 Racine…  
## 4 21742446 2019-01-01 00:13:45 2019-01-01 00:43:28 252 123 Califo…  
## 5 21742447 2019-01-01 00:14:52 2019-01-01 00:20:56 1170 173 Mies v…  
## 6 21742448 2019-01-01 00:15:33 2019-01-01 00:19:09 2437 98 LaSall…  
## # … with 3 more variables: end\_station\_id <dbl>, end\_station\_name <chr>,  
## # member\_casual <chr>, and abbreviated variable names ¹​start\_station\_id,  
## # ²​start\_station\_name

str(all\_trips) #See list of columns and data types (numeric, character, etc)

## tibble [791,956 × 9] (S3: tbl\_df/tbl/data.frame)  
## $ ride\_id : chr [1:791956] "21742443" "21742444" "21742445" "21742446" ...  
## $ started\_at : POSIXct[1:791956], format: "2019-01-01 00:04:37" "2019-01-01 00:08:13" ...  
## $ ended\_at : POSIXct[1:791956], format: "2019-01-01 00:11:07" "2019-01-01 00:15:34" ...  
## $ rideable\_type : chr [1:791956] "2167" "4386" "1524" "252" ...  
## $ start\_station\_id : num [1:791956] 199 44 15 123 173 98 98 211 150 268 ...  
## $ start\_station\_name: chr [1:791956] "Wabash Ave & Grand Ave" "State St & Randolph St" "Racine Ave & 18th St" "California Ave & Milwaukee Ave" ...  
## $ end\_station\_id : num [1:791956] 84 624 644 176 35 49 49 142 148 141 ...  
## $ end\_station\_name : chr [1:791956] "Milwaukee Ave & Grand Ave" "Dearborn St & Van Buren St (\*)" "Western Ave & Fillmore St (\*)" "Clark St & Elm St" ...  
## $ member\_casual : chr [1:791956] "Subscriber" "Subscriber" "Subscriber" "Subscriber" ...

summary(all\_trips) #Statistical summary of data. Mainly for numerics

## ride\_id started\_at   
## Length:791956 Min. :2019-01-01 00:04:37.00   
## Class :character 1st Qu.:2019-02-28 17:04:04.75   
## Mode :character Median :2020-01-07 12:48:50.50   
## Mean :2019-09-01 11:58:08.35   
## 3rd Qu.:2020-02-19 19:31:54.75   
## Max. :2020-03-31 23:51:34.00   
##   
## ended\_at rideable\_type start\_station\_id  
## Min. :2019-01-01 00:11:07.00 Length:791956 Min. : 2.0   
## 1st Qu.:2019-02-28 17:15:58.75 Class :character 1st Qu.: 77.0   
## Median :2020-01-07 13:02:50.00 Mode :character Median :174.0   
## Mean :2019-09-01 12:17:52.17 Mean :204.4   
## 3rd Qu.:2020-02-19 19:51:54.50 3rd Qu.:291.0   
## Max. :2020-05-19 20:10:34.00 Max. :675.0   
##   
## start\_station\_name end\_station\_id end\_station\_name member\_casual   
## Length:791956 Min. : 2.0 Length:791956 Length:791956   
## Class :character 1st Qu.: 77.0 Class :character Class :character   
## Mode :character Median :174.0 Mode :character Mode :character   
## Mean :204.4   
## 3rd Qu.:291.0   
## Max. :675.0   
## NA's :1

# There are a few problems we will need to fix:  
# (1) In the "member\_casual" column, there are two names for members ("member" and  
#"Subscriber") and two names for casual riders ("Customer" and "casual"). We will need to  
#consolidate that from four to two labels.  
# (2) The data can only be aggregated at the ride-level, which is too granular. We will want to  
#add some additional columns of data -- such as day, month, year -- that provide additional  
#opportunities to aggregate the data.  
# (3) We will want to add a calculated field for length of ride since the 2020Q1 data did not have  
#the "tripduration" column. We will add "ride\_length" to the entire dataframe for consistency.  
# (4) There are some rides where tripduration shows up as negative, including several hundred  
#rides where Divvy took bikes out of circulation for Quality Control reasons. We will want to  
#delete these rides.  
# In the "member\_casual" column, replace "Subscriber" with "member" and "Customer" with  
"casual"

## [1] "casual"

# Before 2020, Divvy used different labels for these two types of riders ... we will want to make  
#our dataframe consistent with their current nomenclature  
  
# N.B.: "Level" is a special property of a column that is retained even if a subset does not  
#contain any values from a specific level  
# Begin by seeing how many observations fall under each usertype  
table(all\_trips$member\_casual)

##   
## casual Customer member Subscriber   
## 48480 23163 378407 341906

# Reassign to the desired values (we will go with the current 2020 labels)  
all\_trips <- all\_trips %>%  
 mutate(member\_casual = recode(member\_casual  
 ,"Subscriber" = "member"  
 ,"Customer" = "casual"))  
  
# Check to make sure the proper number of observations were reassigned  
table(all\_trips$member\_casual)

##   
## casual member   
## 71643 720313

# Add columns that list the date, month, day, and year of each ride  
## This will allow us to aggregate ride data for each month, day, or year ... before completing  
#these operations we could only aggregate at the ride level  
# https://www.statmethods.net/input/dates.html more on date formats in R found at that link  
all\_trips$date <- as.Date(all\_trips$started\_at)   
#The default format is yyyy-mm-dd  
all\_trips$month <- format(as.Date(all\_trips$date), "%m")  
all\_trips$day <- format(as.Date(all\_trips$date), "%d")  
all\_trips$year <- format(as.Date(all\_trips$date), "%Y")  
all\_trips$day\_of\_week <- format(as.Date(all\_trips$date), "%A")  
# Add a "ride\_length" calculation to all\_trips (in seconds)  
# https://stat.ethz.ch/R-manual/R-devel/library/base/html/difftime.html  
all\_trips$ride\_length <- difftime(all\_trips$ended\_at,all\_trips$started\_at)  
# Inspect the structure of the columns  
str(all\_trips)

## tibble [791,956 × 15] (S3: tbl\_df/tbl/data.frame)  
## $ ride\_id : chr [1:791956] "21742443" "21742444" "21742445" "21742446" ...  
## $ started\_at : POSIXct[1:791956], format: "2019-01-01 00:04:37" "2019-01-01 00:08:13" ...  
## $ ended\_at : POSIXct[1:791956], format: "2019-01-01 00:11:07" "2019-01-01 00:15:34" ...  
## $ rideable\_type : chr [1:791956] "2167" "4386" "1524" "252" ...  
## $ start\_station\_id : num [1:791956] 199 44 15 123 173 98 98 211 150 268 ...  
## $ start\_station\_name: chr [1:791956] "Wabash Ave & Grand Ave" "State St & Randolph St" "Racine Ave & 18th St" "California Ave & Milwaukee Ave" ...  
## $ end\_station\_id : num [1:791956] 84 624 644 176 35 49 49 142 148 141 ...  
## $ end\_station\_name : chr [1:791956] "Milwaukee Ave & Grand Ave" "Dearborn St & Van Buren St (\*)" "Western Ave & Fillmore St (\*)" "Clark St & Elm St" ...  
## $ member\_casual : chr [1:791956] "member" "member" "member" "member" ...  
## $ date : Date[1:791956], format: "2019-01-01" "2019-01-01" ...  
## $ month : chr [1:791956] "01" "01" "01" "01" ...  
## $ day : chr [1:791956] "01" "01" "01" "01" ...  
## $ year : chr [1:791956] "2019" "2019" "2019" "2019" ...  
## $ day\_of\_week : chr [1:791956] "Tuesday" "Tuesday" "Tuesday" "Tuesday" ...  
## $ ride\_length : 'difftime' num [1:791956] 390 441 829 1783 ...  
## ..- attr(\*, "units")= chr "secs"

# Convert "ride\_length" from Factor to numeric so we can run calculations on the data  
is.factor(all\_trips$ride\_length)

## [1] FALSE

all\_trips$ride\_length <- as.numeric(as.character(all\_trips$ride\_length))  
is.numeric(all\_trips$ride\_length)

## [1] TRUE

# Remove "bad" data  
# The dataframe includes a few hundred entries when bikes were taken out of docks and  
#checked for quality by Divvy or ride\_length was negative  
# We will create a new version of the dataframe (v2) since data is being removed  
# https://www.datasciencemadesimple.com/delete-or-drop-rows-in-r-with-conditions-2/  
all\_trips\_v2 <- all\_trips[!(all\_trips$start\_station\_name == "HQ QR" | all\_trips$ride\_length<0),]

## Annual Members vs Casual Members

Annual members are more than casual members.

# Generate a frequency table for the member\_casual column  
member\_casual\_count <- table(all\_trips$member\_casual)  
  
# Print the frequency table  
print(member\_casual\_count)

##   
## casual member   
## 71643 720313

STEP 4: CONDUCT DESCRIPTIVE ANALYSIS

# Descriptive analysis on ride\_length (all figures in seconds)  
mean(all\_trips\_v2$ride\_length) #straight average (total ride length / rides)

## [1] 1189.459

median(all\_trips\_v2$ride\_length) #midpoint number in the ascending array of ride lengths

## [1] 539

max(all\_trips\_v2$ride\_length) #longest ride

## [1] 10632022

min(all\_trips\_v2$ride\_length) #shortest ride

## [1] 1

# You can condense the four lines above to one line using summary() on the specific attribute  
summary(all\_trips\_v2$ride\_length)

## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## 1 331 539 1189 912 10632022

# Compare members and casual users  
aggregate(all\_trips\_v2$ride\_length ~ all\_trips\_v2$member\_casual, FUN = mean)

## all\_trips\_v2$member\_casual all\_trips\_v2$ride\_length  
## 1 casual 5372.7839  
## 2 member 795.2523

aggregate(all\_trips\_v2$ride\_length ~ all\_trips\_v2$member\_casual, FUN = median)

## all\_trips\_v2$member\_casual all\_trips\_v2$ride\_length  
## 1 casual 1393  
## 2 member 508

aggregate(all\_trips\_v2$ride\_length ~ all\_trips\_v2$member\_casual, FUN = max)

## all\_trips\_v2$member\_casual all\_trips\_v2$ride\_length  
## 1 casual 10632022  
## 2 member 6096428

aggregate(all\_trips\_v2$ride\_length ~ all\_trips\_v2$member\_casual, FUN = min)

## all\_trips\_v2$member\_casual all\_trips\_v2$ride\_length  
## 1 casual 2  
## 2 member 1

# See the average ride time by each day for members vs casual users  
aggregate(all\_trips\_v2$ride\_length ~ all\_trips\_v2$member\_casual + all\_trips\_v2$day\_of\_week,  
FUN = mean)

## all\_trips\_v2$member\_casual all\_trips\_v2$day\_of\_week all\_trips\_v2$ride\_length  
## 1 casual Friday 6090.7373  
## 2 member Friday 796.7338  
## 3 casual Monday 4752.0504  
## 4 member Monday 822.3112  
## 5 casual Saturday 4950.7708  
## 6 member Saturday 974.0730  
## 7 casual Sunday 5061.3044  
## 8 member Sunday 972.9383  
## 9 casual Thursday 8451.6669  
## 10 member Thursday 707.2093  
## 11 casual Tuesday 4561.8039  
## 12 member Tuesday 769.4416  
## 13 casual Wednesday 4480.3724  
## 14 member Wednesday 711.9838

# Notice that the days of the week are out of order. Let's fix that.  
all\_trips\_v2$day\_of\_week <- ordered(all\_trips\_v2$day\_of\_week, levels=c("Sunday", "Monday",  
"Tuesday", "Wednesday", "Thursday", "Friday", "Saturday"))  
# Now, let's run the average ride time by each day for members vs casual users  
aggregate(all\_trips\_v2$ride\_length ~ all\_trips\_v2$member\_casual + all\_trips\_v2$day\_of\_week,  
FUN = mean)

## all\_trips\_v2$member\_casual all\_trips\_v2$day\_of\_week all\_trips\_v2$ride\_length  
## 1 casual Sunday 5061.3044  
## 2 member Sunday 972.9383  
## 3 casual Monday 4752.0504  
## 4 member Monday 822.3112  
## 5 casual Tuesday 4561.8039  
## 6 member Tuesday 769.4416  
## 7 casual Wednesday 4480.3724  
## 8 member Wednesday 711.9838  
## 9 casual Thursday 8451.6669  
## 10 member Thursday 707.2093  
## 11 casual Friday 6090.7373  
## 12 member Friday 796.7338  
## 13 casual Saturday 4950.7708  
## 14 member Saturday 974.0730

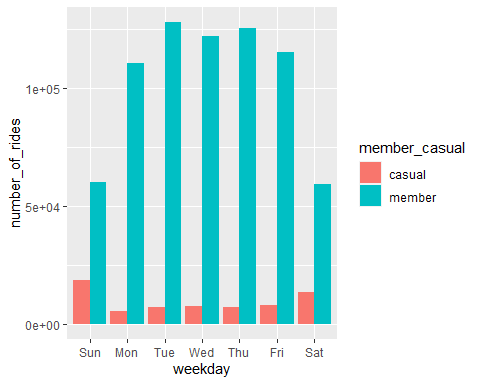
# analyze ridership data by type and weekday  
all\_trips\_v2 %>%  
mutate(weekday = wday(started\_at, label = TRUE)) %>% #creates weekday field usingwday()  
group\_by(member\_casual, weekday) %>% #groups by usertype and weekday  
summarise(number\_of\_rides = n() #calculates the number of rides and average duration  
,average\_duration = mean(ride\_length)) %>% # calculates the average duration  
arrange(member\_casual, weekday) # sorts

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

## # A tibble: 14 × 4  
## # Groups: member\_casual [2]  
## member\_casual weekday number\_of\_rides average\_duration  
## <chr> <ord> <int> <dbl>  
## 1 casual Sun 18652 5061.  
## 2 casual Mon 5591 4752.  
## 3 casual Tue 7311 4562.  
## 4 casual Wed 7690 4480.  
## 5 casual Thu 7147 8452.  
## 6 casual Fri 8013 6091.  
## 7 casual Sat 13473 4951.  
## 8 member Sun 60197 973.  
## 9 member Mon 110430 822.  
## 10 member Tue 127974 769.  
## 11 member Wed 121902 712.  
## 12 member Thu 125228 707.  
## 13 member Fri 115168 797.  
## 14 member Sat 59413 974.

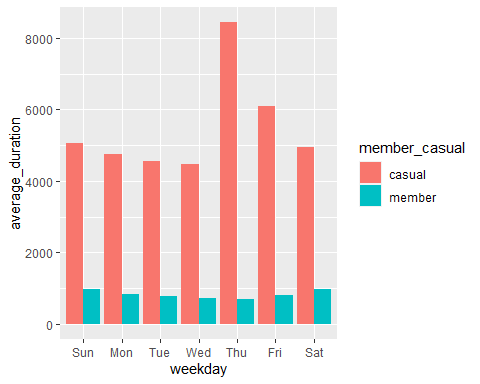
# Let's visualize the number of rides by rider type  
all\_trips\_v2 %>%mutate(weekday = wday(started\_at, label = TRUE)) %>%group\_by(member\_casual, weekday) %>%summarise(number\_of\_rides = n(),average\_duration = mean(ride\_length)) %>%arrange(member\_casual, weekday) %>%ggplot(aes(x = weekday, y = number\_of\_rides, fill = member\_casual)) +  
geom\_col(position = "dodge")

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



# Let's create a visualization for average duration  
all\_trips\_v2 %>%  
mutate(weekday = wday(started\_at, label = TRUE)) %>%  
group\_by(member\_casual, weekday) %>%  
summarise(number\_of\_rides = n()  
,average\_duration = mean(ride\_length)) %>%  
arrange(member\_casual, weekday) %>%  
ggplot(aes(x = weekday, y = average\_duration, fill = member\_casual)) +  
geom\_col(position = "dodge")

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



## Insights

The analysis of Cyclistic’s bike usage data reveals notable differences between annual members and casual riders. Casual riders typically have longer ride durations, suggesting that they are more likely to use bikes for leisurely activities or occasional longer trips. In contrast, annual members have shorter ride durations indicating that they often use the bikes for shorter, possibly more utilitarian trips. Additionally, while both groups show a strong preference for electric bikes, members have a higher usage rate for classic bikes, reflecting a possible preference for reliability and convenience for commuting purposes. Furthermore, casual riders tend to use a wider variety of start and end locations compared to members, highlighting a more diverse and sporadic usage pattern. This information suggests that while casual riders enjoy the flexibility and novelty of bike-share options, annual members benefit from the consistent, routine convenience that the membership provides.