Bikeshare

Pyimoe Than

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Business problem

How do annual members and casual riders use Cyclistic bikes differently?

Importing library

```
library(dplyr)
library(writexl)
library(tidyr)
library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 4.2.1
```

```
library(tidyverse)
library(data.table)
library(lubridate)#for datetime object
```

Load the data

```
Bike_Share_202010=read.csv("202010-divvy-tripdata.csv",header=T)
Bike_Share_202011=read.csv("202011-divvy-tripdata.csv",header=T)
Bike_Share_202012=read.csv("202012-divvy-tripdata.csv",header=T)
```

Total Number of Columns and Width

```
dim(Bike_Share_202010)
```

```
## [1] 388653     13
```

```
dim(Bike_Share_202011)
```

```
## [1] 259716     13
```

```
dim(Bike_Share_202012)
```

```
## [1] 131573     13
```

Check Column name of each dataset for consistency

```
colnames(Bike_Share_202010)
```

```
##  [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"
```

```
colnames(Bike_Share_202011)
```

```
##  [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"
```

```
colnames(Bike_Share_202012)
```

```
##  [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"
```

What kinds of Data we have in the dataset

```
str(Bike_Share_202010)
```

```
## 'data.frame':    388653 obs. of  13 variables:
##  $ ride_id           : chr  "ACB6B40CF5B9044C" "DF450C72FD109C01" "B6396B54A15AC0DF" "44A4AEE
261B9E854" ...
##  $ rideable_type     : chr  "electric_bike" "electric_bike" "electric_bike" "electric_bike"
...
##  $ started_at        : chr  "2020-10-31 19:39:43" "2020-10-31 23:50:08" "2020-10-31 23:00:01"
"2020-10-31 22:16:43" ...
##  $ ended_at          : chr  "2020-10-31 19:57:12" "2020-11-01 00:04:16" "2020-10-31 23:08:22"
"2020-10-31 22:19:35" ...
##  $ start_station_name: chr  "Lakeview Ave & Fullerton Pkwy" "Southport Ave & Waveland Ave" "S
tony Island Ave & 67th St" "Clark St & Grace St" ...
##  $ start_station_id  : int  313 227 102 165 190 359 313 125 NA 174 ...
##  $ end_station_name  : chr  "Rush St & Hubbard St" "Kedzie Ave & Milwaukee Ave" "University A
ve & 57th St" "Broadway & Sheridan Rd" ...
##  $ end_station_id    : int  125 260 423 256 185 53 125 313 199 635 ...
##  $ start_lat         : num  41.9 41.9 41.8 42 41.9 ...
##  $ start_lng         : num  -87.6 -87.7 -87.6 -87.7 -87.7 ...
##  $ end_lat           : num  41.9 41.9 41.8 42 41.9 ...
##  $ end_lng           : num  -87.6 -87.7 -87.6 -87.7 -87.7 ...
##  $ member_casual     : chr  "casual" "casual" "casual" "casual" ...
```

```
str(Bike_Share_202011)
```

```
## 'data.frame':    259716 obs. of  13 variables:
##  $ ride_id           : chr  "BD0A6FF6FFF9B921" "96A7A7A4BDE4F82D" "C61526D06582BDC5" "E533E89
C32080B9E" ...
##  $ rideable_type     : chr  "electric_bike" "electric_bike" "electric_bike" "electric_bike"
...
##  $ started_at        : chr  "2020-11-01 13:36:00" "2020-11-01 10:03:26" "2020-11-01 00:34:05"
"2020-11-01 00:45:16" ...
##  $ ended_at          : chr  "2020-11-01 13:45:40" "2020-11-01 10:14:45" "2020-11-01 01:03:06"
"2020-11-01 00:54:31" ...
##  $ start_station_name: chr  "Dearborn St & Erie St" "Franklin St & Illinois St" "Lake Shore D
r & Monroe St" "Leavitt St & Chicago Ave" ...
##  $ start_station_id  : int  110 672 76 659 2 72 76 NA 58 394 ...
##  $ end_station_name  : chr  "St. Clair St & Erie St" "Noble St & Milwaukee Ave" "Federal St &
Polk St" "Stave St & Armitage Ave" ...
##  $ end_station_id    : int  211 29 41 185 2 76 72 NA 288 273 ...
##  $ start_lat         : num  41.9 41.9 41.9 41.9 41.9 ...
##  $ start_lng         : num  -87.6 -87.6 -87.6 -87.7 -87.6 ...
##  $ end_lat           : num  41.9 41.9 41.9 41.9 41.9 ...
##  $ end_lng           : num  -87.6 -87.7 -87.6 -87.7 -87.6 ...
##  $ member_casual     : chr  "casual" "casual" "casual" "casual" ...
```

```
str(Bike_Share_202012)
```

```
## 'data.frame':    131573 obs. of  13 variables:
##  $ ride_id           : chr  "70B6A9A437D4C30D" "158A465D4E74C54A" "5262016E0F1F2F9A" "BE11962
8E44F871E" ...
##  $ rideable_type     : chr  "classic_bike" "electric_bike" "electric_bike" "electric_bike"
...
##  $ started_at        : chr  "2020-12-27 12:44:29" "2020-12-18 17:37:15" "2020-12-15 15:04:33"
"2020-12-15 15:54:18" ...
##  $ ended_at          : chr  "2020-12-27 12:55:06" "2020-12-18 17:44:19" "2020-12-15 15:11:28"
"2020-12-15 16:00:11" ...
##  $ start_station_name: chr  "Aberdeen St & Jackson Blvd" "" "" "" ...
##  $ start_station_id  : chr  "13157" "" "" "" ...
##  $ end_station_name  : chr  "Desplaines St & Kinzie St" "" "" "" ...
##  $ end_station_id    : chr  "TA1306000003" "" "" "" ...
##  $ start_lat         : num  41.9 41.9 41.9 41.9 41.8 ...
##  $ start_lng         : num  -87.7 -87.7 -87.7 -87.7 -87.6 ...
##  $ end_lat           : num  41.9 41.9 41.9 41.9 41.8 ...
##  $ end_lng           : num  -87.6 -87.7 -87.7 -87.7 -87.6 ...
##  $ member_casual     : chr  "member" "member" "member" "member" ...
```

Convert numeric ID into Categorical ID

```
Bike_Share_202010$start_station_id=as.character(Bike_Share_202010$start_station_id)
Bike_Share_202010$end_station_id=as.character(Bike_Share_202010$end_station_id)

Bike_Share_202011$start_station_id=as.character(Bike_Share_202011$start_station_id)
Bike_Share_202011$end_station_id=as.character(Bike_Share_202011$end_station_id)

Bike_Share_202012$start_station_id=as.character(Bike_Share_202012$start_station_id)
Bike_Share_202012$end_station_id=as.character(Bike_Share_202012$end_station_id)
```

Combine all data and make it all trips

```
Trips=rbind(Bike_Share_202010,Bike_Share_202011,Bike_Share_202012)
str(Trips)
```

Check Missing Values

```
##            ride_id      rideable_type         started_at           ended_at
##                  0                  0                  0                  0
## start_station_name   start_station_id   end_station_name     end_station_id
##                  0              55839                  0              62613
##          start_lat          start_lng            end_lat            end_lng
##                  0                  0                869                869
##      member_casual
##                  0
```

The data set has missing values in start_station_id column, end_station_id column, end_lat column and end_lng column.

rename variable label

```
Trips=Trips%>%
  rename(member_type=member_casual)
```

Check duplicate data

```
count(distinct(Trips))
```

Based on the above results, the dataset has no duplicate rows.

Right now started_at column and ended_at column are in character format. It should be in datetime format. Convert those columns into datetime format.

```
Trips$started_at=strptime(Trips$started_at,format="%Y-%m-%d %H: %M: %S")

Trips$ended_at=strptime(Trips$ended_at,format="%Y-%m-%d %H: %M: %S")
```

Remove start_lat,start_lng, end_lat, and end_lng columns since those columns are not useful in our analysis

```
Trips=Trips%>%
  select(-c(start_lat,start_lng,end_lat,end_lng))
```

Create the new column called ride_length in minutes

```
Trips$ride_length=difftime(Trips$ended_at,Trips$started_at,units="mins")
```

calculate the day of the week that each ride started

```
Trips$day_of_week=wday(Trips$started_at,label=TRUE)
```

calculate the month that each ride started

```
Trips$month=month(Trips$started_at,label=TRUE)
```

Checking for negative values in ride_length column. I Will remove those since it doesn’t make sense to have a negative length of the ride

```
Trips%>%count(ride_length<0)
```

```
Trips=Trips%>%filter(ride_length>0)
```

Remove 10548 rows since they have a negative values in ride_length column.

Analyze Phase

How many customers are casual and paid member

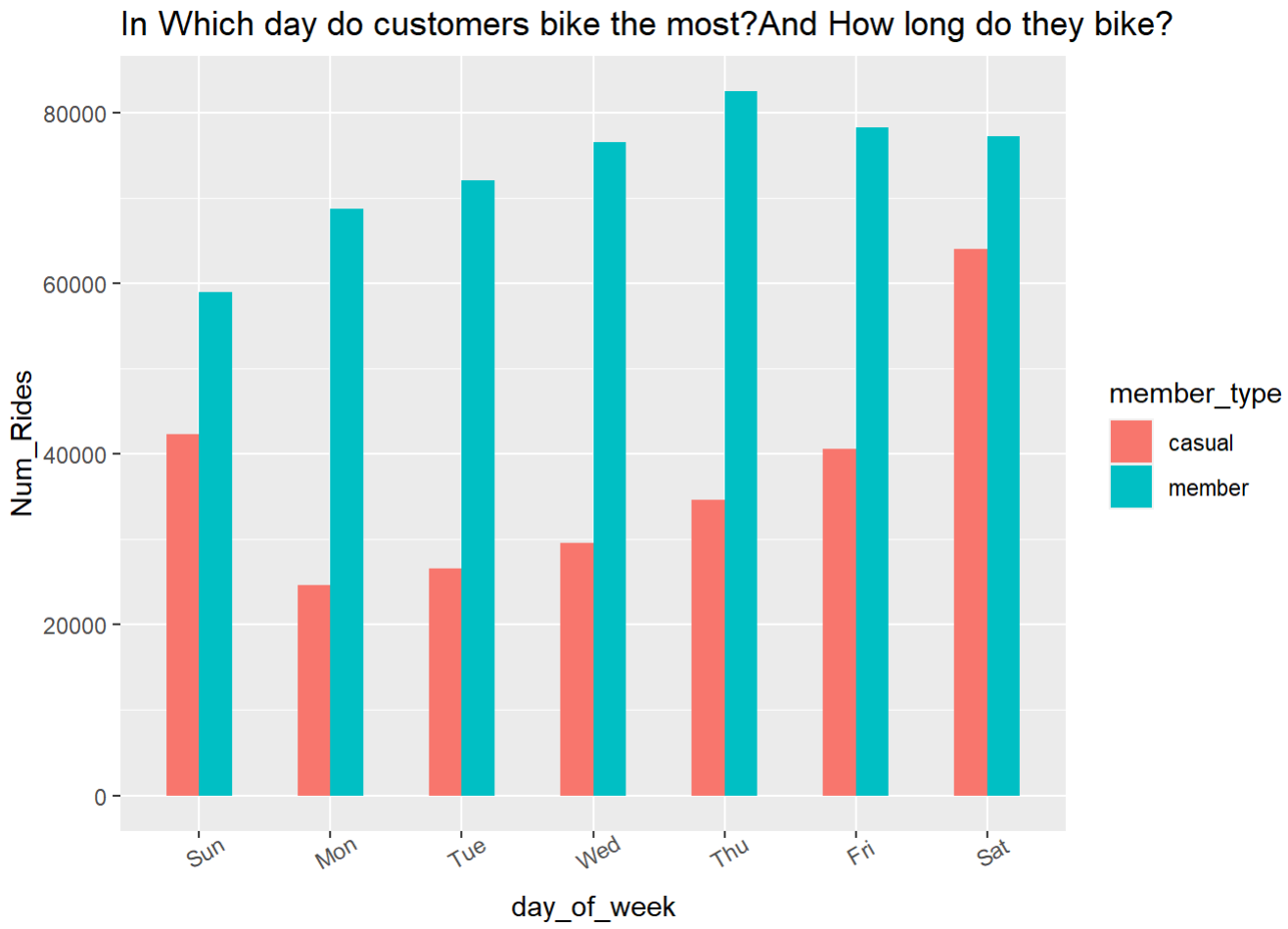
```
Trips%>%
  group_by(member_type)%>%
  summarize(Num_Ride=n())
```

Average length of ride

```
ave=Trips%>%
  group_by(member_type)%>%
  summarize(Average_Ride_length=mean(ride_length))
ave
```

On average, paid member rides the bike less minutes than casual member. This mean that casual members ride the bike longer duration than paid members.

In Which day do customers bike the most?And How long do they bike?

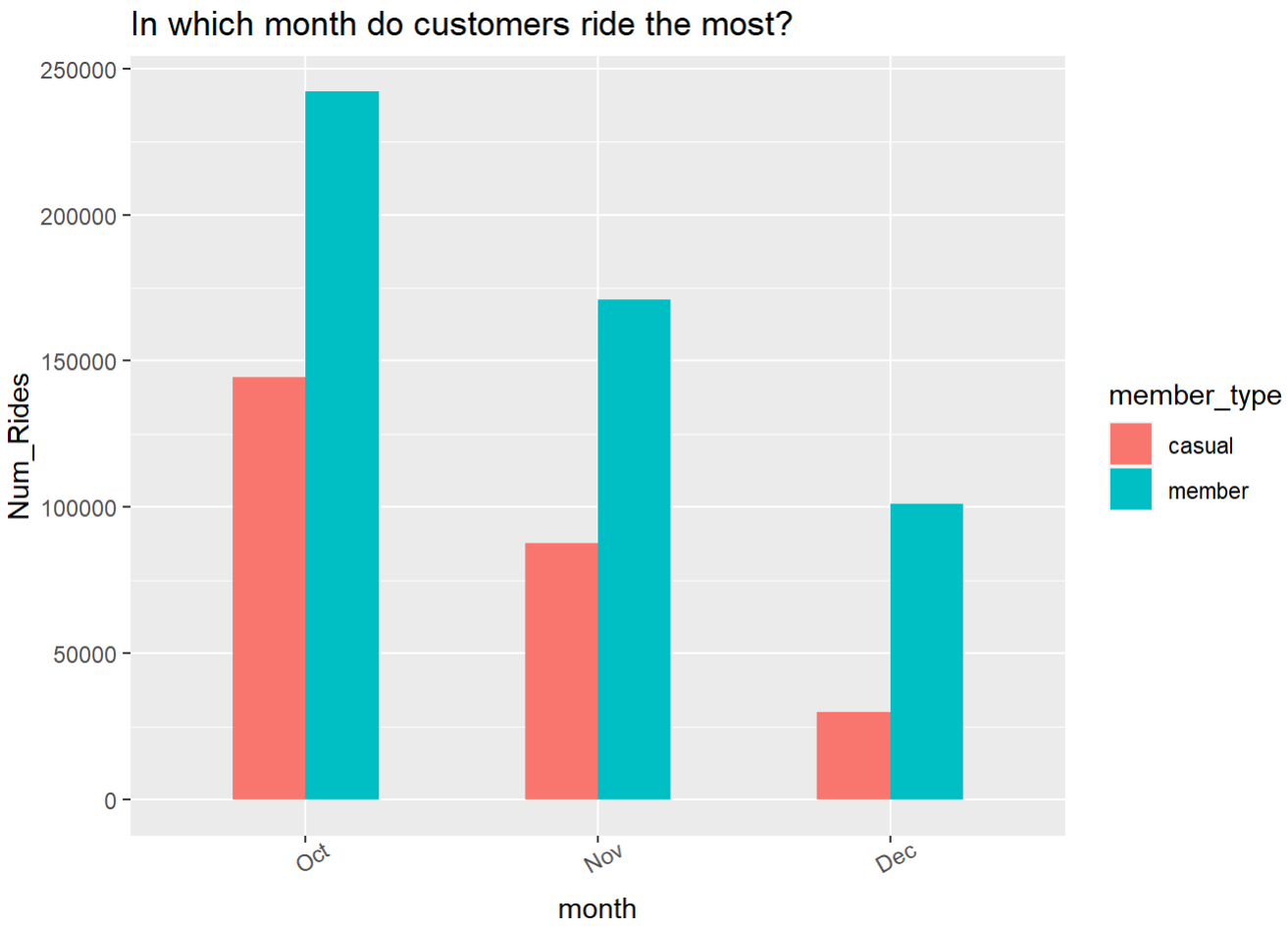


On Weekend, Casual and paid member ride the bike the most. From Monday to Friday, casual member ride decrease. However, paid member ride is still close to weekend ride. On Sunday, casual member ride an average of 51.73 minute. Casual member rides more duration than paid member.

In which month do customers ride the most?

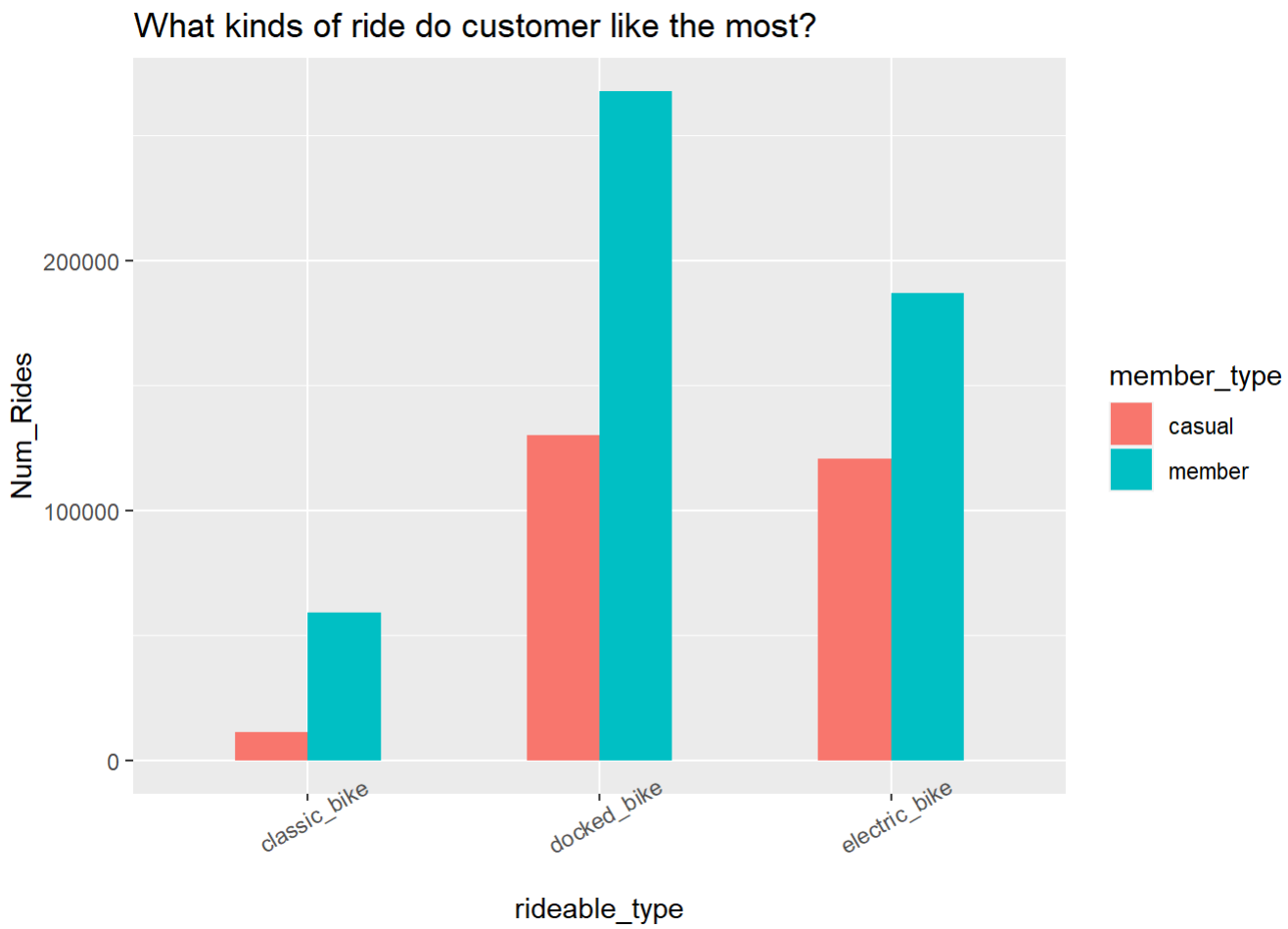
```
Trips%>%
  group_by(member_type,month)%>%
  summarize(Num_Rides=n())%>%
  ggplot(aes(x=month,y=Num_Rides,fill=member_type))+
  theme(axis.text.x=element_text(angle=30))+
  labs(title="In which month do customers ride the most?")+
  geom_col(width=0.5, position=position_dodge(width=0.5))+
  scale_y_continuous(labels=function(x) format(x,scientific=FALSE))
```

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



During the peak of summer months, casual and paid member ride the most. After the summer season is over, number of rides for casual and paid member decrease significantly. And also, average number of rides also decrease after the summer is over.

What kinds of ride do customer like the most?



Based on the data provided, it can be concluded that members took more rides than casual riders across all types of bikes. The average ride time for casual riders was longer than that of members for docked and classic bikes, but the opposite was observed for electric bikes. Additionally, the shortest average ride time was observed for electric bikes, regardless of rider type.

Docked Bikes are the most popular type of bike for both casual and paid member. Both customers don’t usually use classic bike.