Introduction

The case study was part of Google Data Analytics Professional Certifications. The case study resolves around a fictional company Cyclistic bike-share. The director of marketing for Cyclistic bike-share would to like maximize the number of annual memberships by converting casual riders(non-members) to annual memberships. *The director of marketing* believes maximizing membership will help with company's future growth.

Ask

Three questions will guide the future marketing program: 1. How do annual members and casual riders use Cyclistic bikes differently? 2.Why would casual riders buy Cyclistic annual memberships? 3.How can Cyclistic use digital media to influence casual riders to become members?

Preparing the data

In this section I downloaded the necessary libraries for the case study, *dplyr,tidyverse*, and lubricate. Next I downloaded all the data sets that were needed into R and combined them using rbind() under variable *allset*.

```
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
```

```
library(tidyverse)
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.1 --
```

```
## v ggplot2 3.3.3     v purrr   0.3.4
## v tibble  3.1.2     v stringr 1.4.0
## v tidyr   1.1.3     v forcats 0.5.1
## v readr   1.4.0
```

```
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
library(lubridate)
```

```
##
## Attaching package: 'lubridate'
```

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

```
aprilset<-read.csv("202004-divvy-tripdata.csv")
mayset<-read.csv("202005-divvy-tripdata.csv")
juneset<-read.csv("202006-divvy-tripdata.csv")
julyset<-read.csv("202007-divvy-tripdata.csv")
augustset<-read.csv("202008-divvy-tripdata.csv")
sepset<-read.csv("202009-divvy-tripdata.csv")
octset<-read.csv("202010-divvy-tripdata.csv")
novset<-read.csv("202011-divvy-tripdata.csv")
decset<-read.csv("202012-divvy-tripdata.csv")
janset<-read.csv("202101-divvy-tripdata.csv")
febset<-read.csv("202102-divvy-tripdata.csv")
marset<-read.csv("202103-divvy-tripdata.csv")
```

```
allset<-rbind(aprilset,mayset,juneset,julyset,augustset,sepset,octset,novset,decset,janset,febset,marset)
```

Here I used str() to get the number of rows and the number of variables/columns. Summary() to get the Class and Mode of each variables/columns. Here we see the data set has 13 variables/columns which are listed in the output.

```
str(allset)
```

```
## 'data.frame':    3489748 obs. of  13 variables:
##  $ ride_id           : chr  "A847FADBBC638E45" "5405B80E996FF60D" "5DD24A79A4E006F4" "2A59BBDF5CDBA725" ...
##  $ rideable_type     : chr  "docked_bike" "docked_bike" "docked_bike" "docked_bike" ...
##  $ started_at        : chr  "2020-04-26 17:45:14" "2020-04-17 17:08:54" "2020-04-01 17:54:13" "2020-04-07 12:50:19" ...
##  $ ended_at          : chr  "2020-04-26 18:12:03" "2020-04-17 17:17:07" "2020-04-01 18:08:36" "2020-04-07 13:02:31" ...
##  $ start_station_name: chr  "Eckhart Park" "Drake Ave & Fullerton Ave" "McClurg Ct & Erie St" "California Ave & Division St" ...
##  $ start_station_id  : chr  "86" "503" "142" "216" ...
##  $ end_station_name  : chr  "Lincoln Ave & Diversey Pkwy" "Kosciuszko Park" "Indiana Ave & Roosevelt Rd" "Wood St & Augusta Blvd" ...
##  $ end_station_id    : chr  "7192" "499" "7267" "657" ...
##  $ start_lat         : num  41.9 41.9 41.9 41.9 41.9 ...
##  $ start_lng         : num  -87.7 -87.7 -87.6 -87.7 -87.6 ...
##  $ end_lat           : num  41.9 41.9 41.9 41.9 41.9 42 ...
##  $ end_lng           : num  -87.7 -87.7 -87.6 -87.7 -87.7 ...
##  $ member_casual     : chr  "member" "member" "member" "member" ...
```

```
summary(allset)
```

```
##    ride_id          rideable_type      started_at          ended_at
##  Length:3489748     Length:3489748     Length:3489748     Length:3489748
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##
##
##
##
##  start_station_name start_station_id  end_station_name  end_station_id
##  Length:3489748     Length:3489748     Length:3489748     Length:3489748
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##
##
##
##
##    start_lat       start_lng         end_lat          end_lng
##  Min.   :41.64   Min.   :-87.87   Min.   :41.54   Min.   :-88.07
##  1st Qu.:41.88   1st Qu.:-87.66   1st Qu.:41.88   1st Qu.:-87.66
##  Median :41.90   Median :-87.64   Median :41.90   Median :-87.64
##  Mean   :41.90   Mean   :-87.64   Mean   :41.90   Mean   :-87.64
##  3rd Qu.:41.93   3rd Qu.:-87.63   3rd Qu.:41.93   3rd Qu.:-87.63
##  Max.   :42.08   Max.   :-87.52   Max.   :42.16   Max.   :-87.44
##                                   NA's   :4738    NA's   :4738
##  member_casual
##  Length:3489748
##  Class :character
##  Mode  :character
##
##
##
```

Data Cleanup

The code in this section will drop all any *NA* values and remove any duplicate values with the distinct() function. Also the following rows were removed as they do not provide any input with the companies goals. The following rows were removed:rideable_type, start_lat, start_lng, end_lat, and end_lng.

```
allset<-allset %>% drop_na() %>% distinct(.keep_all = TRUE) %>% select(-c(rideable_type,start_lat,start_lng,end_lat,end_lng))
```

Preparing the Date

To prepare the date I made a column called ride_length to get the ride length of all the customers by getting difference of ended_at and started_at. The values in ride_length are in minutes. The customers were categorized with 4 values; subscriber , members, customer, and casual. I made all the subscriber values changed to member and customer values changed to casual. I made a column called day_of_week, this column has the days of the week based on dates in started_at. The values in this column are as follows:
1=Sunday,2=Monday,3=Tuesday,4=Wednesday,5=Thursday,6=Friday,7=Saturday, and 8=Sunday.

```
allset <- allset %>% mutate(ride_length= difftime(ended_at,started_at,units="min"),member_casual = recode(member_casual
                                    ,"Subscriber" = "member"
                                    ,"Customer" = "casual"))
, day_of_week=wday(started_at))%>%filter(ride_length > 0)#1=Sunday
head(allset)
```

```
##                ride_id          started_at            ended_at
## 1 A847FADBBC638E45 2020-04-26 17:45:14 2020-04-26 18:12:03
## 2 5405B80E996FF60D 2020-04-17 17:08:54 2020-04-17 17:17:03
## 3 5DD24A79A4E006F4 2020-04-01 17:54:13 2020-04-01 18:08:36
## 4 2A59BBDF5CDBA725 2020-04-07 12:50:19 2020-04-07 13:02:31
## 5 27AD306C119C9158 2020-04-18 10:22:59 2020-04-18 11:15:54
## 6 35621E6E8751325B1 2020-04-30 17:55:47 2020-04-30 18:01:11
##                    start_station_name start_station_id
## 1                      Eckhart Park                86
## 2          Drake Ave & Fullerton Ave               503
## 3                McClurg Ct & Erie St               142
## 4        California Ave & Division St               216
## 5                    Rush St & Hubbard St               125
## 6 Miles van der Rohe Way & Chicago Ave               173
##                      end_station_name end_station_id member_casual   ride_length
## 1 Lincoln Ave & Diversey Pkwy            152      member 26.81667 mins
## 2          Kosciuszko Park               499      member  8.15000 mins
## 3  Indiana Ave & Roosevelt Rd               255      member 14.38333 mins
## 4       Wood St & Augusta Blvd               657      member 12.20000 mins
## 5  Sheridan Rd & Lawrence Ave               323      casual 52.91667 mins
## 6     Streeter Dr & Grand Ave                35      member  5.40000 mins
##   day_of_week
## 1           1
## 2           6
## 3           4
## 4           3
## 5           7
## 6           5
```

Analyze the Date

This code chunk will output a table with average, maximum, minimum of ride_length categorized by member_casual. We see in this table casual members do have a higher average ride length, while members do have a higher maximum ride length. Interestingly both casual and members have the same minimum ride length.

```
member_min_max_avg <- allset %>% group_by(member_casual) %>% summarise(avg_ride_length=mean(ride_length),max_ride
  _length=max(ride_length),min_ride_length=min(ride_length))
head(member_min_max_avg)
```

```
## # A tibble: 2 x 4
##   member_casual avg_ride_length max_ride_length min_ride_length
##   <chr>                   <drtn>          <drtn>          <drtn>
## 1 casual          45.11344 mins   55683.88 mins   0.01666667 mins
## 2 member          15.92386 mins   58728.03 mins   0.01666667 mins
```

This table shows the average and maximum and numbers of ride for each day of the week. While casual members do have a higher average duration for each day; members have a higher number of rides but are not on the bikes for as long as casual member.

```
allset %>%
  mutate(day = wday(started_at, label = TRUE)) %>%  #creates weekday field using wday()
  group_by(member_casual, day) %>%  #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(day)
```

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

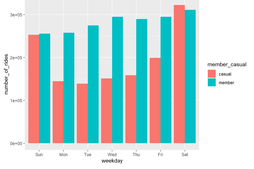
```
## # A tibble: 14 x 4
## # Groups:   member_casual [2]
##    member_casual day   number_of_rides average_duration
##    <chr>         <ord>           <int> <drtn>
##  1 casual        Sun            252589 50.83689 mins
##  2 member        Sun            255294 18.10028 mins
##  3 casual        Mon            144491 45.07004 mins
##  4 member        Mon            257574 15.12338 mins
##  5 casual        Tue            138738 40.52128 mins
##  6 member        Tue            274525 14.96723 mins
##  7 casual        Wed            151917 40.49319 mins
##  8 member        Wed            294789 15.05202 mins
##  9 casual        Thu            158383 43.23258 mins
## 10 member        Thu            289445 15.02532 mins
## 11 casual        Fri            196883 42.94239 mins
## 12 member        Fri            294737 15.55998 mins
## 13 casual        Sat            322414 47.95988 mins
## 14 member        Sat            318828 17.65312 mins
```

Visualizing the Date

The graph below shows a bar chart that shows number of rides by members and *casual*. Here just like the table we can see members generally have a higher number of rides.

```
allset %>%
  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")+ggtitle("Number of rides by member vs casual")
```

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



This graph shows another bar chat but for average duration by member and casual. Like the table we can see the casual members are on the bikes allot longer but not using them as frequently as members.

```
allset %>%
  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")+ggtitle("Average duration by member vs casual")
```

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

```
## Don't know how to automatically pick scale for object of type difftime. Defaulting to continuous.
```

Conclusion

Finding of the Data

Based on the data findings the casual members are using the bikes allot longer then members. This could be because casual members are buying single-ride passes and full-day passes in big groups who will not benefit from having an annual membership or people who just are visiting Chicago and need it for just one day. Members are people who live in Chicago and need the bikes for daily transportation.

Getting casual riders to buy annual memberships

To get casual riders to buy annual memberships is to advertise to people who commute to the city for work. Cyclistic can have partnership with CTA or Metra to have their services included in their memberships as benefit for having a membership with CTA and Metra. Cyclistic can also have their bikes near the train stops to help promote their memberships.

How can Cyclistic use digital media to influence casual riders to become members?

Cyclistic can show their advertisement on social media platforms; Instagram and Youtube. Cyclistic can also have a promotion code for their casual riders when they sign up for an annual memberships that will give them a discount.