Explore_bikeshare_data

April 27, 2024

0.0.1 Explore Bike Share Data

For this project, your goal is to ask and answer three questions about the available bikeshare data from Washington, Chicago, and New York. This notebook can be submitted directly through the workspace when you are confident in your results.

You will be graded against the project Rubric by a mentor after you have submitted. To get you started, you can use the template below, but feel free to be creative in your solutions!

```
In [60]: # Loads ggplot2
         library(ggplot2)

         # Loads lubridate
         library(lubridate)

         # Loads stringr
         library(stringr)
```

```
In [61]: # Loads the bikeshare data from .csv files for three cities
         ny = read.csv('new_york_city.csv')
         wash = read.csv('washington.csv')
         chi = read.csv('chicago.csv')
```

```
In [62]: # Shows the first row of New York city data
         head(ny,1)
```

X	Start.Time	End.Time	Trip.Duration	Start.Station	End.Station
5688089	2017-06-11 14:55:05	2017-06-11 15:08:21	795	Suffolk St & Stanton St	W Broadway

```
In [63]: # Shows the first row of Washington city data
         head(wash,1)
```

X	Start.Time	End.Time	Trip.Duration	Start.Station	End.Station
1621326	2017-06-21 08:36:34	2017-06-21 08:44:43	489.066	14th & Belmont St NW	15th & K St

```
In [64]: # Shows the first row of Chicago city data
         head(chi,1)
```

X	Start.Time	End.Time	Trip.Duration	Start.Station	End.Station
1423854	2017-06-23 15:09:32	2017-06-23 15:14:53	321	Wood St & Hubbard St	Damen Ave

```
In [65]: # Wants to merge the data of three data frames together and make one dataframe: 'all_da
         # and because of that we need to add a new column for 'city' to be able to separate the
         chi$city="Chicago"
         ny$city="New York"
         wash$city="Washington"

         # Later, We wants to extract month, day of week, and hour form 'Start.Time' column, so
         ny=subset(ny, str_length(ny$Start.Time) == 19)
         chi=subset(chi, str_length(chi$Start.Time) == 19)
         wash=subset(wash, str_length(wash$Start.Time) == 19)

         # Adds two columns 'Gender' and 'Birth.Year' to th 'wash' dataframe, to be ready for me
         wash$Gender=NA
         wash$Birth.Year=NA

         # Merges the dataframes.
         all_data = rbind(chi,ny,wash)
```

```
In [66]: # Displays size of the all data.
         sprintf("number of all rows: %d", nrow(all_data))
```

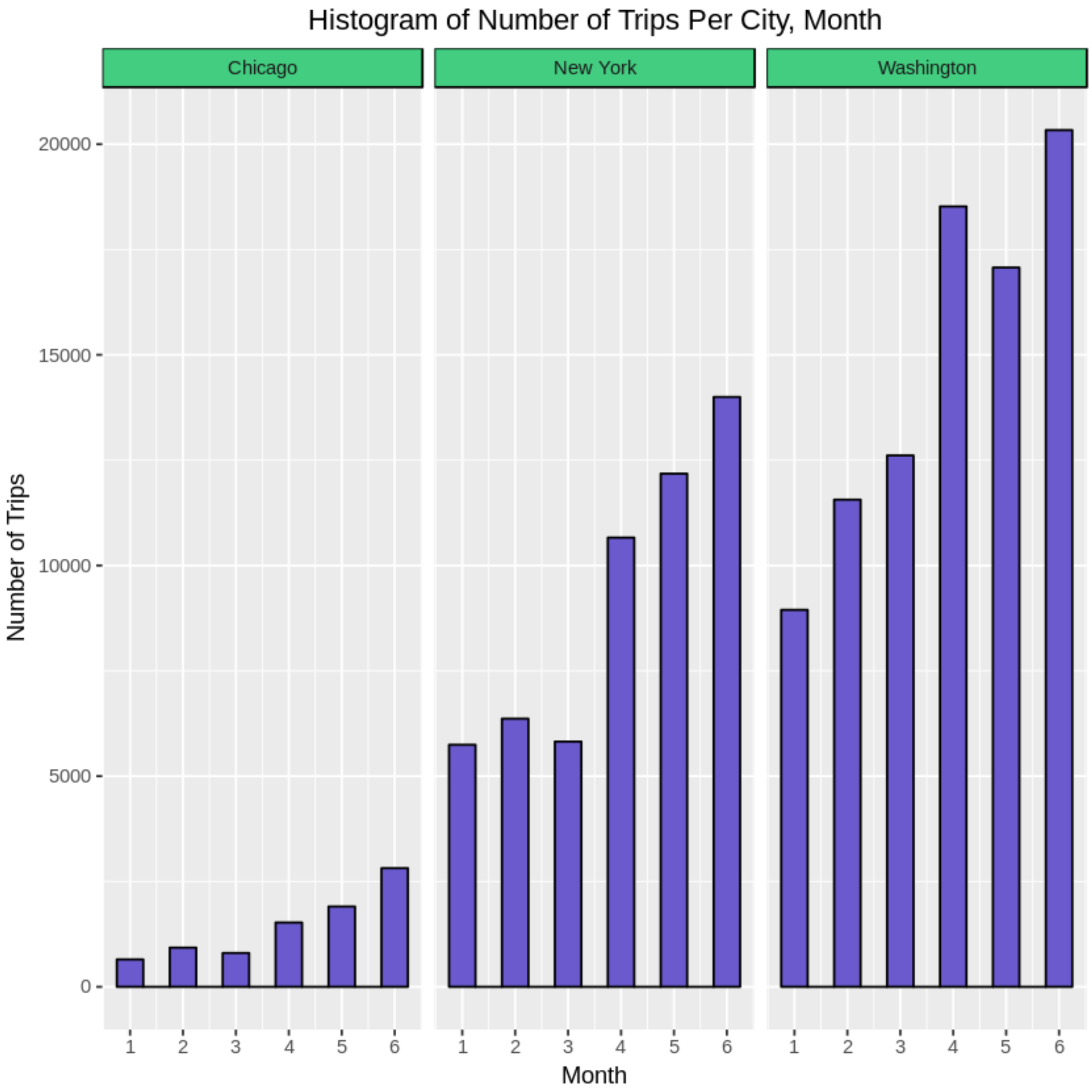
```
'number of all rows: 152450'
```

0.1 Question 1

What are the most common month, day of week, and hour for traveling in each city?

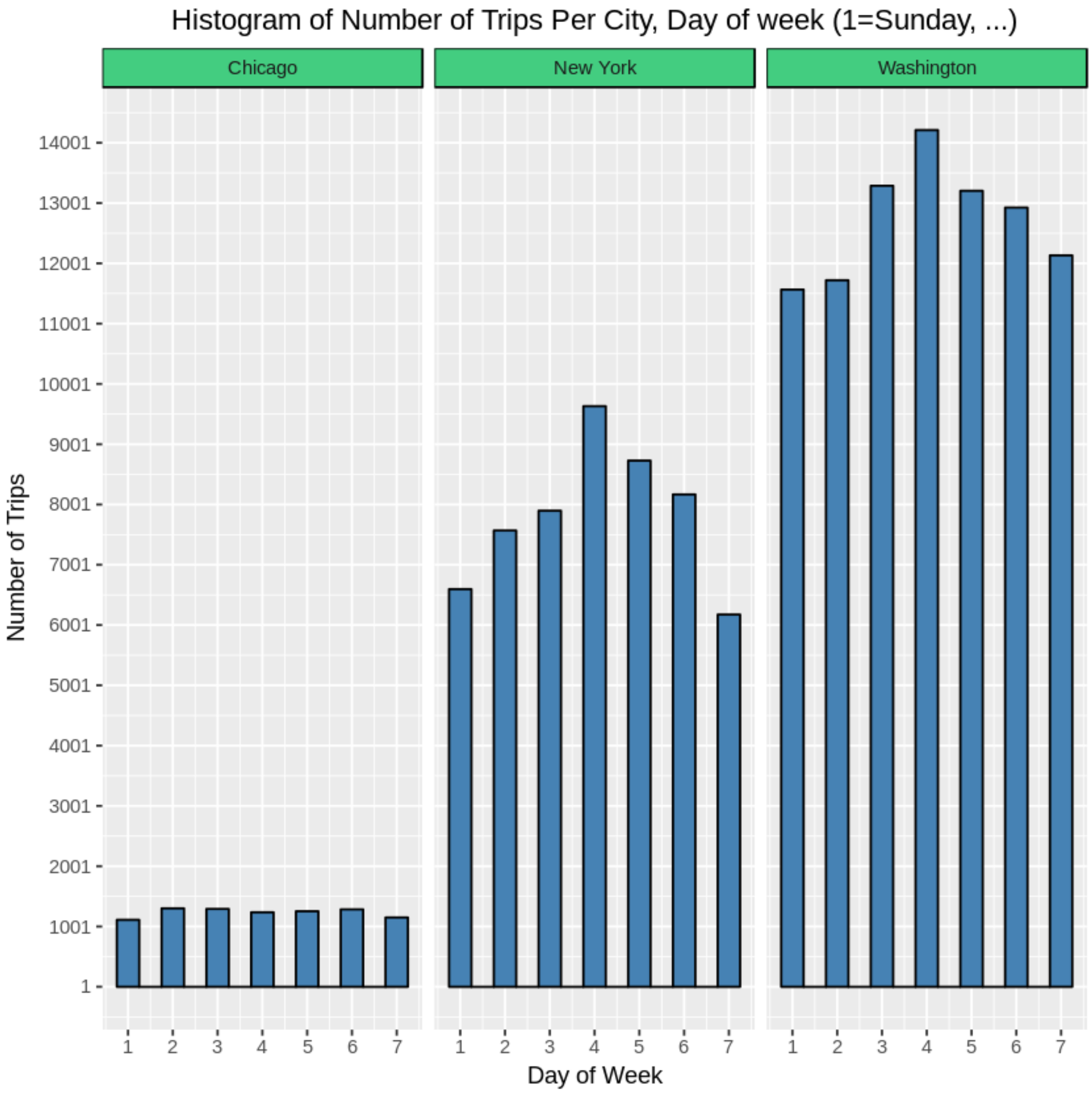
```
In [67]: # Extracts month from 'Start.Time' column and adds it to the dataframe as a new column:
         all_data$Start.Date <- as.POSIXct(all_data$Start.Time)

         all_data$Start.Month <- format(all_data$Start.Date, format = "%m")

         # Extracts day of week from 'Start.Time' column and adds it to the dataframe as a new c
         # It indexes Sunday as '1'.
         all_data$Start.Day <- wday(all_data$Start.Date)

         # Extracts hour from 'Start.Time' column and adds it to the dataframe as a new column:
         all_data$Start.Hour <- format(all_data$Start.Date, format = "%H")
```

```
In [68]: # Histogram of Number of Trips Per City, Month.
         ggplot(aes(x=as.integer(Start.Month)), data=all_data) +
           geom_histogram(binwidth = 0.5, color = 'black', fill = 'slateblue') +
           ggtitle('Histogram of Number of Trips Per City, Month')  +
           labs(x = "Month", y = "Number of Trips") +
           scale_x_continuous(breaks = 1:6) +
           facet_wrap(~city) +
           theme(plot.title = element_text(hjust = 0.5), legend.position="none",
               strip.background=element_rect(colour="black", fill="seagreen3"))
```



As seen in the diagram above, month 6 is the most common in all three cities.

```
In [69]: # Histogram of Number of Trips Per City, Day of Week.
         ggplot(aes(x=Start.Day), data=all_data) +
           geom_histogram(binwidth = 0.5, color = 'black', fill = 'steelblue') +
           ggtitle('Histogram of Number of Trips Per City, Day of week (1=Sunday, ...)')  +
           labs(x = "Day of Week", y = "Number of Trips") +
           scale_x_continuous(breaks = 1:7) +
           scale_y_continuous(breaks = seq(1,15000,1000)) +
           facet_wrap(~city) +
           theme(plot.title = element_text(hjust = 0.5), legend.position="none",
               strip.background=element_rect(colour="black", fill="seagreen3"))
```



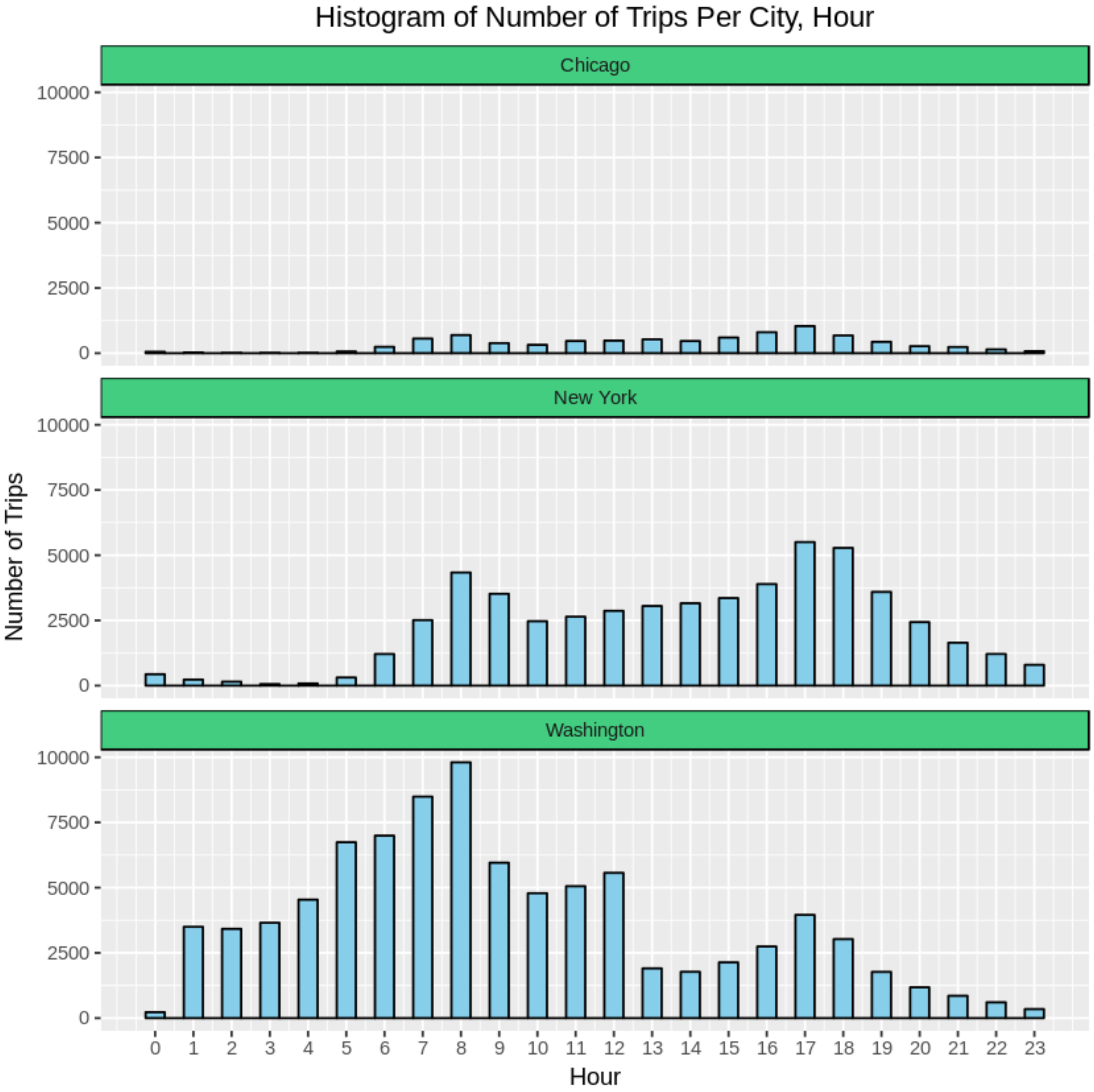
As seen in the diagram above, Wendsday is the most popular in New York and Washington cities, but for Chicago, it's not clear, so we run another command to clear that.

```
In [70]: # Separates the data of Chicago, and then gets count for each DOW with 'Start.Day' colu
         table(subset(all_data, all_data$city == 'Chicago')$Start.Day)
```

```
   1    2    3    4    5    6    7
1111 1302 1292 1236 1254 1285 1150
```

As observed, Monday is the most popular day in Chicago, however Monday, Tuesday, and Friday are all quite close together.

```
In [71]: # Histogram of Number of Trips Per City, Hour.
         ggplot(aes(as.integer(x=Start.Hour)), data=all_data) +
           geom_histogram(binwidth = 0.5, color = 'black', fill = 'skyblue') +
           ggtitle('Histogram of Number of Trips Per City, Hour')  +
           labs(x = "Hour", y = "Number of Trips") +
           scale_x_continuous(breaks = 0:23) +
           facet_wrap(~city, ncol=1) +
           theme(plot.title = element_text(hjust = 0.5), legend.position="none",
               strip.background=element_rect(colour="black", fill="seagreen3"))
```



As seen in the diagram above, in Chicago and New York cities, 17:00 P.M. is the most popular, but in Washington, 8:00 A.M. is the most common.

0.2 Question 2

What are the most frequently used start and end stations in each city?

```
In [72]: # Creates a new function to calculate Mode for input array.
         getmode <- function(v) {
            uniqv <- unique(v)
            uniqv[which.max(tabulate(match(v, uniqv)))]
         }
```

```
In [73]: # Iterates three cities, and finds the most popular start and end stations for each of
         for (curr_city in unique(all_data$city)) {
           curr_city_data = subset(all_data, all_data$city == curr_city)

           cat(paste("\n\nThe most frequently used stations in ", curr_city, "--> "))

           popular_start_station = getmode(curr_city_data$Start.Station)
           cat(paste("\nThe most popular start station: ", popular_start_station))

           popular_end_station = getmode(curr_city_data$End.Station)
           cat(paste("\nThe most popular end station: ", popular_end_station))
         }
```

```


The most frequently used stations in  Chicago -->
The most popular start station:  Streeter Dr & Grand Ave
The most popular end station:  Streeter Dr & Grand Ave

The most frequently used stations in  New York -->
The most popular start station:  Pershing Square North
The most popular end station:  Pershing Square North

The most frequently used stations in  Washington -->
The most popular start station:  Columbus Circle / Union Station
The most popular end station:  Columbus Circle / Union Station
```

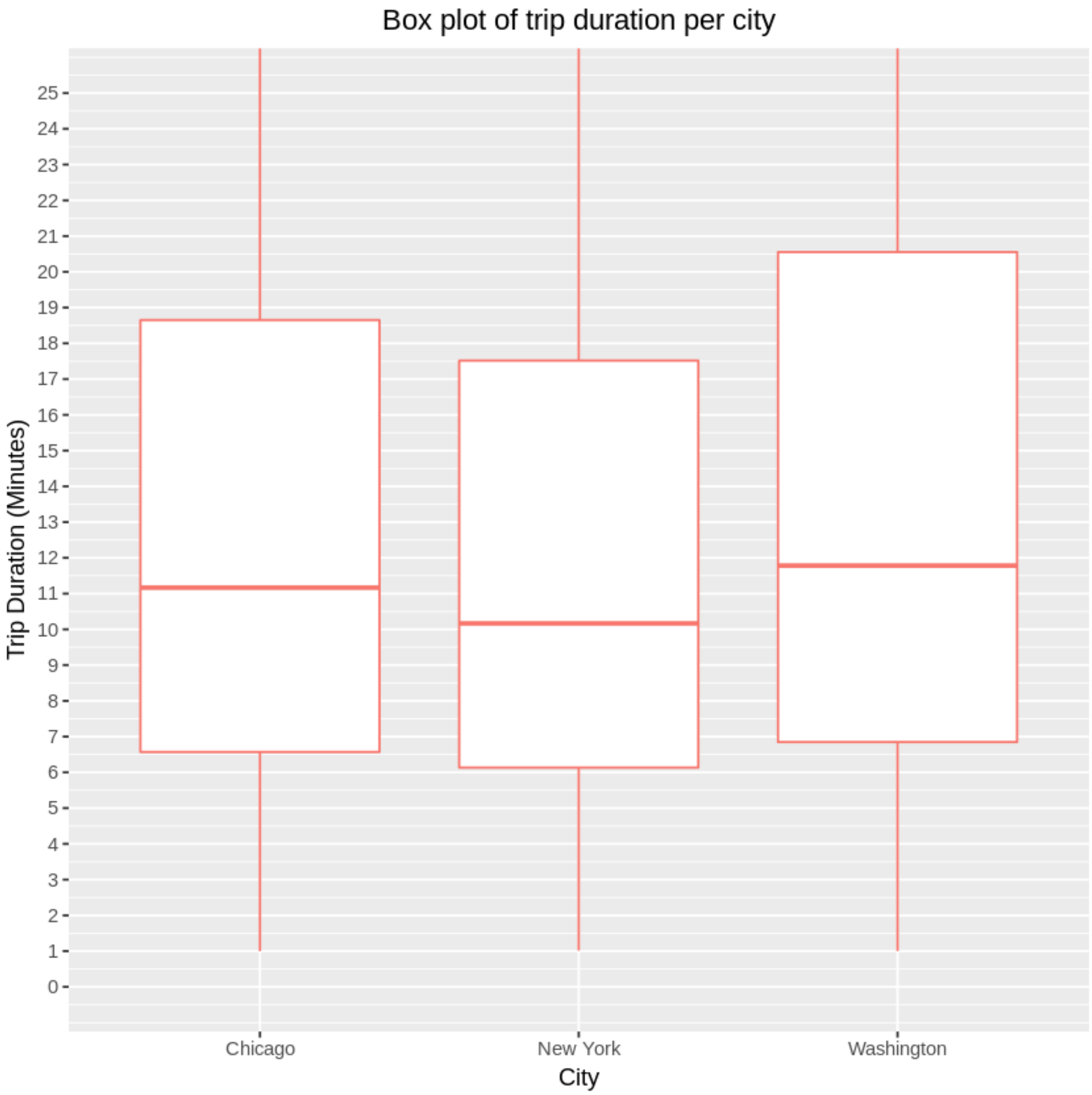
What are the usual ranges of trips in each city?

```
In [74]: # Gets stats for Trip.Duration to config better Box Plot diagram.
         summary(all_data$Trip.Duration)
```

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
     60     392     667    1098    1159 1088634       1
```

```
In [75]: # Gets stats for Trip.Duration to config better Box Plot diagram.
         by(subset(all_data, !is.na(Trip.Duration))$Trip.Duration, subset(all_data, !is.na(Trip.
subset(all_data, !is.na(Trip.Duration))$city: Chicago
[1] 670
------------------------------------------------------------
subset(all_data, !is.na(Trip.Duration))$city: New York
[1] 610
------------------------------------------------------------
subset(all_data, !is.na(Trip.Duration))$city: Washington
[1] 706.991
```

```
In [76]: # Draws a Box Plot diagram for display the range of data.
         qplot(x = city, y = Trip.Duration/60,
               data =subset(all_data, !is.na(Trip.Duration)),
               geom = 'boxplot', color='seagreen') +

           ggtitle('Box plot of trip duration per city') +

           labs(x = "City", y="Trip Duration (Minutes)") +

           theme(plot.title = element_text(hjust = 0.5), legend.position='none') +
           coord_cartesian(ylim = c(0,25)) +
           scale_y_continuous(breaks = seq(0,25, 1))
```



As seen in the diagram above, 50% of trips in Chicago last 6.5 to 18.5 minutes, 50% in New York last 6 to 18 minutes, and 50% in Washington last 7 to 21 minutes. Also, median of trip durations in Chicago is 11 minutes, in New York is 10 minutes, and in Washington is around 12 minuts.

0.3 Question 3

How is the relation between user's age and their trip duration?

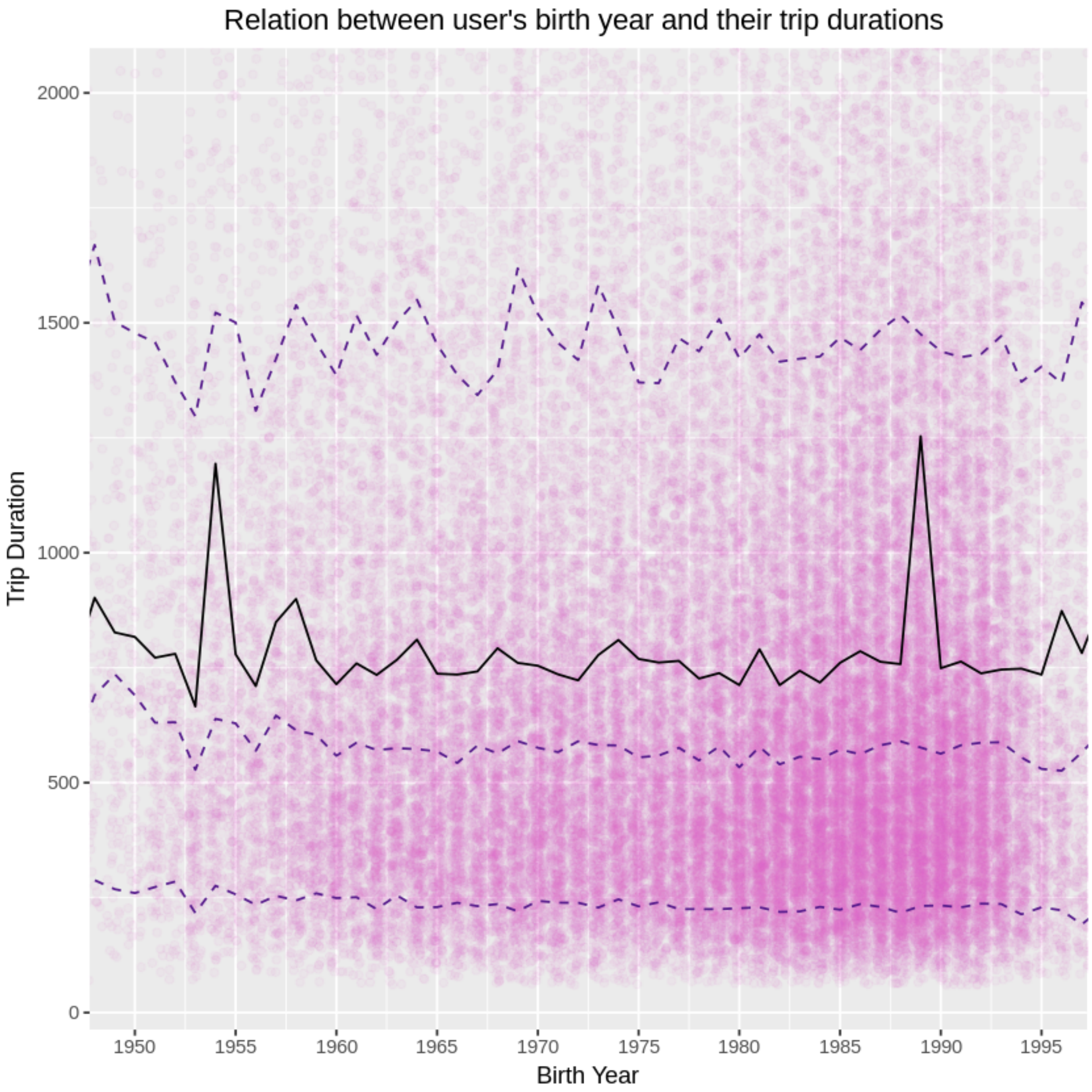
```
In [77]: # Gets stats for 'Birth.Year' column.
         summary(all_data$Birth.Year)

   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
   1885    1970    1981    1979    1988    2002   96015
```

```
In [78]: # Gets stats for 'Trip.Duration' column.
         summary(all_data$Trip.Duration)
```

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's 
     60     392     667    1098    1159 1088634       1 
```

```
In [79]: # Draws a Scatter Plot for show the relation between the user's birth year and their tr
         ggplot(aes(x = as.integer(Birth.Year), y = Trip.Duration), data = subset(all_data, !is.

           ggtitle('Relation between user\'s birth year and their trip durations ') +

           labs(x = "Birth Year", y="Trip Duration") +

           theme(plot.title = element_text(hjust = 0.5)) +

           coord_cartesian(xlim = c(1950,1995), ylim = c(60,2000)) +

           geom_point(alpha=0.05, position = position_jitter(h=0), color = 'orchid') +

           scale_x_continuous(breaks = seq(1950,1995, 5)) +

           stat_summary (geom = "line", fun = 'mean') +

           stat_summary (geom = "line", fun.y = quantile, fun.args = list(probs = .1),
                          linetype=2, color='purple4') +
           stat_summary (geom = "line", fun.y = quantile, fun.args = list(probs = .5),
                          linetype=2, color='purple4') +
           stat_summary (geom = "line", fun.y = quantile, fun.args = list(probs = .9),
                         linetype=2, color='purple4')
```

```
Warning message:
Ignoring unknown parameters: funNo summary function supplied, defaulting to `mean_se()
```



As seen in the diagram above, the users's birth year, between 1980 to 1995, makes most of the data and we have a steady range for different quantiles, and there isn't meaningful relation between age and trip duration.

0.4 Finishing Up

Congratulations! You have reached the end of the Explore Bikeshare Data Project. You should be very proud of all you have accomplished!

Tip: Once you are satisfied with your work here, check over your report to make sure that it is satisfies all the areas of the rubric.

0.5 Directions to Submit

Before you submit your project, you need to create a .html or .pdf version of this notebook in the workspace here. To do that, run the code cell below. If it worked correctly, you should get a return code of 0, and you should see the generated .html file in the workspace directory (click on the orange Jupyter icon in the upper left).

Alternatively, you can download this report as .html via the **File** > **Download as** submenu, and then manually upload it into the workspace directory by clicking on the orange Jupyter icon in the upper left, then using the Upload button.

Once you've done this, you can submit your project by clicking on the "Submit Project" button in the lower right here. This will create and submit a zip file with this .ipynb doc and the .html or .pdf version you created. Congratulations!

```
In [80]: system('python -m nbconvert Explore_bikeshare_data.ipynb')
```