Explore Bike Share Data

Versions & Library used this project

1. R version - 4.4.0
2. ggplot2 3.5.2 (visualization)
3. dplyr 2.5.0 (data manipulation)
4. lubridate 1.9.4 (dates & times manipulation)

- OS: Windows 11
- IDE: RStudio

Install Libraries

```
library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 4.4.3
```

```
library(dplyr)
```

```
## Warning: package 'dplyr' was built under R version 4.4.3
```

```
##
## 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(lubridate)
```

```
## Warning: package 'lubridate' was built under R version 4.4.3
```

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

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

Load Data and process to single data set

```
# Load all csv files in data frame (df)
df_chicago <- read.csv("chicago.csv")
df_newyork <- read.csv("new-york-city.csv")
df_washington <- read.csv("washington.csv")
```

```r
# Add column to df for city name to group by in charts
# we use function so we can use for each of the 3 files or more if they are added
process_city <- function(df, city) {
    df %>% mutate(
        City.Name = city
    )
}

# Load into new df with city name
df_chicago <- process_city(df_chicago, "Chicago")
df_newyork <- process_city(df_newyork, "New York City")
df_washington <- process_city(df_washington, "Washington")

# Make 1 dataset with all 3 cities so we can compare in same chart or filter this down
combined_df <- bind_rows(df_chicago, df_newyork, df_washington)
```

Question 1:

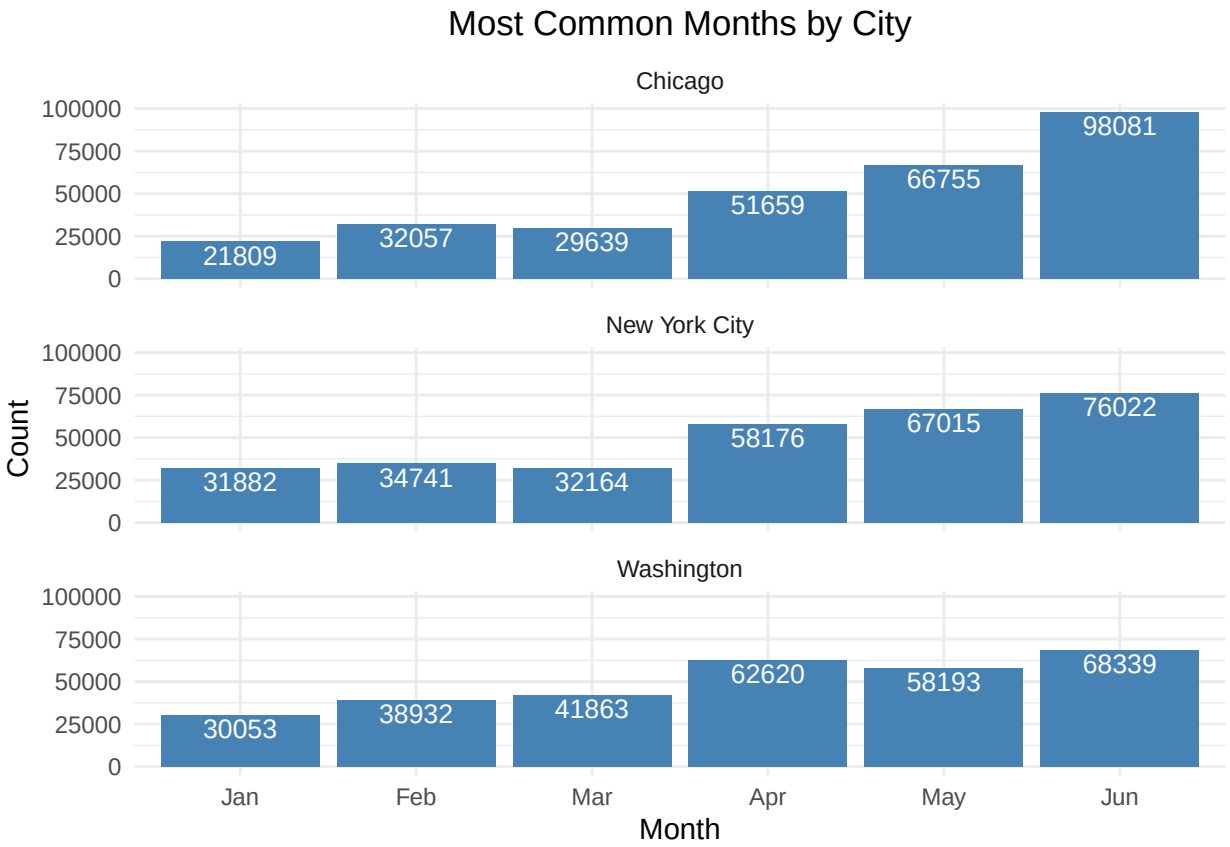
What is the most common month of usage across each of the cities

```r
# Objective: Display all cities and months into bar charts to compare against each other
# Find most common month fo a data frame
# Having function lets you use single city or multi-city data frame
find_most_common_month <- function(df) {
    df %>% mutate(
        month = month(Start.Time, label = TRUE, abbr = TRUE), # mutate to just month
        city = City.Name
    ) %>%
    count(city, month) # count city by month
}

# Make df for most common month so if I want to change plot I don't redue transformation
most_common_month_df <- find_most_common_month(combined_df)

# Plot all 3 cities in different bar charts for easier comparison among each other
# Doing this in case the months for each city is different

ggplot(most_common_month_df, aes(x = month, y = n)) +
    geom_col(fill = "steelblue") +
    geom_text( # add data label to each bar to show exact number
        aes(label = n),
        position = position_dodge(width = 0.8), # dodge overlaps
        vjust = 1.2, # Adjust label into bar
        color = "white", # Label color
        size = 3.5 # Size of label
    ) +
    facet_wrap(~ city, ncol = 1) + # Use facet_wrap to make bar chart for each city
    labs(title = "Most Common Months by City", x = "Month", y = "Count") +
    theme_minimal() + # Removes gray from chart and leaves white background
    theme(
        plot.title = element_text(hjust = 0.5) # Set title to middle
    )
```




```
# Question 1 Analysis:
# Across all 3 cities June is when the bikes are most used
```

Question 2

Find what these bikes are mainly used for, either for work commuters or fun to bike around. Let's assume they are mainly used for work, peak would be 7-9AM and 4-6PM the time average American commutes to work. I would like to find the number of rides each month that start during ON-PEAK times and compare the the OFF-PEAK usage.

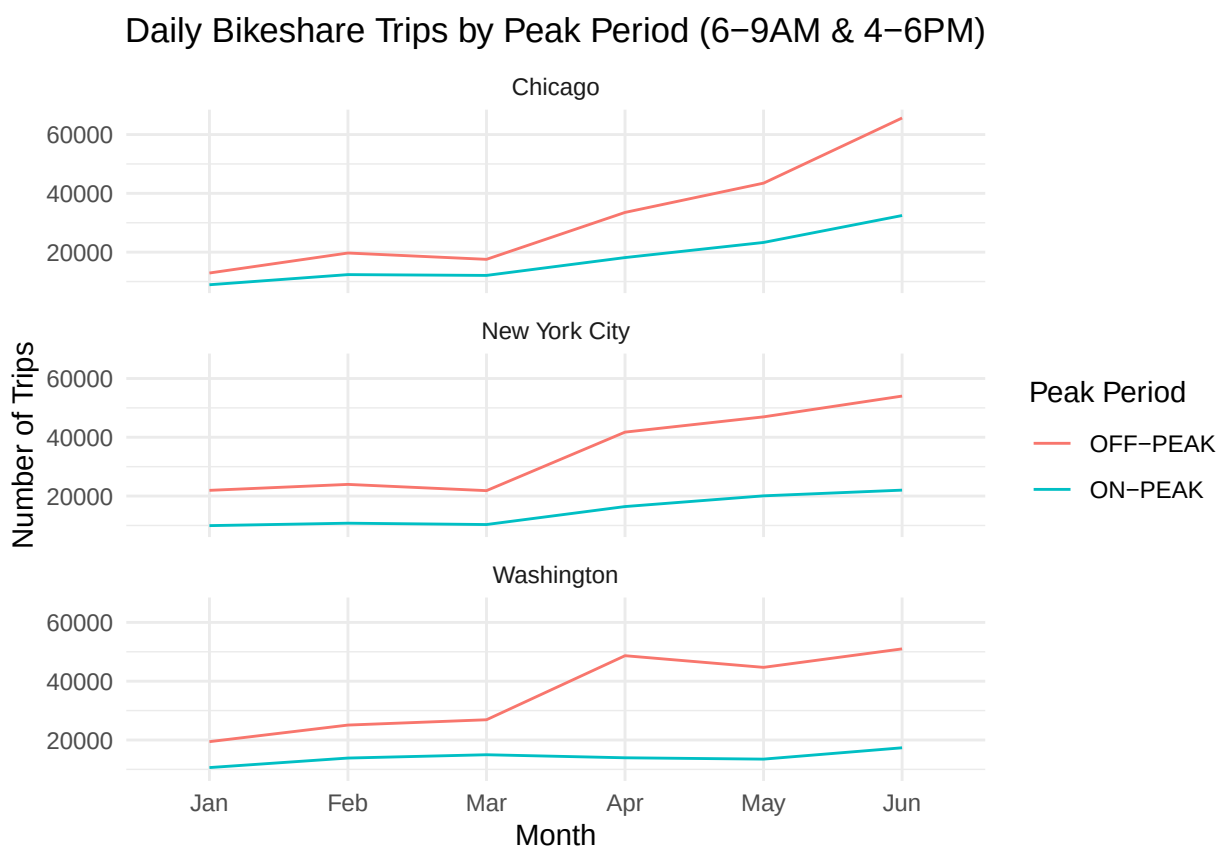
```
# Objective: Define the peak windows in a new column and set to ON-PEAK and OFF-PEAK depending on start
#            show a line graph for each city by month that has 2 lines for ON-PEAK and OFF-PEAK. Displa
#            separate graphs using facet_wrap to dig into each city. Doing this will not only show us e
#            if our bikes are possibly more used during these times we can assume the user is commuting

# Background of why I am curious about this. I work in the power industry and we control during peak ti
# we have found to be the peak usage of residents consuming power. Our peaks are 6-9AM and 5-8PM each d

combined_peak_df <- combined_df %>%
    mutate(
        start_hour = hour(Start.Time), # Get hour of start commute, do this once so we don't repeat in
        month = month(Start.Time, label = TRUE, abbr = TRUE), # mutate to just month
        peak_period = case_when(
            start_hour >= 7 & start_hour < 9   ~ "ON-PEAK", # Morning peak
```

```
            start_hour >= 16 & start_hour < 18 ~ "ON-PEAK", # Evening peak
            TRUE                               ~ "OFF-PEAK" # Off Peak
        )
    ) %>%
    count(City.Name, month, peak_period)


ggplot(combined_peak_df, aes(x = month, y = n, color = peak_period, group = peak_period)) +
    geom_line() +  # Line Chart
    facet_wrap(~ City.Name, ncol = 1) + # make chart for each city
    labs(
        title = "Daily Bikeshare Trips by Peak Period (6-9AM & 4-6PM)",
        x = "Month",
        y = "Number of Trips",
        color = "Peak Period"
    ) +
    theme_minimal() +
    theme (
        plot.title = element_text(hjust = 0.5) # Set title in middle of chart
    )
```




```
# Question 2 Analysis:
# This is was not what I was expecting. It seems each month the rides are higher during what I defined
# as OFF-PEAK when June hit the were almost double the rides during OFF-PEAK. It was fun finding out
# to help me relate back to my job. Seeing this we can assume the bikes are used for riding around the
# this can mean to hang with friends, run errands or just having a nice ride around the city.
```

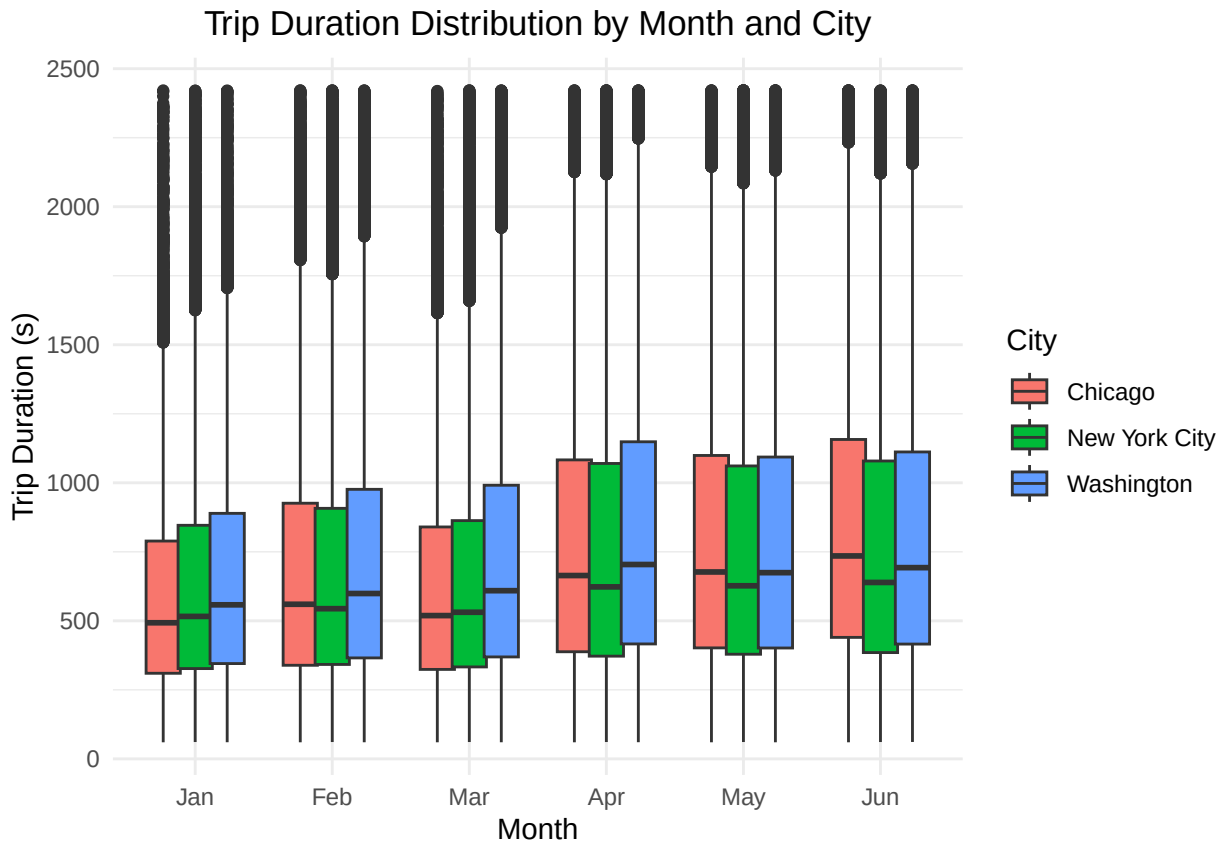
Question 3:

What is the minimum, median, and maximum ride duration for each of the city by month.

```
# Objective: Create a chart that has 3 box-and-whisker for each month. Each box-and-whisker will repres
#            a city that the rides are accruing.

box_and_whisker_df <- combined_df %>%
    mutate(
        month = month(Start.Time, label = TRUE, abbr = TRUE),
        City.Name = City.Name
    ) %>%
    # I created it but each month as extreme outlier and I would like to get rid of it
    # trim anything above 95%
    filter(Trip.Duration <= quantile(Trip.Duration, 0.95, na.rm = TRUE))

ggplot(box_and_whisker_df, aes(x = month, y = Trip.Duration, fill = City.Name)) + # Color by city
    geom_boxplot(position = position_dodge(width = 0.7)) +  # Dodge for any overlap
    labs(
        title = "Trip Duration Distribution by Month and City",
        x = "Month",
        y = "Trip Duration (s)",
        fill = "City" # Define legend
    ) +
    theme_minimal() +
    theme(
        plot.title = element_text(hjust = 0.5) # Adjust chart title to middle of chart
    )
```




```
# Question 3 Analysis:
# The median ride distance in seconds changes across the months and does not correlate with the average
# the given month
```