Udacity R Assignment - Bikesharing

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Contents

1 Bike Share Data

Over the past decade, bicycle-sharing systems have been growing in number and popularity in cities across the world. Bicycle-sharing systems allow users to rent bicycles on a very short-term basis for a price. This allows people to borrow a bike from point A and return it at point B, though they can also return it to the same location if they'd like to just go for a ride. Regardless, each bike can serve several users per day.

Thanks to the rise in information technologies, it is easy for a user of the system to access a dock within the system to unlock or return bicycles. These technologies also provide a wealth of data that can be used to explore how these bike-sharing systems are used.

In this project, you will use data provided by *Motivate*, a bike share system provider for many major cities in the United States, to uncover bike share usage patterns. You will compare the system usage between three large cities: Chicago, New York City, and Washington, DC.

The questions to explore include;

1. What are popular times of travel? i.e. common month? common day of week? common hour?
2. What are the most popular stations and trips?
3. What are the statistical breakdowns for trip duration?
4. What are the counts of each user type?

Set-up and initial synthesis of the dataset is required in order to prepare for the questions later to explore. Installing the required packages followed by setting up the directory and importing the data will occur first. Some preliminary data manipulation will also occur to improve ease and efficiency of which we examine the data.

```
knitr::opts_chunk$set(echo = TRUE)

library(ggplot2)
library(dplyr)
library(tidyverse)
library(lubridate)

#Establishing the working directory and importing the data

setwd("C:/Users/James Nguyen/Desktop/R/Udacity/Bikeshare")
ny <- read.csv('new-york-city.csv')
wash <- read.csv('washington.csv')
chi <- read.csv('chicago.csv')

head(ny) #for reference to data structure
```

```
##         X          Start.Time            End.Time Trip.Duration
## 1 5688089 2017-06-11 14:55:05 2017-06-11 15:08:21           795
## 2 4096714 2017-05-11 15:30:11 2017-05-11 15:41:43           692
## 3 2173887 2017-03-29 13:26:26 2017-03-29 13:48:31          1325
## 4 3945638 2017-05-08 19:47:18 2017-05-08 19:59:01           703
## 5 6208972 2017-06-21 07:49:16 2017-06-21 07:54:46           329
## 6 1285652 2017-02-22 18:55:24 2017-02-22 19:12:03           998
##             Start.Station           End.Station  User.Type Gender Birth.Year
## 1 Suffolk St & Stanton St W Broadway & Spring St Subscriber   Male       1998
```

```
## 2 Lexington Ave & E 63 St        1 Ave & E 78 St Subscriber   Male       1981
## 3       1 Pl & Clinton St   Henry St & Degraw St Subscriber   Male       1987
## 4   Barrow St & Hudson St        W 20 St & 8 Ave Subscriber Female       1986
## 5         1 Ave & E 44 St        E 53 St & 3 Ave Subscriber   Male       1992
## 6     State St & Smith St    Bond St & Fulton St Subscriber   Male       1986
```

```
#head(wash)
#head(chi)
```

```
##First wish to combine all working datasets
#Washington lacks a gender and birth-year column, so we will first create a NA column
wash$Gender <- NA #'NONE' or any character types do not work as the bind_rows function needs matchi
wash$Birth.Year <- NA

#Create a location column to retain city split
ny$location <- 'NY'
wash$location <- 'WASH'
chi$location <- 'CHI'

#Combine all datasets together into ALL, rbind as the variables are the same
ALL <- bind_rows (ny, wash, chi)
```

2 Question 1

Question 1 examines the popular times of travel. Analysis is provided below to which was used to answer these questions.

1. What is the most common month? **June was consistently seen as the most popular month across all locations.**
2. What is the most common day of the week to travel? **Wednesday was the most popular for Washington and New York, albeit Chicago saw Tuesday to be its most popular day.**
3. What is the most common hour of the day to travel? **Chicago and New York saw 5:00PM to be its common hour of travel which aligns with common peak-hour notions. Washington however saw 8:00AM to be its common hour.**

```
class(ALL$Start.Time) #character
```

```
## [1] "character"
```

```
##Lubridate is able to format character types into date formats
#ALL$Start.Time <-as.POSIXlt(ALL$Start.Time, format="%d/%m/%Y")
ALL$Start.Time <- ymd_hms(ALL$Start.Time)
ALL$month <- month(ALL$Start.Time, label=TRUE)
ALL$day <- wday(ALL$Start.Time, label=TRUE)
ALL$hour <- hour(ALL$Start.Time)

by(ALL$month, ALL$location, summary)
```

```
## ALL$location: CHI
##   Jan   Feb   Mar   Apr   May   Jun   Jul   Aug   Sep   Oct   Nov   Dec
## 21809 32057 29639 51659 66755 98081     0     0     0     0     0     0
## ------------------------------------------------------------
## ALL$location: NY
##   Jan   Feb   Mar   Apr   May   Jun   Jul   Aug   Sep   Oct   Nov   Dec
## 31882 34741 32164 58176 67015 76022     0     0     0     0     0     0
## ------------------------------------------------------------
## ALL$location: WASH
##   Jan   Feb   Mar   Apr   May   Jun   Jul   Aug   Sep   Oct   Nov   Dec
## 30053 38932 41863 62620 58193 68339     0     0     0     0     0     0
```

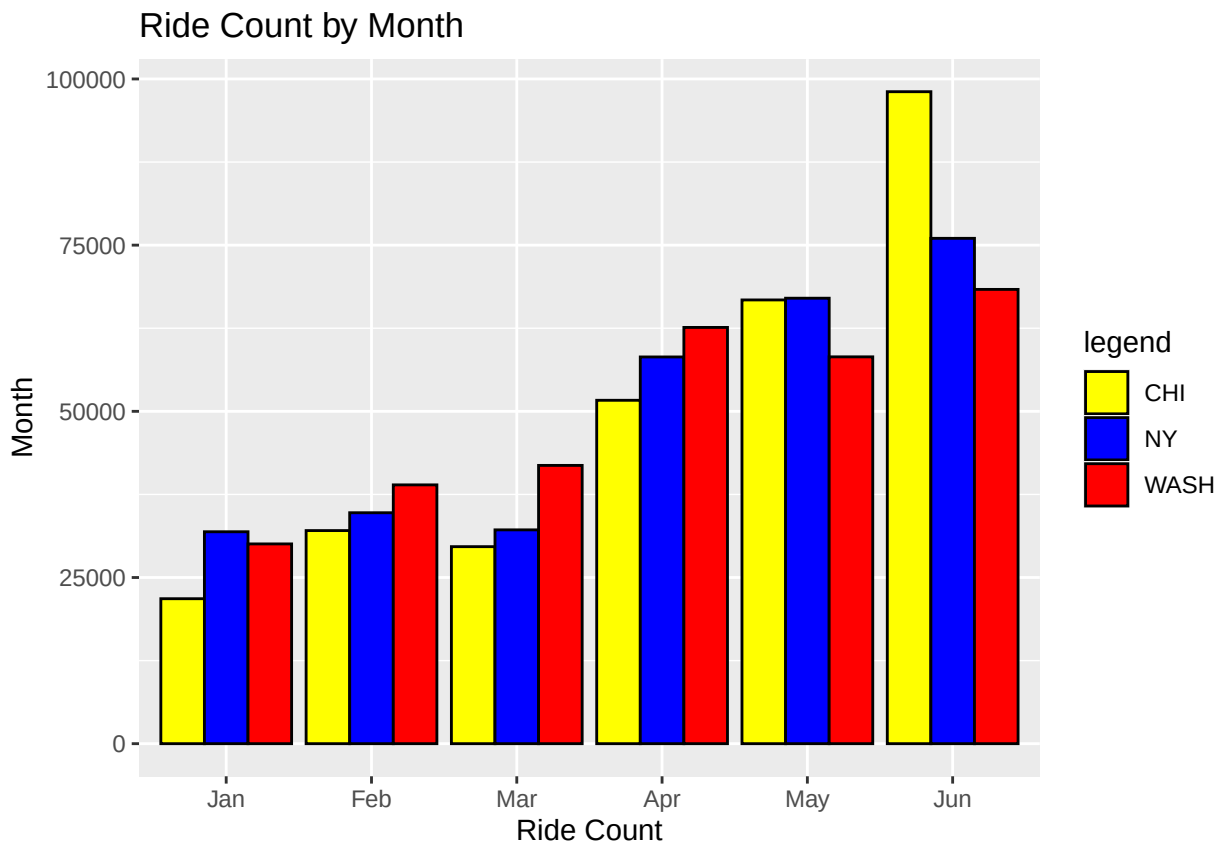
```
by(ALL$day, ALL$location, summary)
```

```
## ALL$location: CHI
##   Sun   Mon   Tue   Wed   Thu   Fri   Sat
## 38775 44881 45912 42530 43095 43922 40885
## ------------------------------------------------------------
## ALL$location: NY
##   Sun   Mon   Tue   Wed   Thu   Fri   Sat
## 36151 41923 43752 52087 47497 44664 33926
## ------------------------------------------------------------
## ALL$location: WASH
##   Sun   Mon   Tue   Wed   Thu   Fri   Sat
## 39576 39930 44519 48156 43946 43280 40593
```

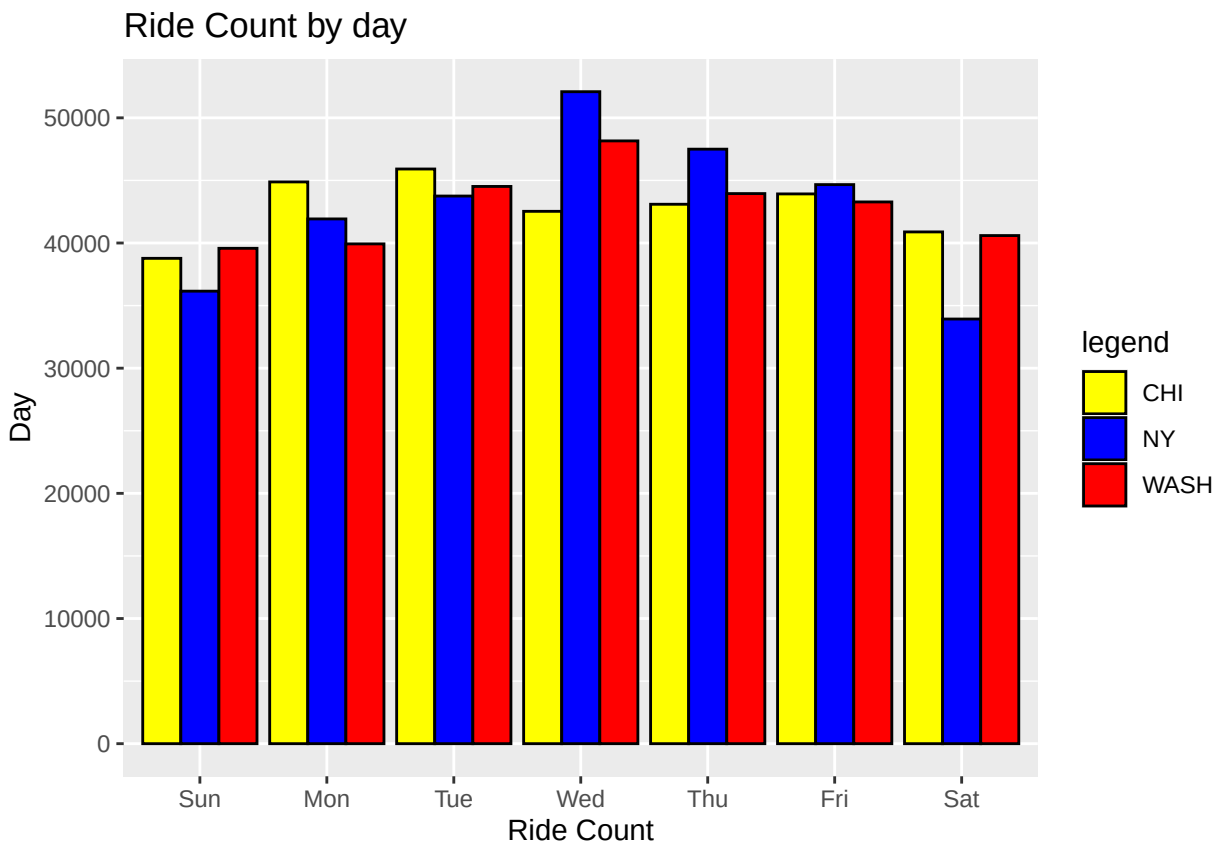
```
by(ALL$hour, ALL$location, summary)
```

```
## ALL$location: CHI
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    0.00   10.00   14.00   13.69   17.00   23.00
## ------------------------------------------------------------
## ALL$location: NY
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    0.00   10.00   15.00   13.93   18.00   23.00
## ------------------------------------------------------------
## ALL$location: WASH
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   0.000   6.000   8.000   9.205  12.000  23.000
```

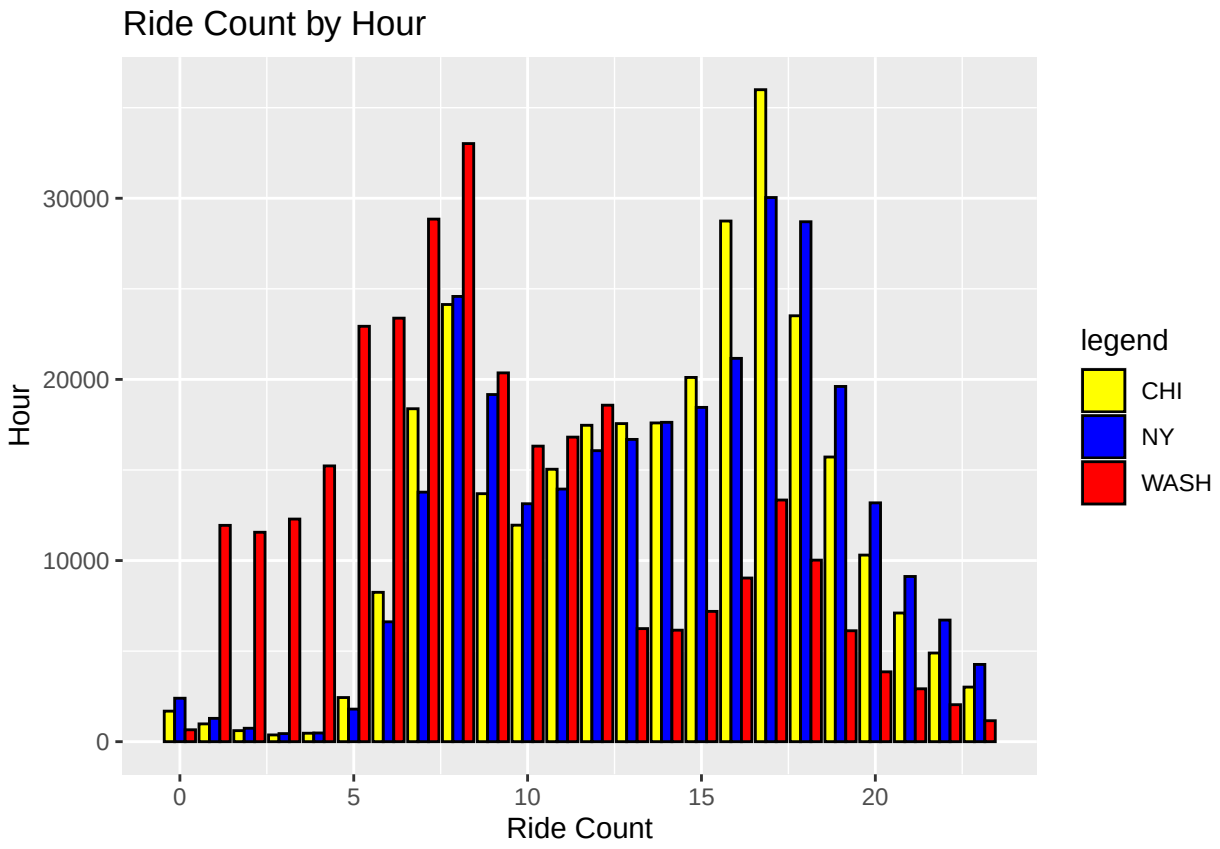
```
## Creating visualisations

ggplot(aes(x = month, fill = location), data = ALL) +
    geom_bar(position = 'dodge', colour="black") +
    ggtitle('Ride Count by Month') +
    xlab('Ride Count') +
    ylab('Month') +
    scale_fill_manual("legend", values = c("CHI" = "Yellow", "NY" = "blue", "WASH" = "Red"))
```




```
ggplot(aes(x = day, fill = location), data = ALL) +
    geom_bar(position = 'dodge', colour="black") +
    ggtitle('Ride Count by day') +
    xlab('Ride Count') +
    ylab('Day') +
    scale_fill_manual("legend", values = c("CHI" = "Yellow", "NY" = "blue", "WASH" = "Red"))
```




```
ggplot(aes(x = hour, fill = location), data = ALL) +
    geom_bar(position = 'dodge', colour="black") +
    ggtitle('Ride Count by Hour') +
    xlab('Ride Count') +
    ylab('Hour') +
    scale_fill_manual("legend", values = c("CHI" = "Yellow", "NY" = "blue", "WASH" = "Red"))
```



3 Question 2

Question 2 examines the popular starting and ending station. Analysis is provided below to which was used to answer these questions.

1. What is the common start station? **Chicago - Streeter Dr & Grand Ave NY - Pershing Square North Wash - Columbus Circle / Union Station**
2. Common end station? **Chicago - Streeter Dr & Grand Ave NY - Pershing Square North Wash - Columbus Circle / Union Station**

```
options(max.print=1)

ChiStart = sort(table((chi$Start.Station)), decreasing = TRUE)
print(ChiStart)
```

```
##
## Streeter Dr & Grand Ave
##                    6911
##  [ reached getOption("max.print") -- omitted 567 entries ]
```

```
NYStart = sort(table((ny$Start.Station)), decreasing = TRUE)
print(NYStart)
```

```
##
```

```
## Pershing Square North
##                   3069
##  [ reached getOption("max.print") -- omitted 642 entries ]
```

```
WashStart = sort(table((wash$Start.Station)), decreasing = TRUE)
print(WashStart)
```

```
##
## Columbus Circle / Union Station
##                             5656
##  [ reached getOption("max.print") -- omitted 478 entries ]
```

```
ChiEnd= sort(table((chi$End.Station)), decreasing = TRUE)
print(ChiEnd)
```

```
##
## Streeter Dr & Grand Ave
##                     7512
##  [ reached getOption("max.print") -- omitted 571 entries ]
```

```
NYEnd = sort(table((ny$End.Station)), decreasing = TRUE)
print(NYEnd)
```

```
##
## Pershing Square North
##                   3077
##  [ reached getOption("max.print") -- omitted 645 entries ]
```

```
WashEnd = sort(table((wash$End.Station)), decreasing = TRUE)
print(WashEnd)
```

```
##
## Columbus Circle / Union Station
##                             6048
##  [ reached getOption("max.print") -- omitted 478 entries ]
```

4 Question 3

Question 3 aims to analyse the trip duration. Analysis is provided below to which was used to answer these questions.

1. What is the total travel time for users in different cities? **Chicago users have travelled a total of 78020 hours (rounded to nearest integer), New York users have travelled for a total of 74974 hours and Washington users have travelled for a total of 103107 hours.**
2. What is average travel time for users in different cities? **Chicago users travel an average of 15.6 minutes. New York users travel for an average of 15 minutes and Washington users travel for an average of 20.6 minutes.**

```
ALL$Trip.Duration <- ALL$Trip.Duration/3600
by(ALL$Trip.Duration, ALL$location, sum)
```

```
## ALL$location: CHI
## [1] 78019.94
## ------------------------------------------------------------
## ALL$location: NY
## [1] 74973.68
## ------------------------------------------------------------
## ALL$location: WASH
## [1] 103106.7
```

```
ALL$Trip.Duration <- ALL$Trip.Duration*60
by(ALL$Trip.Duration, ALL$location, summary)
```

```
## ALL$location: CHI
##    Min.
##    1.00
##  [ reached getOption("max.print") -- omitted 5 entries ]
## ------------------------------------------------------------
## ALL$location: NY
##     Min.
##     1.02
##  [ reached getOption("max.print") -- omitted 5 entries ]
## ------------------------------------------------------------
## ALL$location: WASH
##      Min.
##     1.000
##  [ reached getOption("max.print") -- omitted 5 entries ]
```

5 Question 4

Question 4 examines the user types. Analysis is provided below to which was used to answer these questions.

1. What are the counts of each user type? **There is only 1 user that is a 'dependent' and 170483 users as a customer. 728824 users are subscribers.**
2. What are the counts of each gender? (only available for NYC and Chicago) **Based on the two cities, there is a total of 124541 females and 385198 males.**

```
options(max.print=10)
#Counting User Type
TypeCount = sort(table(subset(ALL$User.Type, !is.na(ALL$User.Type))))
print(TypeCount)
```

```
##
##  Dependent              Customer Subscriber
##          1        692     170483     728824
```

```r
#Counting Gender split
GenderCount = sort(table(subset(ALL$Gender, !is.na(ALL$Gender))))
print(GenderCount)
```

```
##
##        Female   Male
##  90261 124541 385198
```

```r
#Counting Gender split
round((GenderCount / length(ALL$Gender) * 100), digits = 2)
```

```
##
##        Female   Male
##  10.03  13.84  42.80
```

```r
#Graphing and removing Washington as it has NA values for gender
ggplot(aes(x = Gender, fill = location), data = ALL[!is.na(ALL$Gender),]) +
    geom_bar(position = 'dodge', colour="black") +
    ggtitle('Gender Count') +
    scale_x_discrete(labels = c('Null', 'Female', 'Male')) +
    xlab('Gender') +
    ylab('Users')
```