COMPSCIX 415.2 Homework 5/Midterm

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Github location

My homework assignments can be found at https://github.com/santumagic/compscix-415-2assignments.git

RStudio and R Markdown

Question: 1

As part of this question, I have loaded the required packages and added instructions for table of contents etc in the YAML header.

```
# Load the required packages
library(tidyverse)
```

```
library(mdsr)
library(nycflights13)
```

The tidyverse packages

Question: 1

Plotting - **ggplot2**
Data munging/wrangling - **dplyr** Reshaping (speading and gathering) data - **tidyr**
Importing/exporting data - **readr**

Question: 2

Plotting - **ggplot()** and **aes()**
Data munging/wrangling - **select()** and **filter()**
Reshaping (speading and gathering) data - **separate()** and **extract()**
Importing/exporting data - **read_csv()** and **read_delim()**

R Basics

Question: 1

```
My_data.name___is.too00ooLong <- c( 1 , 2 , 3 )
My_data.name___is.too00ooLong
```

```
## [1] 1 2 3
```

Answer: Just with one change (removal of '!'), the code works.

Question: 2

```
# this is a charactor vector
my_string <- c('has', 'an', 'error', 'in', 'it')
my_string
```

```
## [1] "has"   "an"    "error" "in"    "it"
```

Question: 3

```
my_vector <- c(1, 2, '3', '4', 5)
my_vector
```

```
## [1] "1" "2" "3" "4" "5"
```

Answer: This is a numeric vector and with or without the single or double quotes, vector takes values.

Data import/export

Question: 1

```
# Download and import the file rail_trail.txt
rail_trail.txt <- read.delim("/Users/skanutal/Documents/Santosh/Learning/Berkeley/rail_trail.txt", sep=
#glimpse the data from txt file
glimpse(rail_trail.txt)
```

```
## Observations: 90
## Variables: 10
## $ hightemp   <int> 83, 73, 74, 95, 44, 69, 66, 66, 80, 79, 78, 65, 41,...
## $ lowtemp    <int> 50, 49, 52, 61, 52, 54, 39, 38, 55, 45, 55, 48, 49,...
## $ avgtemp    <dbl> 66.5, 61.0, 63.0, 78.0, 48.0, 61.5, 52.5, 52.0, 67....
## $ spring     <int> 0, 0, 1, 0, 1, 1, 1, 1, 0, 0, 0, 1, 1, 0, 0, 1, 0, ...
## $ summer     <int> 1, 1, 0, 1, 0, 0, 0, 0, 1, 1, 1, 0, 0, 0, 0, 0, 1, ...
## $ fall       <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 0, 0, ...
## $ cloudcover <dbl> 7.6, 6.3, 7.5, 2.6, 10.0, 6.6, 2.4, 0.0, 3.8, 4.1, ...
## $ precip     <dbl> 0.00, 0.29, 0.32, 0.00, 0.14, 0.02, 0.00, 0.00, 0.0...
## $ volume     <int> 501, 419, 397, 385, 200, 375, 417, 629, 533, 547, 4...
## $ weekday    <int> 1, 1, 1, 0, 1, 1, 1, 0, 0, 1, 1, 1, 1, 1, 1, 1, 0, ...
```

Question: 2

```
# Export the .txt file as csv into a different location
rail_trail_csv <- write_delim(
  rail_trail.txt, delim = '|',path = "/Users/skanutal/Documents/Santosh/Learning/Berkeley/3. Intro to D
  )
# Load the newly created csv file
rail_trail_csv_final <- read.csv(
  "/Users/skanutal/Documents/Santosh/Learning/Berkeley/3. Intro to DS/Assignments/rail_trail.csv", sep=
  )
# glimpse the data from the final csv file
glimpse(rail_trail_csv_final)
```

```
## Observations: 90
## Variables: 10
## $ hightemp   <int> 83, 73, 74, 95, 44, 69, 66, 66, 80, 79, 78, 65, 41,...
## $ lowtemp    <int> 50, 49, 52, 61, 52, 54, 39, 38, 55, 45, 55, 48, 49,...
## $ avgtemp    <dbl> 66.5, 61.0, 63.0, 78.0, 48.0, 61.5, 52.5, 52.0, 67....
## $ spring     <int> 0, 0, 1, 0, 1, 1, 1, 1, 0, 0, 0, 1, 1, 0, 0, 1, 0, ...
## $ summer     <int> 1, 1, 0, 1, 0, 0, 0, 0, 1, 1, 1, 0, 0, 0, 0, 0, 1, ...
## $ fall       <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 0, 0, ...
## $ cloudcover <dbl> 7.6, 6.3, 7.5, 2.6, 10.0, 6.6, 2.4, 0.0, 3.8, 4.1, ...
## $ precip     <dbl> 0.00, 0.29, 0.32, 0.00, 0.14, 0.02, 0.00, 0.00, 0.0...
## $ volume     <int> 501, 419, 397, 385, 200, 375, 417, 629, 533, 547, 4...
## $ weekday    <int> 1, 1, 1, 0, 1, 1, 1, 0, 0, 1, 1, 1, 1, 1, 1, 1, 0, ...
```

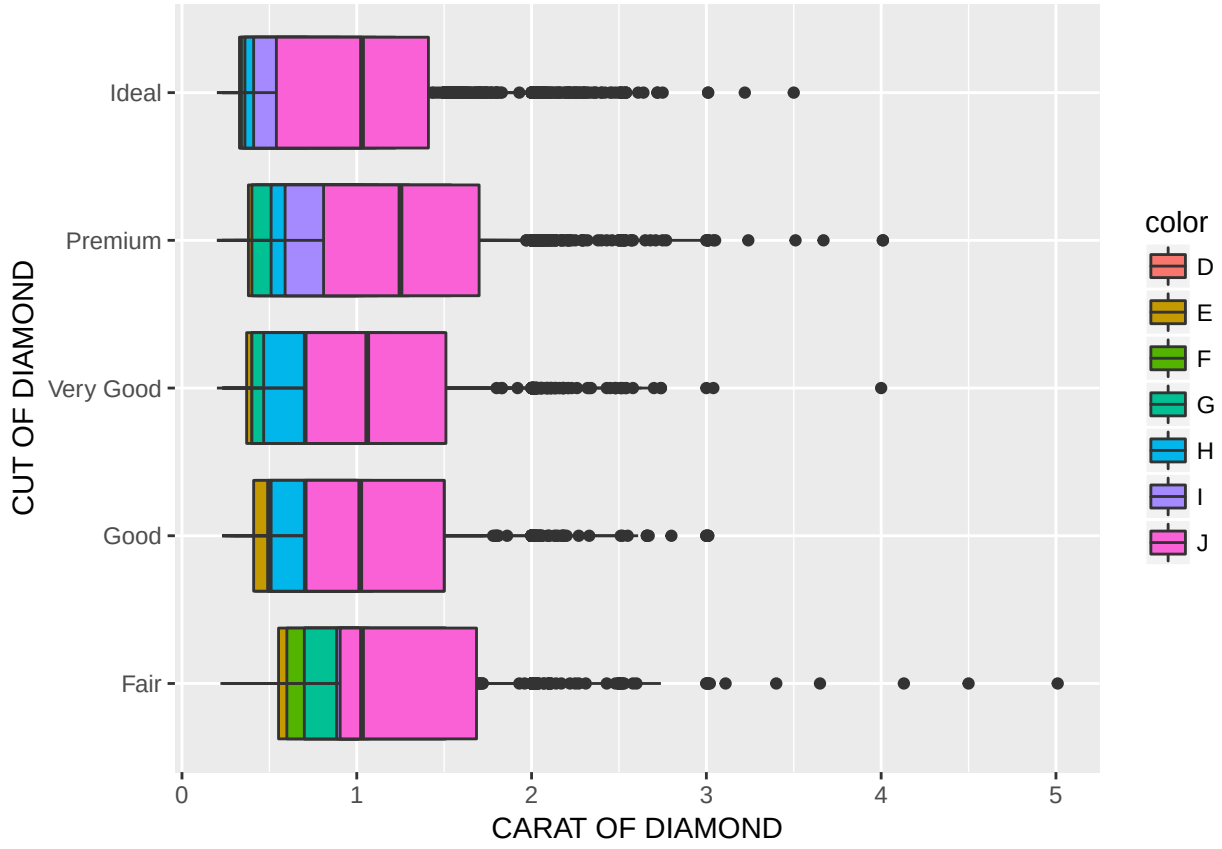
Visualization

Question: 1

Answer:
1. Both the categories age group and gender are plotted on same axis, which is confusing at a first glanse.
2. These are two seperate charts, but they look like one. The first chart is a chart with three ranges (<45, 45 to 64, and >64), the second chart is a men vs women chart. This simple difference is not easily visible with how it is layed out currently.
3. With the way the data is currently layed out it is not clear that yes/no data points are proportions and the title should visually be represented.

Question: 2

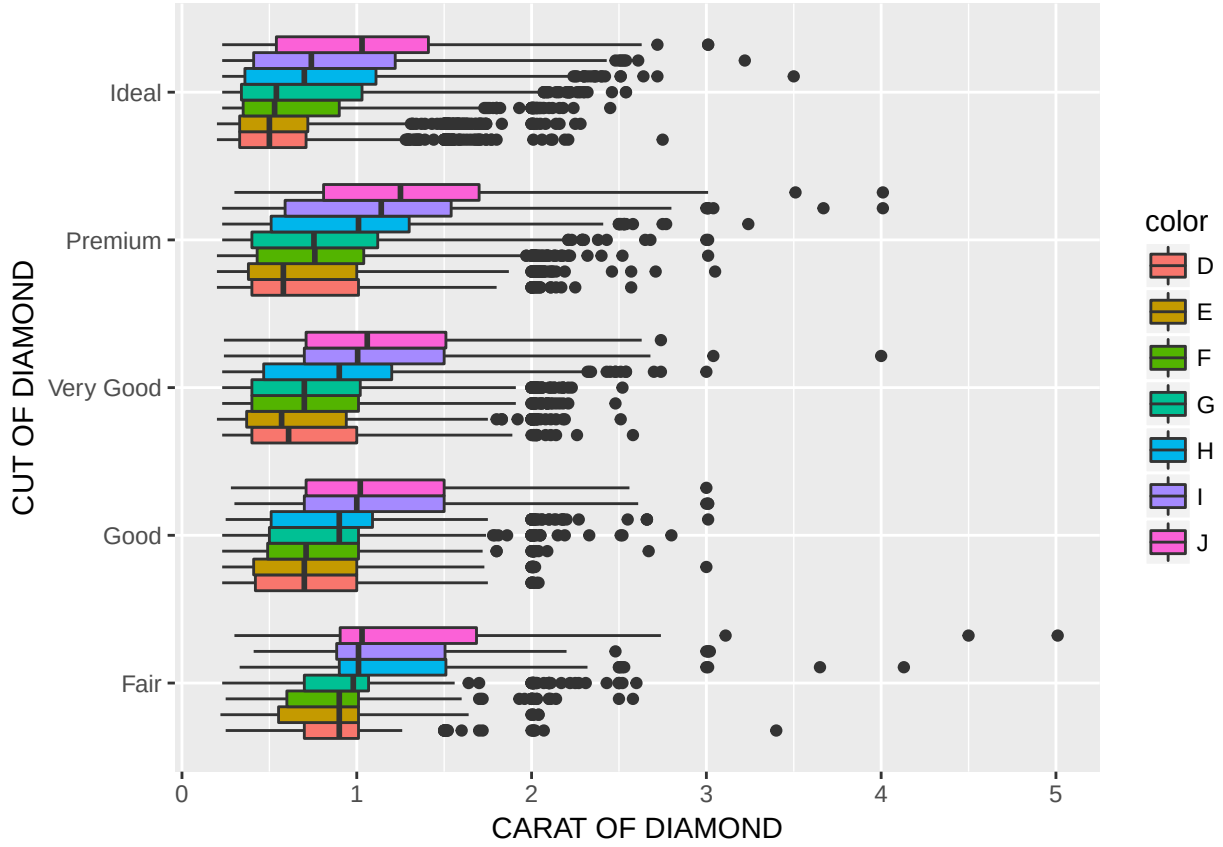
```
# Reproduce the given graph
ggplot(data = diamonds, mapping = aes(x = cut, y = carat, fill = color)) +
  geom_boxplot (position = "identity") +
  coord_flip() +
  labs(x = "CUT OF DIAMOND", y = "CARAT OF DIAMOND")
```



Question: 3

```
# Enhancing the graph by changing the position to "dodge"
ggplot(data = diamonds, mapping = aes(x = cut, y = carat, fill = color)) +
```

```
  geom_boxplot (position = "dodge") +
  coord_flip() +
  labs(x = "CUT OF DIAMOND", y = "CARAT OF DIAMOND")
```



Explanation: By using position = "dodge", we can compare the individual values side by side.

Data munging and wrangling

Question: 1

```
# Finding the dataset tidy or not
table2
```

```
## # A tibble: 12 x 4
##    country      year type            count
##    <chr>       <int> <chr>           <int>
##  1 Afghanistan  1999 cases             745
##  2 Afghanistan  1999 population   19987071
##  3 Afghanistan  2000 cases            2666
##  4 Afghanistan  2000 population   20595360
##  5 Brazil       1999 cases           37737
##  6 Brazil       1999 population  172006362
##  7 Brazil       2000 cases           80488
##  8 Brazil       2000 population  174504898
##  9 China        1999 cases          212258
## 10 China        1999 population 1272915272
```

```
## 11 China        2000 cases          213766
## 12 China        2000 population 1280428583
```

```
# It is not a tidy data, so below code makes it a tidy dataset
table2_tidy <- spread(table2, type, count)
# Display table2 in tidy way
table2_tidy
```

```
## # A tibble: 6 x 4
##   country      year  cases population
##   <chr>       <int>  <int>      <int>
## 1 Afghanistan  1999    745   19987071
## 2 Afghanistan  2000   2666   20595360
## 3 Brazil       1999  37737  172006362
## 4 Brazil       2000  80488  174504898
## 5 China        1999 212258 1272915272
## 6 China        2000 213766 1280428583
```

Answer: To make this data tidy, there needs to be one observation per row, which we can achieve with a "spread".

Question: 2

```
# modify the diamonds dataset by adding an additional column
enhanced_diamonds <- diamonds %>% mutate(price_per_carat = price / carat)
```

Question: 3

```
# finding the number of diamonds with price > 10000 and carat <1.5
diamond_target <- diamonds %>%
mutate (target_segment = (price > 10000 & carat < 1.5)) %>%
group_by(cut)
# finding the proportion
diamond_target %>%
  summarise(target_propotion = (sum(target_segment)/length(target_segment))*100,
target_count = sum(target_segment))
```

```
## # A tibble: 5 x 3
##   cut       target_propotion target_count
##   <ord>                <dbl>        <int>
## 1 Fair                 0.248            4
## 2 Good                 0.347           17
## 3 Very Good            1.28           155
## 4 Premium              1.25           173
## 5 Ideal                2.25           485
```

```
# discplay the final dataset
diamond_target
```

```
## # A tibble: 53,940 x 11
## # Groups:   cut [5]
##    carat cut       color clarity depth table price     x     y     z
##    <dbl> <ord>     <ord> <ord>   <dbl> <dbl> <int> <dbl> <dbl> <dbl>
##  1 0.23  Ideal     E     SI2      61.5    55   326  3.95  3.98  2.43
```

```
##  2 0.21  Premium   E     SI1      59.8    61   326  3.89  3.84  2.31
##  3 0.23  Good      E     VS1      56.9    65   327  4.05  4.07  2.31
##  4 0.290 Premium   I     VS2      62.4    58   334  4.2   4.23  2.63
##  5 0.31  Good      J     SI2      63.3    58   335  4.34  4.35  2.75
##  6 0.24  Very Good J     VVS2     62.8    57   336  3.94  3.96  2.48
##  7 0.24  Very Good I     VVS1     62.3    57   336  3.95  3.98  2.47
##  8 0.26  Very Good H     SI1      61.9    55   337  4.07  4.11  2.53
##  9 0.22  Fair      E     VS2      65.1    61   337  3.87  3.78  2.49
## 10 0.23  Very Good H     VS1      59.4    61   338  4     4.05  2.39
## # ... with 53,930 more rows, and 1 more variable: target_segment <lgl>
```

Answer: As seen in the above dataset there are 485 ideal diamonds, and they comprise 2.25% of all ideal diamonds. This makes sense, since as the diamond is more ideal, small diamonds are more expensive. Similarly, most fair diamonds won't have the same price as any of the others. It is interesting that very-good and premium diamonds are the same. Which implies that we are missing some other parameter, likely clarity, colour or some such variable

EDA

Question: 1

Question: 2

Question: 3

Question: 4

Question: 5

Question: 6

Git and Github