9.13.20 QMB6930 Assn4

Assignment 4

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This code analyzes a data set that comes with Base R - Seatbelts. I have reviewed the file and included 2 visualizations.

Librarys Included:

install.packages("tinytex") install.packages("knitr") install.packages("rmarkdown") install.packages("XQuartx") library(tinytex) library(knitr) library(rmarkdown)

update.packages(ask = FALSE, checkBuilt = TRUE) tinytex::tlmgr_update()Yes tinytex:::install_prebuilt()

Identify and load the base R dataset Seatbelts after comparing it to the base R dataset UKDriverDeaths

```
#4-1 were able to identify and load a base R dataset;
#datasets pre-installed in R in package datasets listed in a new tab R data sets

data()
View(Seatbelts)
View(UKDriverDeaths)
help("Seatbelts")
str(Seatbelts)
```

```
##  Time-Series [1:192, 1:8] from 1969 to 1985: 107 97 102 87 119 106 110 106 107 134 ...
##  - attr(*, "dimnames")=List of 2
##   ..$ : NULL
##   ..$ : chr [1:8] "DriversKilled" "drivers" "front" "rear" ...
```

```
SeatbeltsDF <- data.frame(Year=floor(time(Seatbelts)),Month=factor(cycle(Seatbelts),
          labels=month.abb), Seatbelts)
View(SeatbeltsDF)
```

Mainpulated the dataset, by creating a new column and changing the name of two columns. The updates allowed the data to be easily subset for visualizations later in the project.

```
#4-2-2) that you can manipulate the dataset
#create a new column for total deaths
totalDeaths <- SeatbeltsDF$DriversKilled + SeatbeltsDF$front + SeatbeltsDF$rear
View(totalDeaths)

# add a new column called colname based on the vector of colnames in the myData data frame
SeatbeltsDF$TotalDeaths <- c(totalDeaths)
View(SeatbeltsDF)

# change a single column name
colnames(SeatbeltsDF)[5] <- "FrontKilled"
```

```r
colnames(SeatbeltsDF)[6] <- "RearKilled"
View(SeatbeltsDF)
```

Divided the datset into Pre and Post Seatbelt Law

```r
#UK seatbelt use was mandated in January 1983
preSeatbeltLaw <- SeatbeltsDF[1:169, ] #Filters data before seatbelt law
View(preSeatbeltLaw)
postSeatbeltLaw <- SeatbeltsDF[170:192, ]#Filters data after seatbelt law
View(postSeatbeltLaw)
```

Summarize the data on Total Deaths for the 3 datasets.

```r
# summary value calculations within the matrix
AvgDeathsMonth <- mean(SeatbeltsDF$TotalDeaths) # mean of Total Deaths
AvgPreLawDeathsMonth <- mean(preSeatbeltLaw$TotalDeaths) # mean of PreLaw Deaths
AvgPostLawDeathsMonth <- mean(postSeatbeltLaw$TotalDeaths) # mean of PostLaw Deaths
AvgDeathsMonth
```

```
## [1] 1361.229
```

```r
AvgPreLawDeathsMonth
```

```
## [1] 1399.645
```

```r
AvgPostLawDeathsMonth
```

```
## [1] 1078.957
```

```r
#Standard Deviation of Deaths
SDDeathsMonth <- sd(SeatbeltsDF$TotalDeaths) # mean of Total Deaths
SDPreLawDeathsMonth <- sd(preSeatbeltLaw$TotalDeaths) # mean of PreLaw Deaths
SDPostLawDeathsMonth <- sd(postSeatbeltLaw$TotalDeaths) # mean of PostLaw Deaths
SDDeathsMonth
```

```
## [1] 253.0452
```

```r
SDPreLawDeathsMonth
```

```
## [1] 239.2439
```

```r
SDPostLawDeathsMonth
```

```
## [1] 155.5297
```

```r
#Max Deaths Per Month
MaxDeathsMonth <- max(SeatbeltsDF$TotalDeaths) # max of Total Deaths
MaxPreLawDeathsMonth <- max(preSeatbeltLaw$TotalDeaths) # max of PreLaw Deaths
MaxPostLawDeathsMonth <- max(postSeatbeltLaw$TotalDeaths) # max of PostLaw Deaths
MaxDeathsMonth
```

```
## [1] 1980
```

```r
MaxPreLawDeathsMonth
```

```
## [1] 1980
```

```r
MaxPostLawDeathsMonth
```

```
## [1] 1366
```

```r
#Min Deaths Per Month
MinDeathsMonth <- min(SeatbeltsDF$TotalDeaths) # min of Total Deaths
```

```
MinPreLawDeathsMonth <- min(preSeatbeltLaw$TotalDeaths) # min of PreLaw Deaths
MinPostLawDeathsMonth <- min(postSeatbeltLaw$TotalDeaths) # min of PostLaw Deaths
MinDeathsMonth
```

```
## [1] 821
```

```
MinPreLawDeathsMonth
```

```
## [1] 870
```

```
MinPostLawDeathsMonth
```

```
## [1] 821
```

Build a New Visualization using Base R Commands

```
#Start with understanding the data
class(preSeatbeltLaw)
```

```
## [1] "data.frame"
```

```
head(preSeatbeltLaw)
```

```
##   Year Month DriversKilled drivers FrontKilled RearKilled   kms PetrolPrice
## 1 1969   Jan           107    1687         867        269  9059   0.1029718
## 2 1969   Feb            97    1508         825        265  7685   0.1023630
## 3 1969   Mar           102    1507         806        319  9963   0.1020625
## 4 1969   Apr            87    1385         814        407 10955   0.1008733
## 5 1969   May           119    1632         991        454 11823   0.1010197
## 6 1969   Jun           106    1511         945        427 12391   0.1005812
##   VanKilled law TotalDeaths
## 1        12   0        1243
## 2         6   0        1187
## 3        12   0        1227
## 4         8   0        1308
## 5        10   0        1564
## 6        13   0        1478
```

```
summary(preSeatbeltLaw)
```

```
##       Year          Month    DriversKilled      drivers      FrontKilled
##  Min.   :1969   Jan    :15   Min.   : 79.0   Min.   :1309   Min.   : 567.0
##  1st Qu.:1972   Feb    :14   1st Qu.:108.0   1st Qu.:1511   1st Qu.: 767.0
##  Median :1976   Mar    :14   Median :121.0   Median :1653   Median : 860.0
##  Mean   :1976   Apr    :14   Mean   :125.9   Mean   :1718   Mean   : 873.5
##  3rd Qu.:1979   May    :14   3rd Qu.:140.0   3rd Qu.:1926   3rd Qu.: 986.0
##  Max.   :1983   Jun    :14   Max.   :198.0   Max.   :2654   Max.   :1299.0
##                 (Other):84
##    RearKilled         kms          PetrolPrice        VanKilled           law
##  Min.   :224.0   Min.   : 7685   Min.   :0.08118   Min.   : 2.000   Min.   :0
##  1st Qu.:344.0   1st Qu.:12387   1st Qu.:0.09078   1st Qu.: 7.000   1st Qu.:0
##  Median :401.0   Median :14455   Median :0.10273   Median :10.000   Median :0
##  Mean   :400.3   Mean   :14463   Mean   :0.10187   Mean   : 9.586   Mean   :0
##  3rd Qu.:454.0   3rd Qu.:16585   3rd Qu.:0.11132   3rd Qu.:13.000   3rd Qu.:0
##  Max.   :646.0   Max.   :21040   Max.   :0.13303   Max.   :17.000   Max.   :0
##
##   TotalDeaths
##  Min.   : 870
##  1st Qu.:1233
```

```
##  Median :1376
##  Mean   :1400
##  3rd Qu.:1564
##  Max.   :1980
##
```

```
View(preSeatbeltLaw)

class(postSeatbeltLaw)
```

```
## [1] "data.frame"
```

```
head(postSeatbeltLaw)
```

```
##     Year Month DriversKilled drivers FrontKilled RearKilled   kms PetrolPrice
## 170 1983   Feb            95    1057         426        300 15511   0.1136570
## 171 1983   Mar           100    1218         475        318 18308   0.1131444
## 172 1983   Apr            89    1168         556        391 17793   0.1184955
## 173 1983   May            82    1236         559        398 19205   0.1179694
## 174 1983   Jun            89    1076         483        337 19162   0.1176866
## 175 1983   Jul            60    1174         587        477 20997   0.1200592
##     VanKilled law TotalDeaths
## 170         3   1         821
## 171         2   1         893
## 172         6   1        1036
## 173         3   1        1039
## 174         7   1         909
## 175         6   1        1124
```

```
summary(postSeatbeltLaw)
```

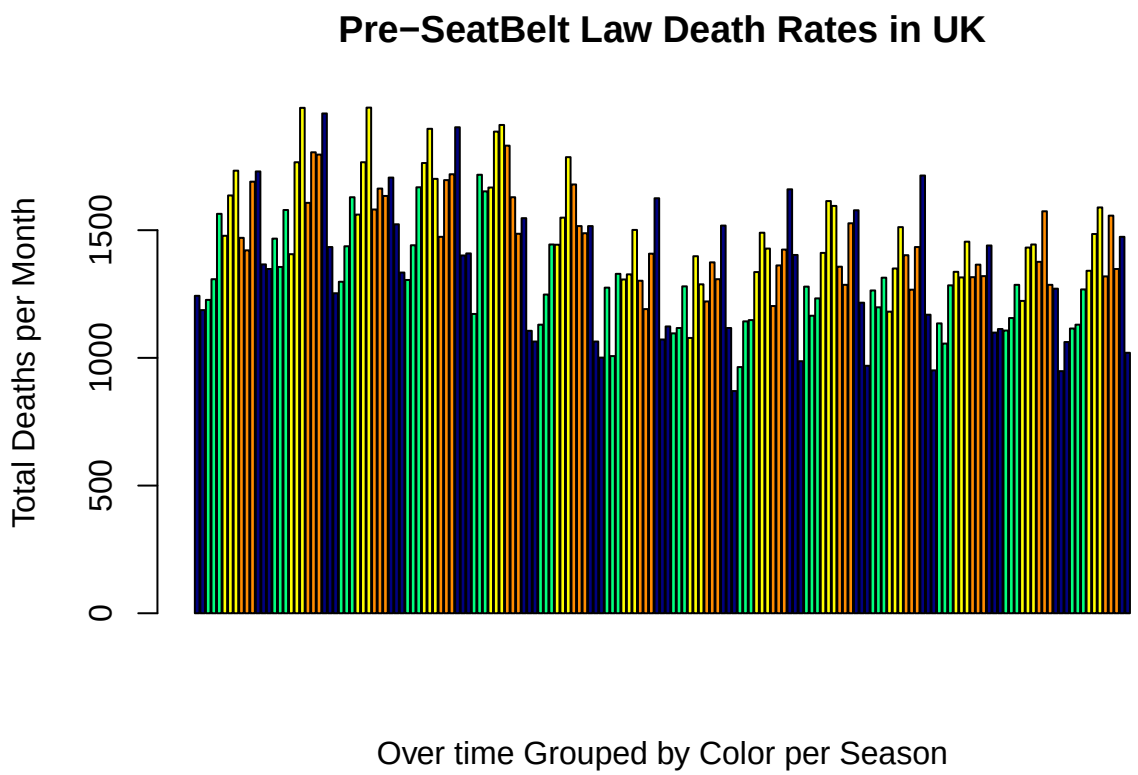
```
##       Year          Month    DriversKilled      drivers      FrontKilled
##  Min.   :1983   Feb    : 2   Min.   : 60.0   Min.   :1057   Min.   :426.0
##  1st Qu.:1983   Mar    : 2   1st Qu.: 85.0   1st Qu.:1171   1st Qu.:516.0
##  Median :1984   Apr    : 2   Median : 92.0   Median :1282   Median :585.0
##  Mean   :1984   May    : 2   Mean   :100.3   Mean   :1322   Mean   :571.0
##  3rd Qu.:1984   Jun    : 2   3rd Qu.:119.0   3rd Qu.:1464   3rd Qu.:629.5
##  Max.   :1984   Jul    : 2   Max.   :154.0   Max.   :1763   Max.   :721.0
##                 (Other):11
##    RearKilled         kms         PetrolPrice       VanKilled          law
##  Min.   :296.0   Min.   :15511   Min.   :0.1131   Min.   :2.000   Min.   :1
##  1st Qu.:347.0   1st Qu.:17971   1st Qu.:0.1148   1st Qu.:3.500   1st Qu.:1
##  Median :408.0   Median :19162   Median :0.1161   Median :5.000   Median :1
##  Mean   :407.7   Mean   :18890   Mean   :0.1165   Mean   :5.174   Mean   :1
##  3rd Qu.:471.5   3rd Qu.:19952   3rd Qu.:0.1180   3rd Qu.:7.000   3rd Qu.:1
##  Max.   :521.0   Max.   :21626   Max.   :0.1201   Max.   :8.000   Max.   :1
##
##   TotalDeaths
##  Min.   : 821
##  1st Qu.: 975
##  Median :1077
##  Mean   :1079
##  3rd Qu.:1182
##  Max.   :1366
##
```

```
View(postSeatbeltLaw)

help("barplot")
```

```
Simple Bar Chart
Indicates the total deaths per Month over time prior to the UK Seatbelt Law being inacted.

Colors represent the season the deaths occured.
Winter is Blue
Spring is Green
Summer is Yellow
Fall is Orange
```

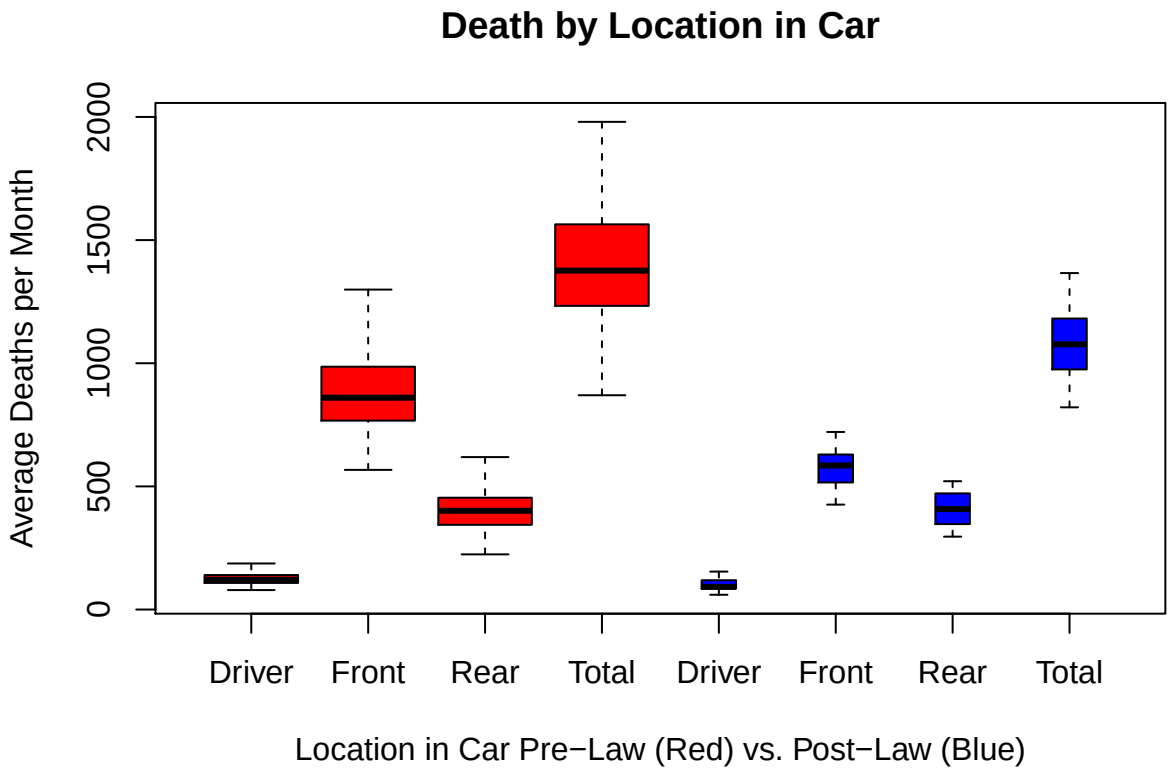


Complex Visualization, Box Plot

The Box Plot shows the comparison of deaths from two seperate data frames. Indicated in red, the first data frame has death statistics from before the seatbelt law was inacted. Indicated in blue, the second data frame has death statistics from after the seatbelt law was inacted.

```
# boxplot examples
help("boxplot")
boxplotcolor <- c("red", "red", "red", "red", "blue", "blue", "blue", "blue")
boxplotnames <- c("Driver", "Front", "Rear", "Total", "Driver", "Front", "Rear", "Total")
boxplot(preSeatbeltLaw$DriversKilled, preSeatbeltLaw$FrontKilled, preSeatbeltLaw$RearKilled,
        preSeatbeltLaw$TotalDeaths, postSeatbeltLaw$DriversKilled, postSeatbeltLaw$FrontKilled,
        postSeatbeltLaw$RearKilled, postSeatbeltLaw$TotalDeaths, main = "Death by Location in Car",
        xlab = "Location in Car Pre-Law (Red) vs. Post-Law (Blue)", ylab = "Average Deaths per Month",
        col = boxplotcolor, varwidth = TRUE,
```

```
        names = boxplotnames)
```



From the plot, we can see that the average monthly deaths regardless of a person's placement in a car went down after the seatbelt law.

We can also see that drivers were least likely to die in an automobile crash both before and after the law was passed. Followed by passagers in the rear seats, and then front seat passagers who have the highest death rates.

While still higher than their rear seat passagers, the seatbelt law reduced the average death per month for front seat the most.

```
preSeatbeltLawMatrix <- data.matrix(preSeatbeltLaw)
class(preSeatbeltLawMatrix)
```

```
## [1] "matrix" "array"
```