STA 250: Homework #4

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1 About the Assignment

The first thing I did for this assignment was to follow the R Shiny tutorial at the following URL: http://rstudio.github.io/shiny/tutorial . To start this, I made a ui.R and a server.R file to work on. I also had to install and load the shiny package in RStudio.

I decided to work with the Airline Data that we have used for other assignments. My thought was to allow the user to graphically compare the arrival delays of two airlines side-by-side. For this, I used the year 2003, given in the file 2003.csv. First, I had to subset my data frame down to contain only the 5 airlines with the most amount of flights in the dataset. I also only focused on some of the variables given. I used the resulting data frame in my server.R file.

I wanted my application to be reactive, so I read the tutorial from the RStudio webpage about reactivity, and implemented the reactive elements into my application. In my application, the user chooses two airlines from two different drop-down menus, and those two airlines are compared in the output graphs. In total, there are 4 comparative graphs. The first graph plots the average arrival delays per month against each other in the same window. The second section shows two side-by-side boxplots of arrival delays for either airline. The third section shows 12 box plots for each airline (by month). The fourth section of the output gives 7 box plots for each airline, separated by days of the week.

2 Getting the data

```
air2003 = read.csv("2003.csv")

air = subset(air2003, air2003$UniqueCarrier == "WN" | air2003$
    UniqueCarrier == "AA" | air2003$UniqueCarrier == "DL" |
    air2003$UniqueCarrier == "UA" | air2003$UniqueCarrier == "NW")

air = data.frame(air$Month, air$DayofMonth, air$DayOfWeek, air$
    UniqueCarrier, air$Distance, air$AirTime, air$ArrDelay)
```

3 ui.R

```
library(shiny)


shinyUI(pageWithSidebar(

  headerPanel("Compare Airline Arrival Delays in 2003"),

  sidebarPanel(
    selectInput("airline1", "Airline 1:", list("American Airlines
        (AA)",
      "Delta Airlines (DL)", "Southwest Airlines (SW)", "United
          Airlines (UA)",
      "Northwest Airlines (NW)")),

    selectInput("airline2", "Airline 2:", list("American Airlines
        (AA)",
      "Delta Airlines (DL)", "Southwest Airlines (WN)", "United
          Airlines (UA)",
      "Northwest Airlines (NW)"))

  ),
```

```
  mainPanel(
    h3(textOutput("caption")),
    plotOutput("plotgood"),
    plotOutput("whole"),

    plotOutput("month"),
    plotOutput("day")
    )

  ))
```

4 server.R

```
library(shiny)
library(datasets)

airData <- air


shinyServer(function(input, output){

  airline1Input <- reactive({
    switch(input$airline1,
      "American Airlines (AA)" = "AA", "Delta Airlines (DL)" = "
          DL",
      "Southwest Airlines (SW)" = "SW", "United Airlines (UA)" = "
          UA",
      "Northwest Airlines (NW)" = "NW")
  })
  airline2Input <- reactive({
    switch(input$airline2,
      "American Airlines (AA)" = "AA", "Delta Airlines (DL)" = "
          DL",
      "Southwest Airlines (WN)" = "WN", "United Airlines (UA)" = "
          UA",
      "Northwest Airlines (NW)" = "NW")
```

```
 })

output$caption <- renderText({
  carrier1 <- airline1Input()
  carrier2 <- airline2Input()
  paste("Comparing Arrival Delays of", carrier1, "with",
     carrier2, sep = " ")
})

output$whole <- renderPlot({
  carrier1 <- airline1Input()
  carrier2 <- airline2Input()
  par(mfrow = c(1,2))
  boxplot(subset(airData$air.ArrDelay, airData$air.UniqueCarrier
      == carrier1),
     main = paste("Arrival Delays for", carrier1, sep = " "),
        notch = TRUE, ylim =
     c(-200, 1500), col = "tomato")
   points(mean(subset(airData$air.ArrDelay, airData$air.
      UniqueCarrier == carrier1)))
  boxplot(subset(airData$air.ArrDelay, airData$air.UniqueCarrier
      == carrier2),
     main = paste("Arrival Delays for", carrier2, sep = " "),
        ylim = c(-200, 1500),
     col = "cadetblue", notch = TRUE)
})

 output$month <- renderPlot({
   carrier1 <- airline1Input()
   carrier2 <- airline2Input()
   par(mfrow = c(1,2))

   boxplot(subset(airData$air.ArrDelay, airData$air.
      UniqueCarrier == carrier1) ~
     subset(airData$air.Month, airData$air.UniqueCarrier ==
        carrier1), main =
     paste("Arrival Delays by Month for ", carrier1), xlab = "
        Month",
     ylab = "Arrival Delay", ylim = c(-200, 1500), notch = TRUE,
         col =
     rep("tomato", times = 12))
```

```
    boxplot(subset(airData$air.ArrDelay, airData$air.
        UniqueCarrier == carrier2) ~
      subset(airData$air.Month, airData$air.UniqueCarrier ==
          carrier2), main =
      paste("Arrival Delays by Month for ", carrier2), xlab = "
          Month",
      ylab = "Arrival Delay", ylim = c(-200, 1500), notch = TRUE,
          col =
      rep("cadetblue", times = 12))
  })


output$day <- renderPlot({
  carrier1 <- airline1Input()
  carrier2 <- airline2Input()
  par(mfrow = c(1,2))

  boxplot(subset(airData$air.ArrDelay, airData$air.UniqueCarrier
      == carrier1) ~
      subset(airData$air.DayOfWeek, airData$air.UniqueCarrier ==
          carrier1), main =
      paste("Arrival Delays by Day of Week for ", carrier1), xlab
          = "Day of Week",
      ylab = "Arrival Delay", ylim = c(-200, 1500), notch = TRUE,
          col =
      rep("tomato", times = 7))

  boxplot(subset(airData$air.ArrDelay, airData$air.UniqueCarrier
      == carrier2) ~
      subset(airData$air.DayOfWeek, airData$air.UniqueCarrier ==
          carrier2), main =
      paste("Arrival Delays by Day of Week for ", carrier2), xlab
          = "Day of Week",
      ylab = "Arrival Delay", ylim = c(-200, 1500), notch = TRUE,
          col =
      rep("cadetblue", times = 7))
})

output$plotgood <- renderPlot({
  carrier1 <- airline1Input()
```

```
    carrier2 <- airline2Input()
    a1 <- numeric(12)
    a2 <- numeric(12)

    for(i in 1:12){
      a1[i]= mean(subset(airData$air.ArrDelay, airData$air.Month
          == i
          & airData$air.UniqueCarrier == carrier1), na.rm = TRUE)
          i = i+1
    }
    for(j in 1:12){
      a2[j] = mean(subset(airData$air.ArrDelay, airData$air.Month
          == j
          & airData$air.UniqueCarrier == carrier2), na.rm = TRUE)
          j = j+1
    }
    months <- 1:12

    plot(a1 ~ months, type = "l", col = "tomato",
     main = "Average Arrival Delays per Month", xlab = "Month",
     ylab = "Average Arrival Delay", ylim = c(-10, 20))
    lines(a2 ~ months, type = "l", col = "cadetblue")
    legend("topleft", c(as.character(carrier1), as.character(
        carrier2)), fill =
        c("tomato", "cadetblue"), bty = "n", cex = 0.9)
  })

})
```