# Data Visualization - Assignment 3

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Dashboard link: https://rpubs.com/VISHAL34PATNAIK/779409

## Code for dashboard:

```
---
title: "Data Visualisation - 3"
author: "Vishal Patnaik Damodarapatruni - s3811521"
date: "11/05/2021"
output:
  flexdashboard::flex_dashboard:
    orientation: rows
    vertical_layout: fill
---


```{r setup, include=FALSE}
library(flexdashboard)
library(readxl)
library(tidyverse)
library(plotly)
library(magrittr)
library(dplyr)
library(readr)
library(knitr)
```
```

```
library(car)
library(mapview)
library(rnaturalearth)
library(rnaturalearthhires)

# if using rnaturalearthhires install it through below link.
# devtools::install_github('ropensci/rnaturalearthhires')

library(sp)
library(leaflet)
library(htmlwidgets)
library(htmltools)
```

```{r data, include=FALSE}
hos_data <- read_csv("ALOS.csv")
```

```{r stucture, include=FALSE}
# Checking data and data types.

str(hos_data)
```

```{r filtering, include=FALSE}
# Data type conversion and Pre - Processing.
```

```
hos <- hos_data %>% filter(`Peer group` == "Large regional hospitals" | `Peer group` == "Medium regional hospitals" | `Peer group` == "Large metropolitan hospitals" | `Peer group` == "Medium metropolitan hospitals")

hos <- hos[, -c(8, 10)]

hos
```

```{r type, include=FALSE}
# Checking Null values for all columns.

hos$`Number of patients` <- as.numeric((gsub(",", "", hos$`Number of patients`)))

hos$`Percentage of patients seen on time` <- as.numeric((gsub("%", "", hos$`Percentage of patients seen on time`)))

str(hos)
```

```{r nu0, include=FALSE}
colSums(is.na(hos))
```

```{r hos, include=FALSE}
# Interpreting Null values.

print("Before")

print(sum(is.na(hos$`Number of patients`)))

c <- unique(hos$`Peer group`)
```

```
hos %<>% mutate(`Number of patients` = ifelse(is.na(`Number of patients`), mean(hos$`Number of patients`, na.rm = TRUE), `Number of patients`))

print("After")

sum(is.na(hos$`Number of patients`))
```

```{r, include=FALSE}
hos
```

Australia {data-icon="fa-globe-asia"}

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Row {data-width=150}

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### Total large hospitals in metropolitan

```{r}
Metropolitan_L = hos %>% filter(`Peer group` == "Large metropolitan hospitals")

v2 = Metropolitan_L %>% nrow()

valueBox(value = v2, icon = "fa-hospital-alt", caption = "Large hospitals in Metropolitan areas", color = "Blue")
```

### Total medium hospitals in metropolitan

```{r}
Metropolitan_M = hos %>% filter(`Peer group` == "Medium metropolitan hospitals")

v3 = Metropolitan_M %>% nrow()

valueBox(value = v3, icon = "fa-hospital", caption = "Medium hospitals in Metropolitan areas", color = "Blue")
```

```

### Total large hospitals in regional

```{r}

Regional_L = hos %>% filter(`Peer group` == "Large regional hospitals")

v = Regional_L %>% nrow()

valueBox(value = v, icon = "fa-hospital-alt", caption = "Large hospitals in Regional areas", color = "Red")

```


### Total medium hospitals in regional

```{r}

Regional_M = hos %>% filter(`Peer group` == "Medium regional hospitals")

v1 = Regional_M %>% nrow()

valueBox(value = v1, icon = "fa-hospital", caption = "Medium hospitals in Regional areas", color = "Red")

```


Row {data-height=98%}

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### <b>Total number of patients admitted in australian hospitals over the past decade (2011 - 2020). <i class="fa fa-line-chart" aria-hidden="true"></i></b>

```{r}

h1 = hos %>% group_by(`Time period`, `Peer group`) %>%

  summarise(count = round(sum(`Number of patients`, na.rm = TRUE)))

p1 = plot_ly(data = h1,

      x = h1$`Time period`,

      y = h1$count) %>%

```
 add_lines(linetype = h1$`Peer group`,
           data = h1$count,
           hoverinfo = "text",
           text = paste(h1$`Peer group`, ":", h1$count)) %>%
 layout(yaxis = list(zeroline = FALSE, title = "<b>Average number of admissions</b>"),
        xaxis = list(zeroline = FALSE, title = "<b>Time Period</b>"),
        legend = list(title = list(text = "<b>Severity</b>")),
        hovermode = "x unified"
        )


p1
```

### Hospital admissions in each Australian state over the time period 2019 to 2020. 

```{r, include=FALSE}
#devtools::install_github('ropensci/rnaturalearthhires')

aussie_states <- rnaturalearth::ne_states(country = 'australia')

aussie_states$State <- aussie_states$name



hos3 <- hos[c(3, 5, 7)]

hos3 <- hos3 %>%
```

```
 filter(`Time period` == "2019–20")

hos3 <- hos3[-2]

hos3 <- hos3 %>%
 group_by(State)%>%
 summarise(ANP = round(sum(`Number of patients`)/1000, 2))

hos3$State[hos3$State == "WA"] <- "Western Australia"
hos3$State[hos3$State == "NT"] <- "Northern Territory"
hos3$State[hos3$State == "SA"] <- "South Australia"
hos3$State[hos3$State == "Qld"] <- "Queensland"
hos3$State[hos3$State == "Vic"] <- "Victoria"
hos3$State[hos3$State == "NSW"] <- "New South Wales"
hos3$State[hos3$State == "Tas"] <- "Tasmania"
hos3$State[hos3$State == "ACT"] <- "Australian Capital Territory"

state_merge <- merge(aussie_states, hos3,
                     by="State", all.x=TRUE)
```

```{r, include=FALSE}
v_labs <- sprintf("<strong>%s</strong><br/>%gK admissions (2019 - 2020).",
                  state_merge$State, state_merge$ANP) %>%
 lapply(htmltools::HTML)
```

```
title <- tags$div(HTML('<h3>Hospital admissions in the time period 2019 to 2020.</h3>'))


p2 <- leaflet(state_merge) %>%
  setView(lng = 138, lat = -25, zoom = 4)

b <- quantile(hos3$ANP, probs = seq(0, 1, .2), names = FALSE, na.rm = TRUE)

CB <- colorBin("YlOrRd", domain = hos3$ANP, bins = b)

CB1 <- colorBin("YlOrRd", domain = hos3$ANP, bins = 4, pretty = FALSE)
```

```{r}
p2 %>% addPolygons(fillColor = ~CB1(ANP), weight = 2, opacity = 1,
                   color = "white", dashArray = "3", fillOpacity = 0.7,
                   highlight = highlightOptions(weight = 5, color = "#666", dashArray = "",
                                                fillOpacity = 0.7, bringToFront = TRUE),

  label = v_labs,
  labelOptions = labelOptions(style = list("font-weight" = "normal", padding = "3px 8px"),
                              textsize = "13px", direction = "auto")) %>%


  addLegend(pal = CB1, values = ~ANP, opacity = 0.7, title = "Admissions (in thousands).",
            position = "bottomright") %>%
```

```
  addControl(title, position = "topright")
```

```

Metropolitan {data-icon="fa-subway"}

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Row

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### Large hospitals

```{r}
patient_byperiod = hos %>%
  filter(`Peer group` == "Large metropolitan hospitals") %>%
  group_by(`Time period`)
avg = paste0(round(mean(patient_byperiod$`Percentage of patients seen on time`, na.rm = TRUE), 2), "%")

valueBox(avg, icon = "fa-user-md", caption = "Patients seen on time in Large hospitals", color = "Blue")
```

### Medium hospitals

```{r}
patient_byperiod = hos %>%
  filter(`Peer group` == "Medium metropolitan hospitals") %>%
  group_by(`Time period`)
```
```

```
avg = paste0(round(mean(patient_byperiod$`Percentage of patients seen on time`, na.rm = TRUE), 2), "%")


valueBox(avg, icon = "fa-user-md", caption = "Patients seen on time in Medium hospitals", color = "Blue")
```

Row

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### Average number of admissions into metropolitan hospitals in each State. 

```{r}
hos1 = hos[c(3:5, 7)]

h1 = hos1 %>%
  filter(`Peer group` == "Large metropolitan hospitals" | `Peer group` == "Medium metropolitan hospitals") %>%
  group_by(`Time period`, State) %>%
  summarise(ANP = round(mean(`Number of patients`), 2))


hos_v <- table(h1$`Time period`,
               h1$State,
               dnn = c("Time Period", "State")) %>%
  data.frame()


p3 <- plot_ly(data = hos_v, x = ~h1$`Time period`, y = ~h1$ANP, type = "bar",
              color = ~h1$State, colors = c("#67a9cf","#ef8a62")) %>%
  layout(yaxis = list(zeroline = FALSE, title = "<b>Average number of admissions</b>"),
```

```
      xaxis = list(zeroline = FALSE, title = "<b>Time Period</b>"),
      legend = list(title = list(text = "<b>State</b>")),
      hovermode = "x unified"
      )

p3
```

### Average number of admissions into metropolitan hospitals based on Severity of the patient. 

```{r}
hos2 = hos[c(4:7)]
h2 = hos2 %>%
 filter(`Peer group` == "Large metropolitan hospitals" | `Peer group` == "Medium metropolitan hospitals") %>%
 group_by(`Time period`, `Patient cohort`)%>%
 summarise(ANP = round(mean(`Number of patients`), 2))

hos_v <- table(h2$`Time period`,
           h2$`Patient cohort`,
           dnn = c("Time Period", "Patient cohort")) %>%
 data.frame()

p4 <- plot_ly(data = hos_v, x = ~h2$`Time period`, y = ~h2$ANP, type = "bar",
         color = ~h2$`Patient cohort`, colors = c("#67a9cf","#ef8a62")) %>%

 layout(yaxis = list(zeroline = FALSE, title = "<b>Average number of admissions</b>"),
```

```
      xaxis = list(zeroline = FALSE, title = "<b>Time Period</b>"),
      legend = list(title = list(text = "<b>Severity</b>")),
      hovermode = "x unified"
      )

p4
```

Regional {data-icon="fa-train"}
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Row
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### Large hospitals

```{r}
patient_byperiod = hos %>%
 filter(`Peer group` == "Large regional hospitals") %>%
 group_by(`Time period`)
avg = paste0(round(mean(patient_byperiod$`Percentage of patients seen on time`, na.rm = TRUE), 2), "%")

valueBox(avg, icon = "fa-user-md", caption = "Patients seen on time in Large hospitals", color = "Blue")
```

### Medium hospitals

```{r}

patient_byperiod = hos %>%

 filter(`Peer group` == "Medium regional hospitals") %>%

 group_by(`Time period`)

avg = paste0(round(mean(patient_byperiod$`Percentage of patients seen on time`, na.rm = TRUE), 2), "%")


valueBox(avg, icon = "fa-user-md", caption = "Patients seen on time in Medium hospitals", color = "Blue")

```


Row{data-height=90%}

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### Average number of admissions into regional hospitals in each State. 

```{r}

h3 = hos1 %>%

 filter(`Peer group` == "Large regional hospitals" | `Peer group` == "Medium regional hospitals") %>%

 group_by(`Time period`, State)%>%

 summarise(ANP = round(mean(`Number of patients`), 2))


hos_v <- table(h3$`Time period`,

               h3$State,

               dnn = c("Time Period", "State")) %>%

 data.frame()
```

```
p5 <- plot_ly(data = hos_v, x = ~h3$`Time period`, y = ~h3$ANP, type = "bar",
        color = ~h3$State, colors = c("#67a9cf","#ef8a62")) %>%

 layout(yaxis = list(zeroline = FALSE, title = "<b>Average number of admissions</b>"),
      xaxis = list(zeroline = FALSE, title = "<b>Time Period</b>"),
      legend = list(title = list(text = "<b>State</b>")),
      hovermode = "x unified"
      )

p5
```

### Average number of admissions into regional hospitals based on Severity of the patient. 

```{r}
h4 = hos2 %>%
 filter(`Peer group` == "Large regional hospitals" | `Peer group` == "Medium regional hospitals") %>%
 group_by(`Time period`, `Patient cohort`) %>%
 summarise(ANP = round(mean(`Number of patients`), 2))


hos_v <- table(h4$`Time period`,
        h4$`Patient cohort`,
        dnn = c("Time Period", "Patient cohort")) %>%
 data.frame()
```

```
p6 <- plot_ly(data = hos_v, x = ~h4$`Time period`, y = ~h4$ANP, type = "bar",
        color = ~h4$`Patient cohort`, colors = c("#67a9cf","#ef8a62")) %>%

 layout(yaxis = list(zeroline = FALSE, title = "<b>Average number of admissions</b>"),
      xaxis = list(zeroline = FALSE, title = "<b>Time Period</b>"),
      legend = list(title = list(text = "<b>Severity</b>")),
      hovermode = "x unified"
      )

p6
```

Row{data-height=10%}

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### Data Reference

Data - Data downloads - Australian Institute of Health and Welfare. (2021). Retrieved 9 June 2021, from https://www.aihw.gov.au/reports-data/myhospitals/content/data-downloads

Code - Some code from lectures.

### Australia map References

Spatial data - (2021). Generate an Australian state/territory choropleth in R?. Retrieved 9 June 2021, from https://stackoverflow.com/questions/61228231/generate-an-australian-state-territory-choropleth-in-r

Code - Chapter 7 - Spatial data.