hw5_tdolkar

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10/26/2020

Problem 1.

Worked through the Swirl "Exploratory_Data_Analysis" lesson parts 1-10.

Problem 2.

Created the Rmd file

Problem 3.

```
## getting http://databank.worldbank.org/data/download/Edstats_csv.zip

#read in data, looks like csv dump, blah
data_raw <- read.csv('EdStatsData.csv', sep = ",")
```

```
destroyX = function(es) {
  f = es
  for (i in c(1:length(f))){ #for each value in Year
    if (startsWith(f[i], "X") == TRUE)  { #if starts with 'X' ..
      f[i] <- substr(f[i], 2, 100) #get rid of it
    }
  }
  return(f)
}
```

```
tidy_data <- data_raw %>%
  gather(key = "Year", value = "Data", 5:70)
tidy_data$Year <- destroyX(tidy_data$Year)
tidy_data <- na.omit(tidy_data)
completeDataset_dataPoints <- dim(data_raw)
completeDataset_dataPoints
```

```
## [1] 886930     70
```

```
cleanedDataset_dataPoints <- dim(tidy_data)
cleanedDataset_dataPoints
```

```
## [1] 5082201       6
```

```
chosenCountries <- tidy_data %>%
  filter(Country.Code == "EMU"| Country.Code == "ECS")
summary_stat <- by(chosenCountries, chosenCountries$Indicator.Name, summary)
length(summary_stat)
```

```
## [1] 367
```

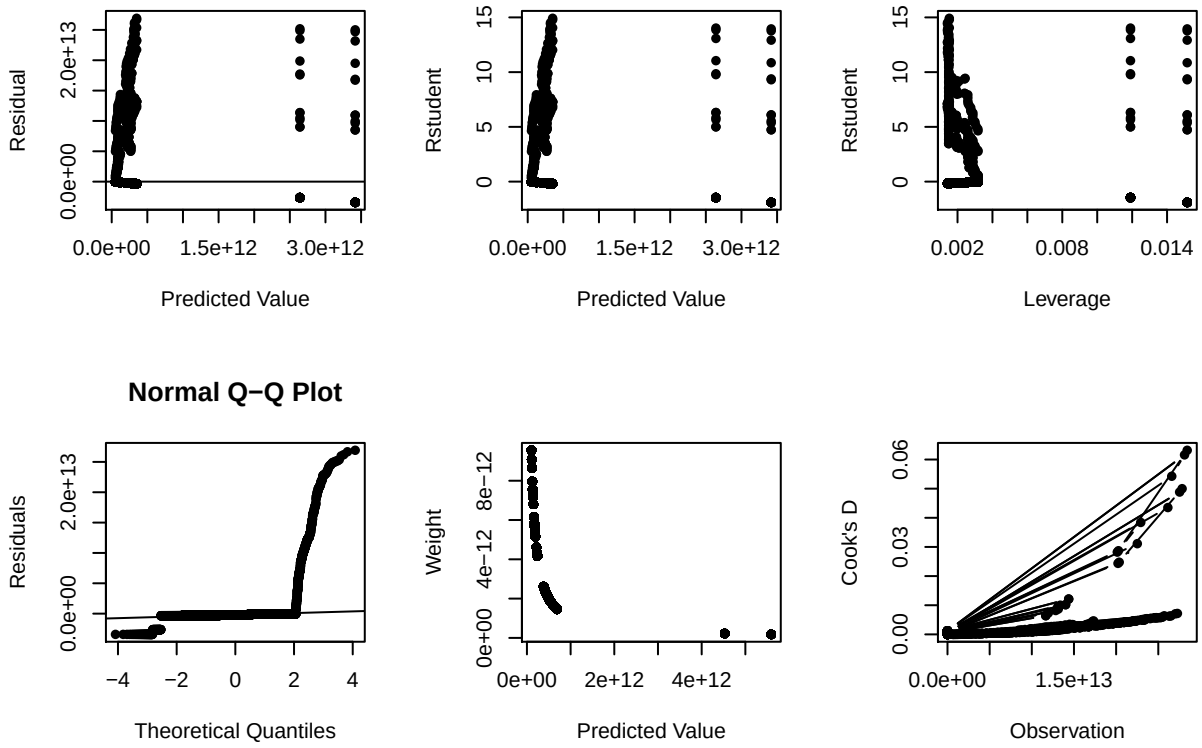
```
head(summary_stat)
```

```
## $`Adjusted net enrolment rate, primary, both sexes (%)`
##  Country.Name       Country.Code       Indicator.Name     Indicator.Code
##  Length:88          Length:88          Length:88          Length:88
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##
##
##
##      Year                Data
##  Length:88          Min.   :93.05
##  Class :character   1st Qu.:95.01
##  Mode  :character   Median :96.72
##                     Mean   :96.41
##                     3rd Qu.:97.51
##                     Max.   :99.35
##
## $`Adjusted net enrolment rate, primary, female (%)`
##  Country.Name       Country.Code       Indicator.Name     Indicator.Code
##  Length:87          Length:87          Length:87          Length:87
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##
##
##
##      Year                Data
##  Length:87          Min.   :92.44
##  Class :character   1st Qu.:94.60
##  Mode  :character   Median :96.73
##                     Mean   :96.31
##                     3rd Qu.:97.36
##                     Max.   :99.43
##
## $`Adjusted net enrolment rate, primary, gender parity index (GPI)`
##  Country.Name       Country.Code       Indicator.Name     Indicator.Code
##  Length:87          Length:87          Length:87          Length:87
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##
##
##
##      Year                Data
##  Length:87          Min.   :0.9810
```

```
##  Class :character   1st Qu.:0.9907
##  Mode  :character   Median :0.9985
##                     Mean   :0.9971
##                     3rd Qu.:1.0040
##                     Max.   :1.0112
##
## $`Adjusted net enrolment rate, primary, male (%)`
##  Country.Name       Country.Code       Indicator.Name     Indicator.Code
##  Length:87          Length:87          Length:87          Length:87
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##
##
##
##      Year                Data
##  Length:87          Min.   :93.64
##  Class :character   1st Qu.:95.30
##  Mode  :character   Median :96.72
##                     Mean   :96.58
##                     3rd Qu.:97.78
##                     Max.   :99.31
##
## $`Adjusted net intake rate to Grade 1 of primary education, both sexes (%)`
##  Country.Name       Country.Code       Indicator.Name     Indicator.Code
##  Length:87          Length:87          Length:87          Length:87
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##
##
##
##      Year                Data
##  Length:87          Min.   :89.44
##  Class :character   1st Qu.:91.62
##  Mode  :character   Median :92.91
##                     Mean   :93.45
##                     3rd Qu.:95.91
##                     Max.   :97.30
##
## $`Adjusted net intake rate to Grade 1 of primary education, female (%)`
##  Country.Name       Country.Code       Indicator.Name     Indicator.Code
##  Length:53          Length:53          Length:53          Length:53
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##
##
##
##      Year                Data
##  Length:53          Min.   :89.56
##  Class :character   1st Qu.:93.80
##  Mode  :character   Median :95.85
##                     Mean   :95.42
##                     3rd Qu.:96.99
##                     Max.   :97.80
```

Problem 4.

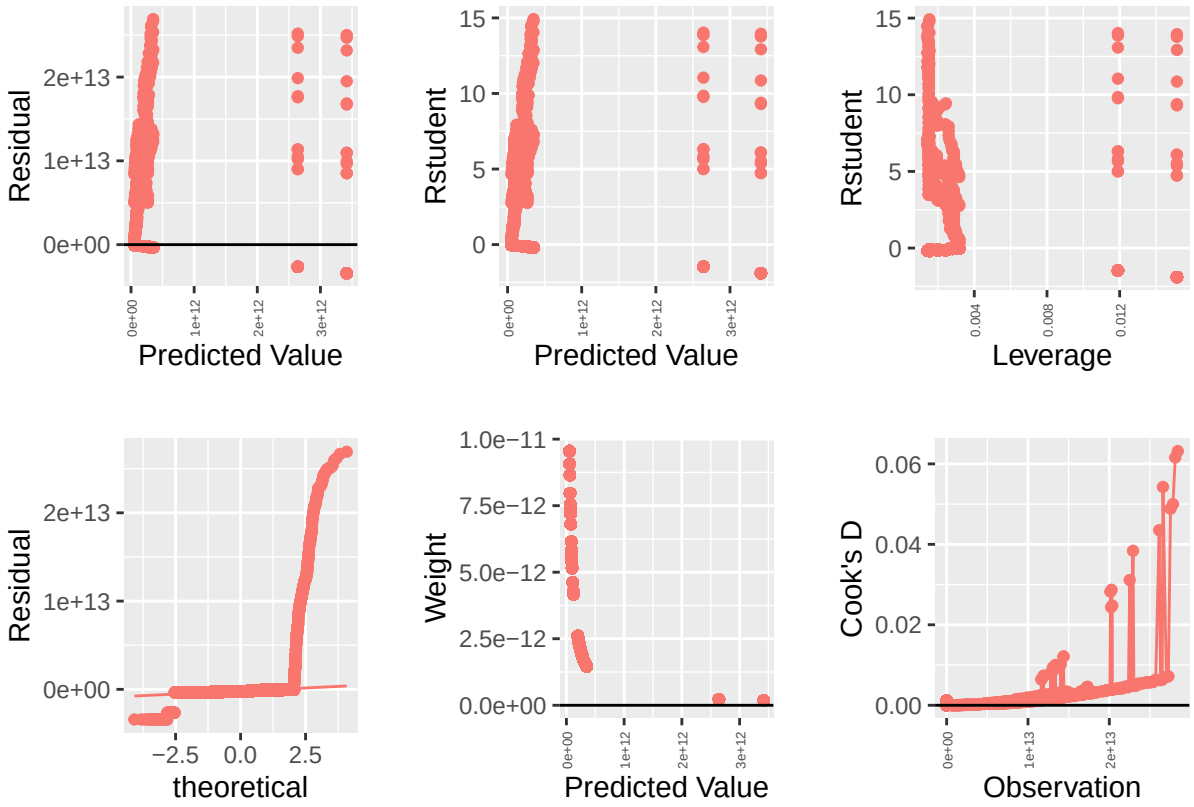
```
options(scipen = 0)
options(digits = 2)

par(mfrow=c(2,3))

lmfit <- lm(chosenCountries$Data ~ chosenCountries$Year)

plot(fitted(lmfit),residuals(lmfit),pch=16,xlab = "Predicted Value", ylab = "Residual")
abline(h = 0)

plot(fitted(lmfit),rstudent(lmfit),pch=16,xlab = "Predicted Value", ylab = "Rstudent")

plot(hatvalues(lmfit), rstudent(lmfit), pch = 16, xlab="Leverage", ylab = "Rstudent")

qqnorm(residuals(lmfit), ylab = "Residuals", pch = 16)
qqline(residuals(lmfit))

lmfitw <- lm(abs(residuals(lmfit)) ~ chosenCountries$Year)
w <- 1/abs(fitted(lmfitw))
yw <- w^0.5*chosenCountries$Data
plot(fitted(lmfitw), w, pch=16, xlab = "Predicted Value", ylab = "Weight")


plot(chosenCountries$Data, cooks.distance(lmfit),pch=16, xlab = "Observation", ylab = "Cook's D", type =
```



Problem 5.

```
p1 <- ggplot(chosenCountries, aes(x=fitted(lmfit), y=residuals(lmfit), color="red")) +
      geom_point() +
      geom_hline(yintercept = 0) +
      labs(x = "Predicted Value", y = "Residual") +
      theme(axis.text.x = element_text(angle = 90, size = 5,
                                       vjust = 0.6),legend.position = "none")

p2 <-ggplot(chosenCountries, aes(x=fitted(lmfit), y=rstudent(lmfit), color="red")) +
     geom_point() +
     labs(x = "Predicted Value", y = "Rstudent") +
     theme(axis.text.x = element_text(angle = 90, size = 5,
                                      vjust = 0.6),legend.position = "none")

p3 <-ggplot(chosenCountries, aes(x=hatvalues(lmfit), y=rstudent(lmfit), color="red")) +
     geom_point() +
     labs(x = "Leverage", y = "Rstudent") +
     theme(axis.text.x = element_text(angle = 90, size = 5,
                                      vjust = 0.6),legend.position = "none")

p4 <-ggplot(chosenCountries, aes(sample=residuals(lmfit), color = "red")) +
     stat_qq() +
     stat_qq_line(line.p = c(0.25, 0.75)) +
```

```
     labs(y = "Residual") +
     theme(legend.position = "none")

p5 <-ggplot(chosenCountries, aes(x=fitted(lmfit), y= w, color="red")) +
     geom_point() +
     geom_hline(yintercept = 0) +
     labs(x = "Predicted Value", y = "Weight") +
     theme(axis.text.x = element_text(angle = 90, size = 5,
                                      vjust = 0.6),legend.position = "none")

p6 <-ggplot(chosenCountries, aes(x=Data, y= cooks.distance(lmfit), color="red")) +
     geom_line() +
     geom_point() +
     geom_hline(yintercept = 0) +
     labs(x = "Observation", y = "Cook's D") +
     theme(axis.text.x = element_text(angle = 90, size = 5,
                                      vjust = 0.6),legend.position = "none")

figure1 <- multi_panel_figure(columns = 3, rows = 2, panel_label_type = "none")
figure1 %<>%
  fill_panel(p1, column = 1, row = 1) %<>%
  fill_panel(p2, column = 2, row = 1) %<>%
  fill_panel(p3, column = 3, row = 1) %<>%
  fill_panel(p4, column = 1, row = 2) %<>%
  fill_panel(p5, column = 2, row = 2) %<>%
  fill_panel(p6, column = 3, row = 2)
figure1
```


Residual
2e+13
1e+13
0e+00
0e+00
1e+12
2e+12
3e+12
Predicted Value
Rstudent
15
10
5
0
0e+00
1e+12
2e+12
3e+12
Predicted Value
Rstudent
15
10
5
0
0.004
0.008
0.012
Leverage
Residual
2e+13
1e+13
0e+00
−2.5
0.0
2.5
theoretical
Weight
1.0e−11
7.5e−12
5.0e−12
2.5e−12
0.0e+00
0e+00
1e+12
2e+12
3e+12
Predicted Value
Cook's D
0.06
0.04
0.02
0.00
0e+00
1e+13
2e+13
Observation