MA615 Assignment1-Li Yuyang

Firstly, mtcars dataset was imported, this dataset has 11 variables and 32 observations. And then data with mpg less than 20 was selected from mtcars to form a new dataset named mtcars_mpg20, which has 5 variables and 18 observations.

In the exploration, I've learned to cloned the github repository to my local folder in R, and upload my R script and R Markdown files to github. Also R Markdown to form PDF and html.

```
library(tidyverse)
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.1 --

## v ggplot2 3.3.5     v purrr   0.3.4
## v tibble  3.1.4     v dplyr   1.0.7
## v tidyr   1.1.3     v stringr 1.4.0
## v readr   2.0.1     v forcats 0.5.1

## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

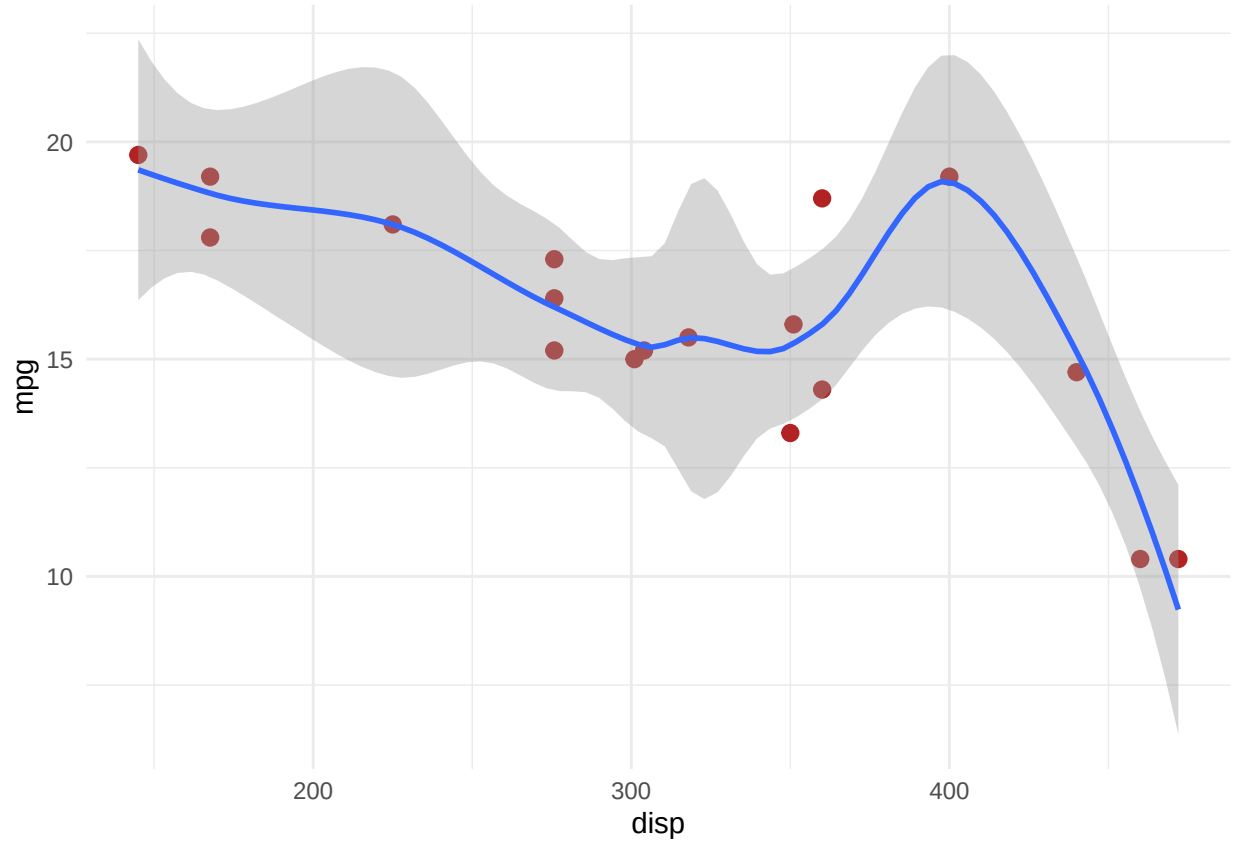
```
# call built-in data mtcars.
data(mtcars)

# Select only car models where mpg<20
mtcars_mpg2 <- mtcars[mtcars$mpg < 20,]


# Reduce the variables to mpg, cyl, disp, hp, gears
mtcars_mpg2 <- mtcars_mpg2[, c(1,2,3,4,10)]

# read the R file hand_functions.R so that it can be used
# notice that with echo = TRUE
source(file = "hand_functions.R", echo = TRUE)
```

```
##
## > sum_special <- function(df_x) {
## +     try(if (!is.data.frame(df_x))
## +         stop("Input data must be a data frame."))
## +     sp_means <- apply(df_ .... [TRUNCATED]
```

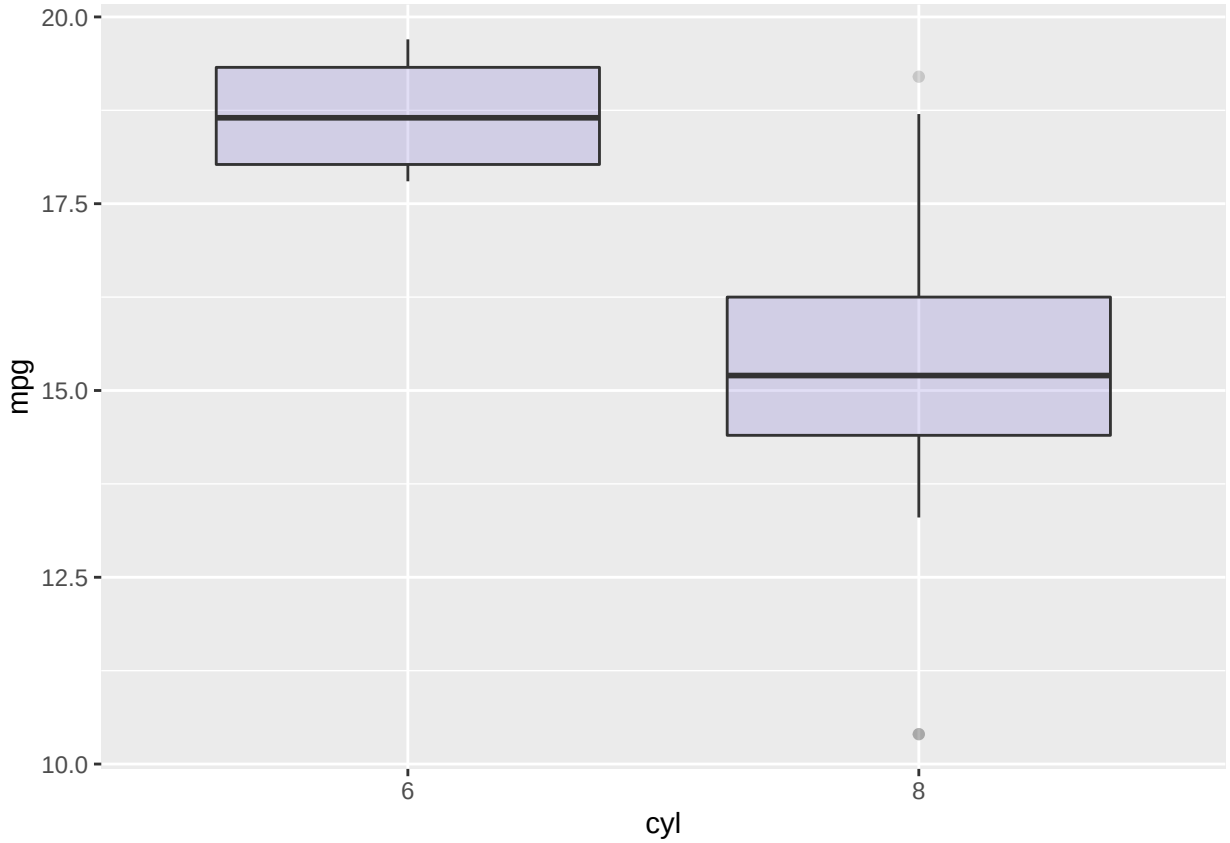
```
# Now use the function from hand_functions.R
#The function of hand_function.R is get the mean, variance, correlation and covariance of input.
sp_out <- sum_special(mtcars_mpg2)
```

```
# library(esquisse)
#
# esquisser(data = mtcars_mpg2, viewer = "browser")


#using ggplot2 to plot a image of mtcars_mpg2 dataset with x is disp in data, y is mgp in data, plot po
ggplot(mtcars_mpg2) +
  aes(x = disp, y = mpg) +
  geom_point(shape = "bullet", size = 4L, colour = "#B22222") +
  geom_smooth(span = 0.5) +
  theme_minimal()
```

```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
```




```
# note that this boxplot cannot be made with esquisse() unless
# the data is adjusted.  What adjustment is needed?

#using ggplot2 to plot a image of mtcars_mpg2 dataset with x is cyl in data, y is mgp in data, draw box
ggplot(mtcars_mpg2, aes(x=as.factor(cyl), y=mpg)) +
  geom_boxplot(fill="slateblue", alpha=0.2) +
  xlab("cyl")
```




```r
sum_special <- function(df_x){

  ## sum_special calculates data summary statistics
  ## the input param df_x is the data frame of input values

  #  browser()  # browser() will start the debugger
               # if the line is uncommented


  ## test the input data to assure that it is a data frame.
  try(if(!is.data.frame(df_x)) stop("Input data must be a data frame."))

  #get the mean variance, covariance and correlation of the input.
  sp_means <- apply(df_x, MARGIN = 2, FUN = mean)
  sp_var <- apply(df_x, MARGIN = 2, FUN = var)
  sp_cov <- cov(df_x)
  sp_cor <- cor(df_x)

  ## Note that defining a list with the
  ## syntax list(list_name = list_content) produces
  ## named list items
  sp_outputs <- list(sp_means=sp_means,
                     sp_var = sp_var,
                     sp_cov = sp_cov,
                     sp_cor = sp_cor)
```

```
  return(sp_outputs)
}
```