ACADGILD

SESSION 7: Basic Statistics

Assignment 1

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1. Problem Statement

1. Histogram for all variables in a dataset **mtcars.** Write a program to create histograms for all columns

2. Check the probability distribution of all variables in **mtcars**.

3. Write a program to create boxplot for all variables.

2. Solution

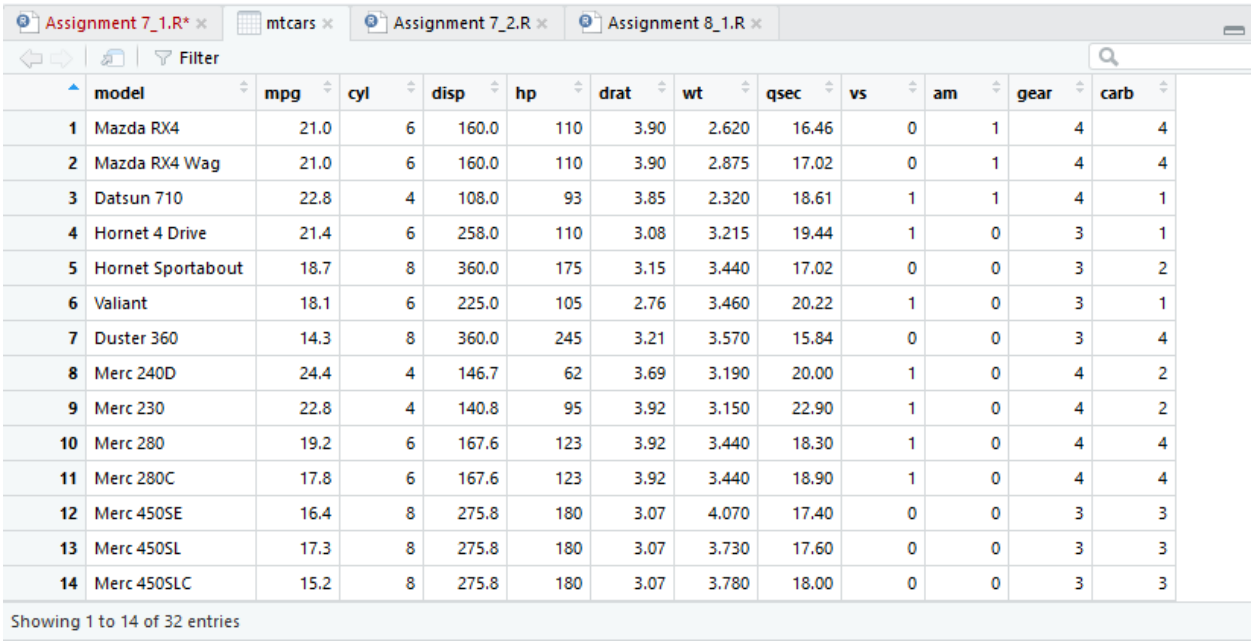
1. Histogram for all variables in a dataset mtcars. Write a program to create histograms for all columns

The R-script for the given problem is as follows:

```
library(readr)
mtcars <- read_csv("E:/munmun_acadgild/acadgild data analytics/supporting files/mtcars.csv")
View(mtcars)
mtcars
str(mtcars)
par(mfrow=c(3,4))          # set the graph area
lapply(mtcars[2:12], hist)   # apply histogram plot function to all column of mtcars
```

The output of the R-Script (from Console window) is given as follows:

The mtcars dataset is shown as follows:


Assignment 7_1.R* | mtcars | Assignment 7_2.R | Assignment 8_1.R

Filter

	model	mpg	cyl	disp	hp	drat	wt	qsec	vs	am	gear	carb
1	Mazda RX4	21.0	6	160.0	110	3.90	2.620	16.46	0	1	4	4
2	Mazda RX4 Wag	21.0	6	160.0	110	3.90	2.875	17.02	0	1	4	4
3	Datsun 710	22.8	4	108.0	93	3.85	2.320	18.61	1	1	4	1
4	Hornet 4 Drive	21.4	6	258.0	110	3.08	3.215	19.44	1	0	3	1
5	Hornet Sportabout	18.7	8	360.0	175	3.15	3.440	17.02	0	0	3	2
6	Valiant	18.1	6	225.0	105	2.76	3.460	20.22	1	0	3	1
7	Duster 360	14.3	8	360.0	245	3.21	3.570	15.84	0	0	3	4
8	Merc 240D	24.4	4	146.7	62	3.69	3.190	20.00	1	0	4	2
9	Merc 230	22.8	4	140.8	95	3.92	3.150	22.90	1	0	4	2
10	Merc 280	19.2	6	167.6	123	3.92	3.440	18.30	1	0	4	4
11	Merc 280C	17.8	6	167.6	123	3.92	3.440	18.90	1	0	4	4
12	Merc 450SE	16.4	8	275.8	180	3.07	4.070	17.40	0	0	3	3
13	Merc 450SL	17.3	8	275.8	180	3.07	3.730	17.60	0	0	3	3
14	Merc 450SLC	15.2	8	275.8	180	3.07	3.780	18.00	0	0	3	3

Showing 1 to 14 of 32 entries

```
> mtcars <- read_csv("E:/munmun_acadgild/acadgild data analytics/supporting
files/mtcars.csv")
Parsed with column specification:
cols(
  model = col_character(),
  mpg = col_double(),
  cyl = col_double(),
  disp = col_double(),
  hp = col_double(),
  drat = col_double(),
  wt = col_double(),
  qsec = col_double(),
  vs = col_double(),
  am = col_double(),
  gear = col_double(),
  carb = col_double()
)
> View(mtcars)
> mtcars
# A tibble: 32 x 12
   model               mpg   cyl  disp    hp  drat    wt  qsec    vs    am
gear  carb
   <chr>             <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
<dbl> <dbl>
 1 Mazda RX4          21       6  160    110  3.9   2.62  16.5     0     1
4     4
 2 Mazda RX4 Wag      21       6  160    110  3.9   2.88  17.0     0     1
4     4
 3 Datsun 710         22.8     4  108     93  3.85  2.32  18.6     1     1
4     1
 4 Hornet 4 Drive     21.4     6  258    110  3.08  3.22  19.4     1     0
3     1
 5 Hornet Sportabout  18.7     8  360    175  3.15  3.44  17.0     0     0
3     2
 6 Valiant            18.1     6  225    105  2.76  3.46  20.2     1     0
3     1
 7 Duster 360         14.3     8  360    245  3.21  3.57  15.8     0     0
3     4
 8 Merc 240D          24.4     4  147.    62  3.69  3.19  20       1     0
4     2
 9 Merc 230           22.8     4  141.    95  3.92  3.15  22.9     1     0
4     2
10 Merc 280           19.2     6  168.   123  3.92  3.44  18.3     1     0
4     4
# ... with 22 more rows
> str(mtcars)
Classes ‘spec_tbl_df’, ‘tbl_df’, ‘tbl’ and 'data.frame':    32 obs. of  12
variables:
 $ model: chr  "Mazda RX4" "Mazda RX4 Wag" "Datsun 710" "Hornet 4 Drive" ...
 $ mpg  : num  21 21 22.8 21.4 18.7 18.1 14.3 24.4 22.8 19.2 ...
 $ cyl  : num  6 6 4 6 8 6 8 4 4 6 ...
 $ disp : num  160 160 108 258 360 ...
 $ hp   : num  110 110 93 110 175 105 245 62 95 123 ...
 $ drat : num  3.9 3.9 3.85 3.08 3.15 2.76 3.21 3.69 3.92 3.92 ...
 $ wt   : num  2.62 2.88 2.32 3.21 3.44 ...
 $ qsec : num  16.5 17 18.6 19.4 17 ...
```

```
 $ vs   : num  0 0 1 1 0 1 0 1 1 1 ...
 $ am   : num  1 1 1 0 0 0 0 0 0 0 ...
 $ gear : num  4 4 4 3 3 3 3 4 4 4 ...
 $ carb : num  4 4 1 1 2 1 4 2 2 4 ...
 - attr(*, "spec")=
  .. cols(
  ..   model = col_character(),
  ..   mpg = col_double(),
  ..   cyl = col_double(),
  ..   disp = col_double(),
  ..   hp = col_double(),
  ..   drat = col_double(),
  ..   wt = col_double(),
  ..   qsec = col_double(),
  ..   vs = col_double(),
  ..   am = col_double(),
  ..   gear = col_double(),
  ..   carb = col_double()
  .. )
```

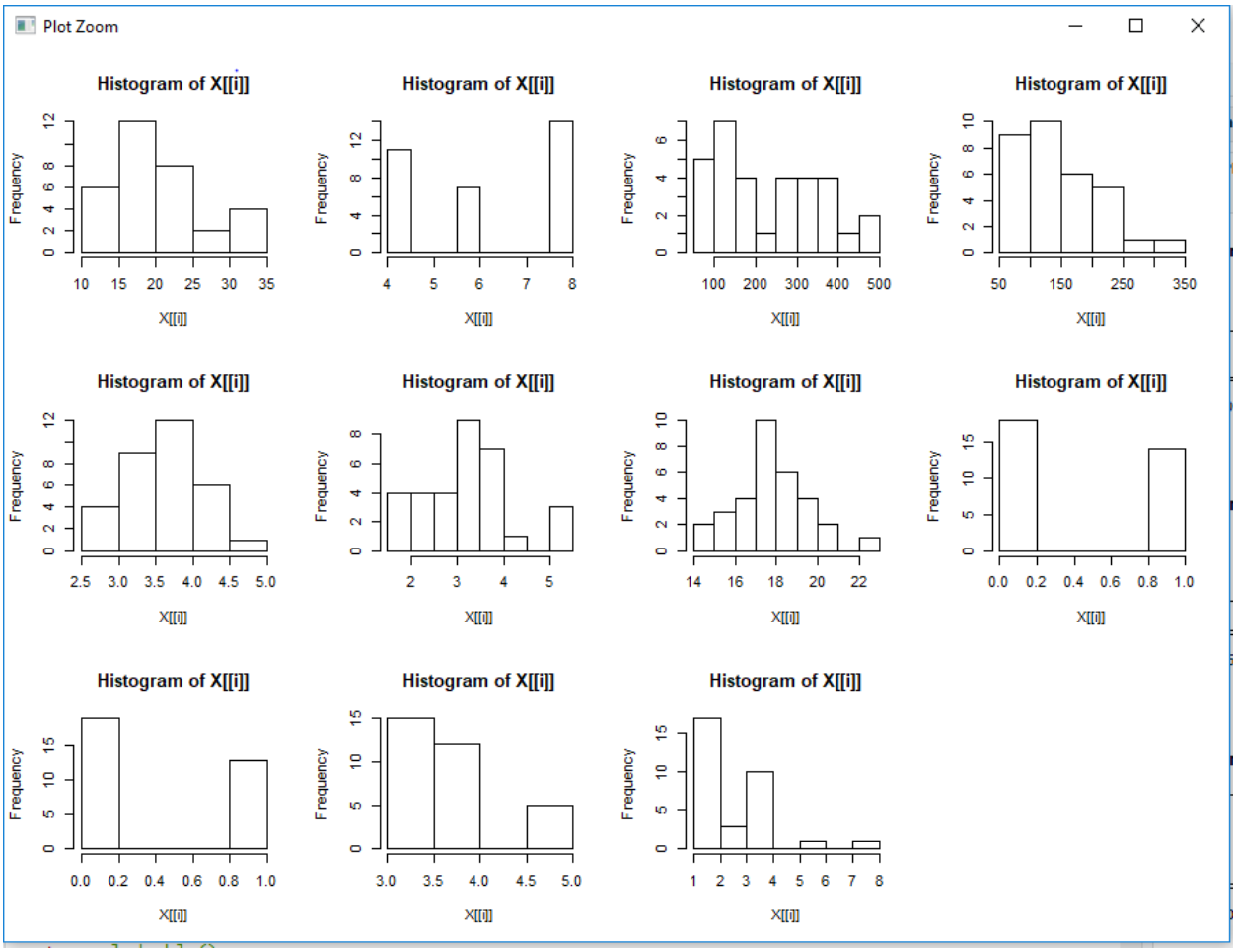
```
> par(mfrow=c(3,4))            # set the graph area
> lapply(mtcars[2:12], hist)   # apply histogram plot function to all column
of mtcars
$`mpg`
$`breaks`
[1] 10 15 20 25 30 35

$counts
[1]  6 12  8  2  4

$density
[1] 0.0375 0.0750 0.0500 0.0125 0.0250

$mids
[1] 12.5 17.5 22.5 27.5 32.5

$xname
[1] "X[[i]]"

$equidist
[1] TRUE

attr(,"class")
[1] "histogram"

$cyl
$`breaks`
[1] 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0

$counts
[1] 11  0  0  7  0  0  0 14

$density
[1] 0.6875 0.0000 0.0000 0.4375 0.0000 0.0000 0.0000 0.8750

$mids
```

```
[1] 4.25 4.75 5.25 5.75 6.25 6.75 7.25 7.75

$xname
[1] "X[[i]]"

$equidist
[1] TRUE

attr(,"class")
[1] "histogram"

$disp
$`breaks`
 [1]  50 100 150 200 250 300 350 400 450 500

$counts
[1] 5 7 4 1 4 4 4 1 2

$density
[1] 0.003125 0.004375 0.002500 0.000625 0.002500 0.002500 0.002500 0.000625
0.001250

$mids
[1]  75 125 175 225 275 325 375 425 475

$xname
[1] "X[[i]]"

$equidist
[1] TRUE

attr(,"class")
[1] "histogram"

$hp
$`breaks`
[1]  50 100 150 200 250 300 350

$counts
[1]  9 10  6  5  1  1

$density
[1] 0.005625 0.006250 0.003750 0.003125 0.000625 0.000625

$mids
[1]  75 125 175 225 275 325

$xname
[1] "X[[i]]"

$equidist
[1] TRUE

attr(,"class")
[1] "histogram"
```

```
$drat
$`breaks`
[1] 2.5 3.0 3.5 4.0 4.5 5.0

$counts
[1]  4  9 12  6  1

$density
[1] 0.2500 0.5625 0.7500 0.3750 0.0625

$mids
[1] 2.75 3.25 3.75 4.25 4.75

$xname
[1] "X[[i]]"

$equidist
[1] TRUE

attr(,"class")
[1] "histogram"

$wt
$`breaks`
[1] 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5

$counts
[1] 4 4 4 9 7 1 0 3

$density
[1] 0.2500 0.2500 0.2500 0.5625 0.4375 0.0625 0.0000 0.1875

$mids
[1] 1.75 2.25 2.75 3.25 3.75 4.25 4.75 5.25

$xname
[1] "X[[i]]"

$equidist
[1] TRUE

attr(,"class")
[1] "histogram"

$qsec
$`breaks`
 [1] 14 15 16 17 18 19 20 21 22 23

$counts
[1]  2  3  4 10  6  4  2  0  1

$density
[1] 0.06250 0.09375 0.12500 0.31250 0.18750 0.12500 0.06250 0.00000 0.03125

$mids
[1] 14.5 15.5 16.5 17.5 18.5 19.5 20.5 21.5 22.5
```

```
$xname
[1] "X[[i]]"

$equidist
[1] TRUE

attr(,"class")
[1] "histogram"

$vs
$`breaks`
[1] 0.0 0.2 0.4 0.6 0.8 1.0

$counts
[1] 18  0  0  0 14

$density
[1] 2.8125 0.0000 0.0000 0.0000 2.1875

$mids
[1] 0.1 0.3 0.5 0.7 0.9

$xname
[1] "X[[i]]"

$equidist
[1] TRUE

attr(,"class")
[1] "histogram"

$am
$`breaks`
[1] 0.0 0.2 0.4 0.6 0.8 1.0

$counts
[1] 19  0  0  0 13

$density
[1] 2.96875 0.00000 0.00000 0.00000 2.03125

$mids
[1] 0.1 0.3 0.5 0.7 0.9

$xname
[1] "X[[i]]"

$equidist
[1] TRUE

attr(,"class")
[1] "histogram"

$gear
$`breaks`
```

```
[1] 3.0 3.5 4.0 4.5 5.0

$counts
[1] 15 12  0  5

$density
[1] 0.9375 0.7500 0.0000 0.3125

$mids
[1] 3.25 3.75 4.25 4.75

$xname
[1] "X[[i]]"

$equidist
[1] TRUE

attr(,"class")
[1] "histogram"

$carb
$`breaks`
[1] 1 2 3 4 5 6 7 8

$counts
[1] 17  3 10  0  1  0  1

$density
[1] 0.53125 0.09375 0.31250 0.00000 0.03125 0.00000 0.03125

$mids
[1] 1.5 2.5 3.5 4.5 5.5 6.5 7.5

$xname
[1] "X[[i]]"

$equidist
[1] TRUE

attr(,"class")
[1] "histogram"
```

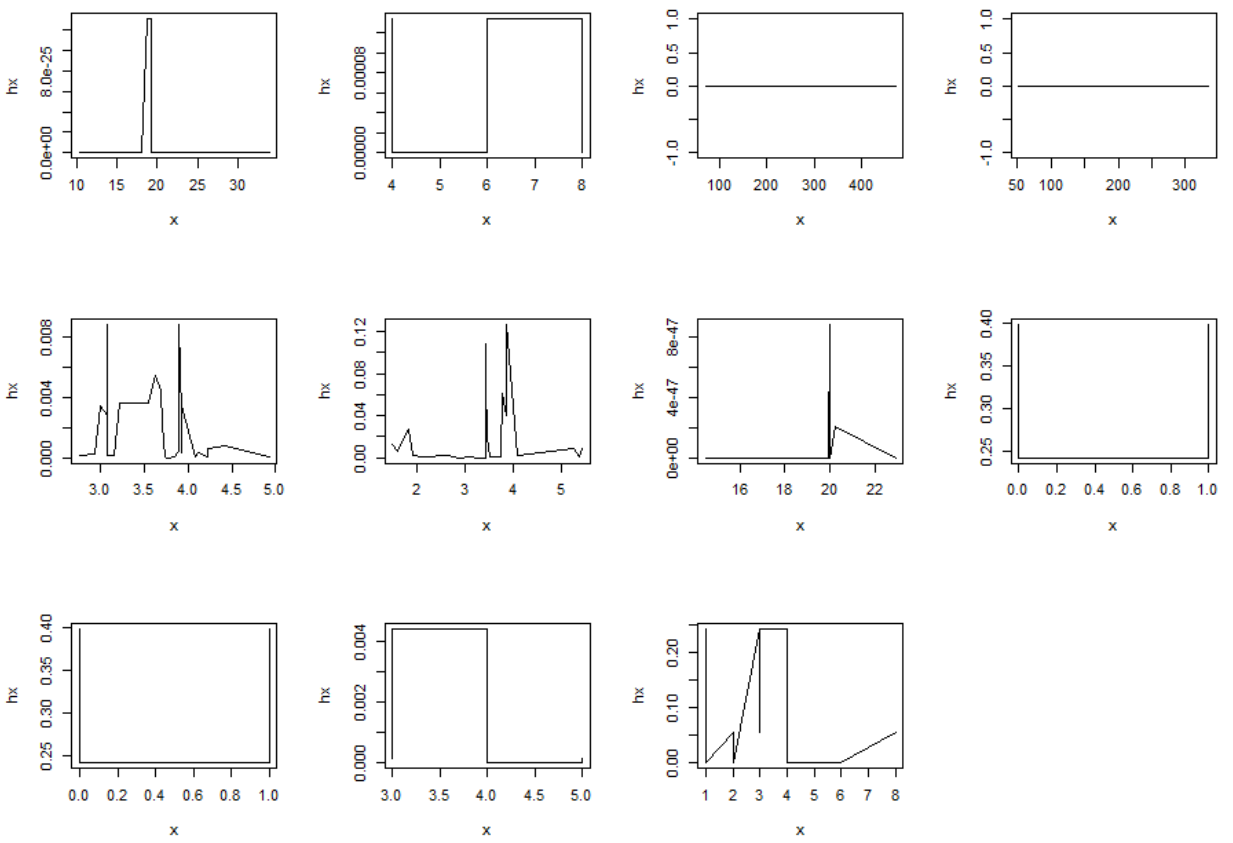


2. Check the probability distribution of all variables in mtcars.

The R-script for the given problem is as follows:

```
par(mfrow=c(3,4))          # set the graph area
# writing a function to plot probability
prob <- function(prob){
x <- sort(prob)
hx <- dnorm(prob)
p <- plot(x, hx, type="l")
}

lapply(mtcars[2:12], prob)   # applying the function to all the columns
```

The output of the R-Script (from Console window/Plot window) is given as follows:



3. Write a program to create boxplot for all variables.

The R-script for the given problem is as follows:

```
par(mfrow=c(3,4))
lapply(mtcars[2:12], boxplot)   # applying the function to all the columns
```

The output of the R-Script (from Console window/Plot window) is given as follows:

```
> par(mfrow=c(3,4))
>
> lapply(mtcars[2:12], boxplot)   # applying the function to all the columns
$`mpg`
$`mpg`$`stats`
      [,1]
[1,] 10.40
[2,] 15.35
[3,] 19.20
[4,] 22.80
[5,] 33.90

$`mpg`$n
[1] 32

$`mpg`$conf
         [,1]
[1,] 17.11916
```

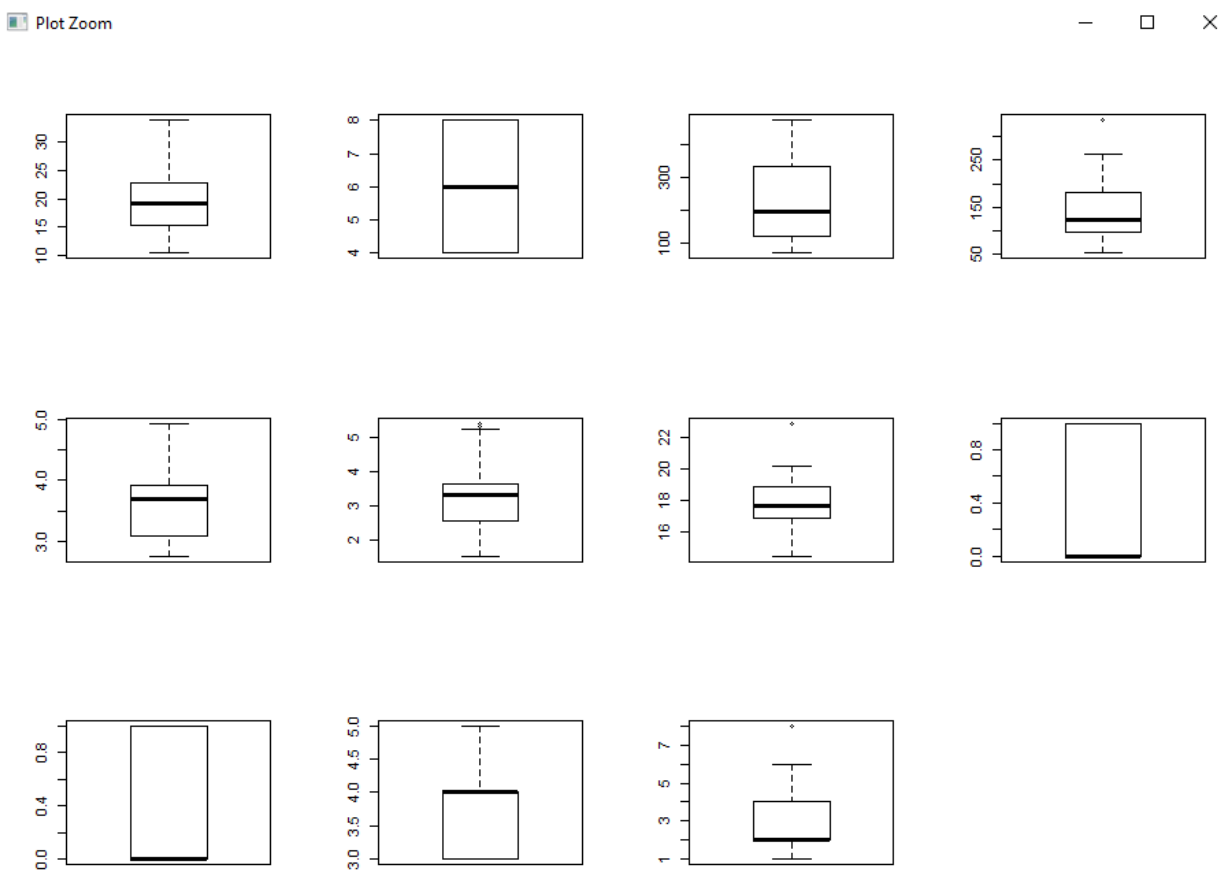
```
[2,] 21.28084

$`mpg`$out
numeric(0)

$`mpg`$group
numeric(0)

$`mpg`$names
[1] "1"


$cyl
$cyl$`stats`
     [,1]
[1,]    4
[2,]    4
[3,]    6
[4,]    8
[5,]    8

$cyl$n
[1] 32

$cyl$conf
         [,1]
[1,] 4.882771
[2,] 7.117229

$cyl$out
numeric(0)

$cyl$group
numeric(0)

$cyl$names
[1] "1"


$disp
$disp$`stats`
       [,1]
[1,]  71.10
[2,] 120.65
[3,] 196.30
[4,] 334.00
[5,] 472.00

$disp$n
[1] 32

$disp$conf
         [,1]
[1,] 136.7098
[2,] 255.8902
```

```
$disp$out
numeric(0)

$disp$group
numeric(0)

$disp$names
[1] "1"


$hp
$hp$`stats`
     [,1]
[1,]   52
[2,]   96
[3,]  123
[4,]  180
[5,]  264

$hp$n
[1] 32

$hp$conf
         [,1]
[1,]  99.5382
[2,] 146.4618

$hp$out
[1] 335

$hp$group
[1] 1

$hp$names
[1] "1"


$drat
$drat$`stats`
      [,1]
[1,] 2.760
[2,] 3.080
[3,] 3.695
[4,] 3.920
[5,] 4.930

$drat$n
[1] 32

$drat$conf
         [,1]
[1,] 3.460382
[2,] 3.929618

$drat$out
numeric(0)
```

```
$drat$group
numeric(0)

$drat$names
[1] "1"


$wt
$wt$`stats`
       [,1]
[1,] 1.5130
[2,] 2.5425
[3,] 3.3250
[4,] 3.6500
[5,] 5.2500

$wt$n
[1] 32

$wt$conf
         [,1]
[1,] 3.015667
[2,] 3.634333

$wt$out
[1] 5.424 5.345

$wt$group
[1] 1 1

$wt$names
[1] "1"


$qsec
$qsec$`stats`
       [,1]
[1,] 14.500
[2,] 16.885
[3,] 17.710
[4,] 18.900
[5,] 20.220

$qsec$n
[1] 32

$qsec$conf
        [,1]
[1,] 17.1472
[2,] 18.2728

$qsec$out
[1] 22.9

$qsec$group
```

```
[1] 1

$qsec$names
[1] "1"


$vs
$vs$`stats`
     [,1]
[1,]    0
[2,]    0
[3,]    0
[4,]    1
[5,]    1

$vs$n
[1] 32

$vs$conf
           [,1]
[1,] -0.2793072
[2,]  0.2793072

$vs$out
numeric(0)

$vs$group
numeric(0)

$vs$names
[1] "1"


$am
$am$`stats`
     [,1]
[1,]    0
[2,]    0
[3,]    0
[4,]    1
[5,]    1

$am$n
[1] 32

$am$conf
           [,1]
[1,] -0.2793072
[2,]  0.2793072

$am$out
numeric(0)

$am$group
numeric(0)
```

```
$am$names
[1] "1"


$gear
$gear$`stats`
     [,1]
[1,]    3
[2,]    3
[3,]    4
[4,]    4
[5,]    5

$gear$n
[1] 32

$gear$conf
         [,1]
[1,] 3.720693
[2,] 4.279307

$gear$out
numeric(0)

$gear$group
numeric(0)

$gear$names
[1] "1"


$carb
$carb$`stats`
     [,1]
[1,]    1
[2,]    2
[3,]    2
[4,]    4
[5,]    6

$carb$n
[1] 32

$carb$conf
         [,1]
[1,] 1.441386
[2,] 2.558614

$carb$out
[1] 8

$carb$group
[1] 1

$carb$names
[1] "1"
```


Plot Zoom