ACADGILD

SESSION 7: Basic Statistics

Assignment 2

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2. Solution

1. Write a program to create barplots for all the categorical columns in mtcars.

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

```
library(readr)
library(ggplot2)
mtcars <- read_csv("E:/munmun_acadgild/acadgild data analytics/supporting
files/mtcars.csv")
View(mtcars)
mtcars
str(mtcars)
# change the categorical variables to factor
library(dplyr)
mtcars1 <- mutate(mtcars,
                  cyl = as.factor(cyl),
                  disp = as.factor(disp),
                  vs = as.factor(vs),
                  am = as.factor(am),
                  gear = as.factor(gear),
                  carb = as.factor(carb))
str(mtcars1)

is.fact <- sapply(mtcars1, is.factor)
mtcars2 <- mtcars1[,is.fact]   # creating dataframe of only factor class of variables

str(mtcars2)                # check structure
par(mfrow= c(2,3))            # Set plot area
lapply(lapply(mtcars2[,1:5], table), barplot)  # barplots for categorical variables
```

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

```
> library(readr)
> library(ggplot2)
> 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()
  .. )
> library(dplyr)

Attaching package: ‘dplyr’

The following objects are masked from ‘package:stats’:

    filter, lag

The following objects are masked from ‘package:base’:

    intersect, setdiff, setequal, union

> mtcars1 <- mutate(mtcars,
+                   cyl = as.factor(cyl),
+                   disp = as.factor(disp),
```

```
+                   vs = as.factor(vs),
+                   am = as.factor(am),
+                   gear = as.factor(gear),
+                   carb = as.factor(carb))
> str(mtcars1)
Classes ‘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  : Factor w/ 3 levels "4","6","8": 2 2 1 2 3 2 3 1 1 2 ...
 $ disp : Factor w/ 27 levels "71.1","75.7",..: 13 13 6 16 23 15 23 12 10 14
...
 $ 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   : Factor w/ 2 levels "0","1": 1 1 2 2 1 2 1 2 2 2 ...
 $ am   : Factor w/ 2 levels "0","1": 2 2 2 1 1 1 1 1 1 1 ...
 $ gear : Factor w/ 3 levels "3","4","5": 2 2 2 1 1 1 1 2 2 2 ...
 $ carb : Factor w/ 6 levels "1","2","3","4",..: 4 4 1 1 2 1 4 2 2 4 ...
> is.fact <- sapply(mtcars1, is.factor)  # checking the categorical variables
> mtcars2 <- mtcars1[,is.fact]   # creating dataframe of only factor class of
variables
> str(mtcars2)                   # check structure
Classes ‘tbl_df’, ‘tbl’ and 'data.frame':    32 obs. of  6 variables:
 $ cyl : Factor w/ 3 levels "4","6","8": 2 2 1 2 3 2 3 1 1 2 ...
 $ disp: Factor w/ 27 levels "71.1","75.7",..: 13 13 6 16 23 15 23 12 10 14
...
 $ vs  : Factor w/ 2 levels "0","1": 1 1 2 2 1 2 1 2 2 2 ...
 $ am  : Factor w/ 2 levels "0","1": 2 2 2 1 1 1 1 1 1 1 ...
 $ gear: Factor w/ 3 levels "3","4","5": 2 2 2 1 1 1 1 2 2 2 ...
 $ carb: Factor w/ 6 levels "1","2","3","4",..: 4 4 1 1 2 1 4 2 2 4 ...
> par(mfrow= c(2,3))             # Set plot area
>
> lapply(lapply(mtcars2[,1:6], table), barplot)  # barplots for categorical
variables
$`cyl`
     [,1]
[1,]  0.7
[2,]  1.9
[3,]  3.1

$disp
      [,1]
 [1,]  0.7
 [2,]  1.9
 [3,]  3.1
 [4,]  4.3
 [5,]  5.5
 [6,]  6.7
 [7,]  7.9
 [8,]  9.1
 [9,] 10.3
[10,] 11.5
[11,] 12.7
[12,] 13.9
[13,] 15.1
```

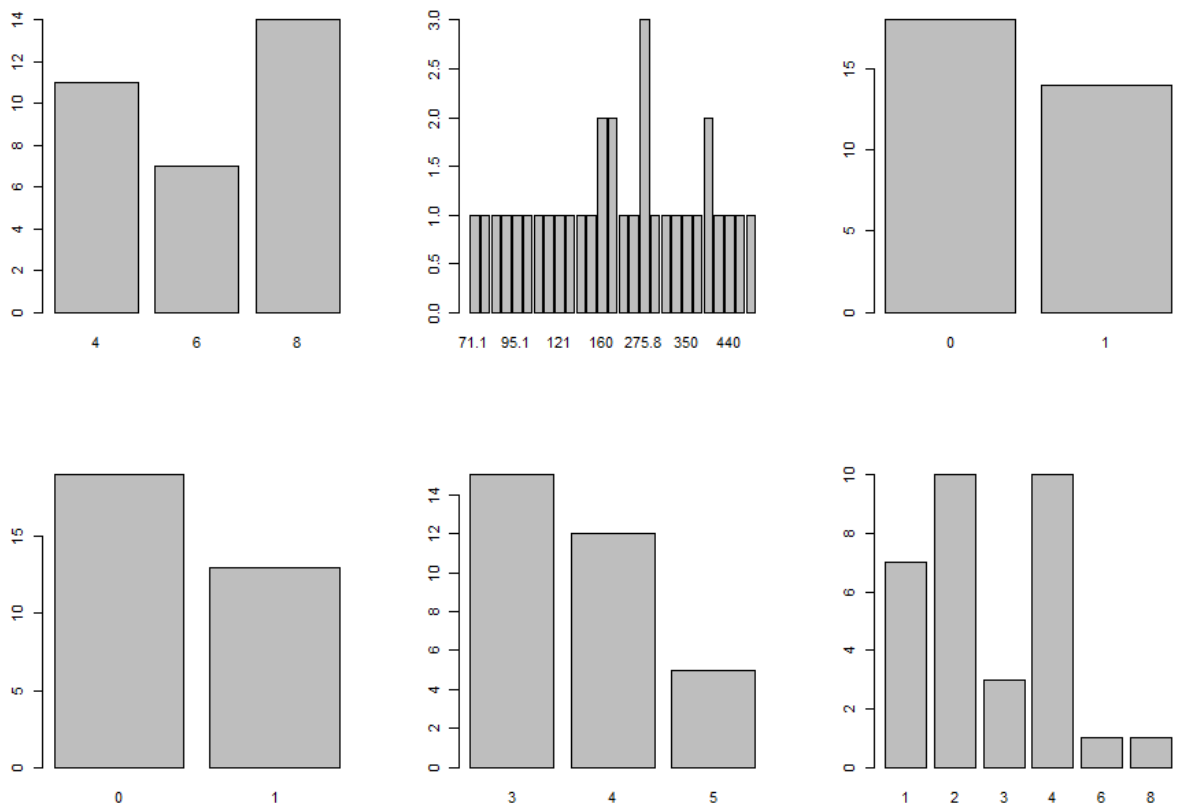
```
[14,] 16.3
[15,] 17.5
[16,] 18.7
[17,] 19.9
[18,] 21.1
[19,] 22.3
[20,] 23.5
[21,] 24.7
[22,] 25.9
[23,] 27.1
[24,] 28.3
[25,] 29.5
[26,] 30.7
[27,] 31.9

$vs
     [,1]
[1,]  0.7
[2,]  1.9

$am
     [,1]
[1,]  0.7
[2,]  1.9

$gear
     [,1]
[1,]  0.7
[2,]  1.9
[3,]  3.1

$carb
     [,1]
[1,]  0.7
[2,]  1.9
[3,]  3.1
[4,]  4.3
[5,]  5.5
[6,]  6.7
```



2. Create a scatterplot matrix by gear types in mtcars dataset.

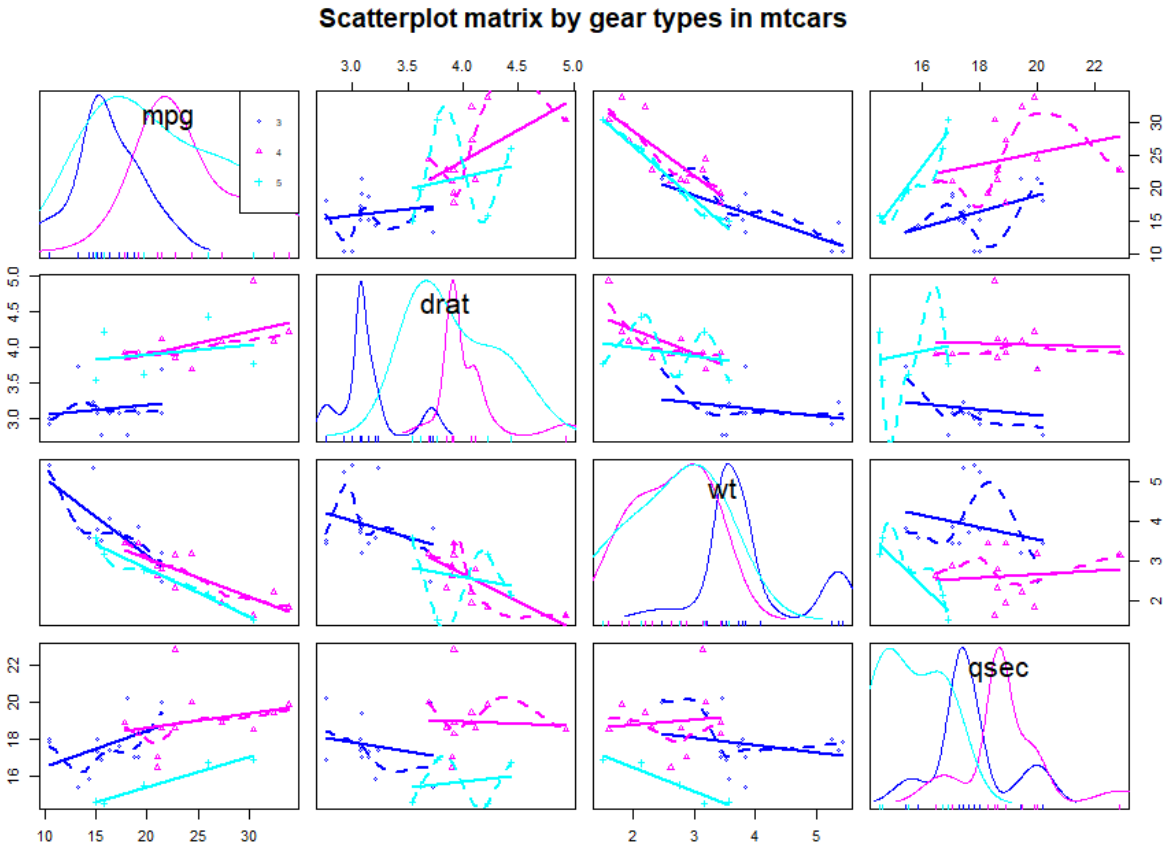
The R-script for the given problem is as follows:

```
library(car)
str(mtcars)
scatterplotMatrix(~mpg+drat+wt+qsec|gear, data=mtcars,main="Scatterplot matrix by gear types in mtcars")
```

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

```
> library(car)
> 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()
.. )
> scatterplotMatrix(~mpg+drat+wt+qsec|gear, data=mtcars,main="Scatterplot
matrix by gear types in mtcars")
```



3. Write a program to create a plot density by class variable

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

```
par(mfrow = c(1,1))
x <- mtcars$mpg
h <- hist(x, breaks = 10, col = "pink",
        xlab = "MPG",
        main = "Density plot of mpg")       # plot histogram of the object
xfit <- seq(min(x), max(x), length = 40)      # create 40 points on x axis
yfit <- dnorm(xfit, mean = mean(x), sd= sd(x)) # normal plot of xfit
yfit <- yfit*diff(h$mids[1:2]*length(x))      # mids of the histogram with changing x
lines(xfit, yfit, col="Blue", lwd = 3)        # line plot for xfit and yfit
```

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

```
> par(mfrow = c(1,1))
> x <- mtcars$mpg          # assign mpg to a object
> h <- hist(x, breaks = 10, col = "pink",
+           xlab = "MPG",
+           main = "Density plot of mpg")        # plot histogram of the
object
> xfit <- seq(min(x), max(x), length = 40)       # create 40 points on x axis
> yfit <- dnorm(xfit, mean = mean(x), sd= sd(x)) # normal plot of xfit
> yfit <- yfit*diff(h$mids[1:2]*length(x))       # mids of the histogram with
changing x
> lines(xfit, yfit, col="Blue", lwd = 3)         # line plot for xfit and
yfit
```