

2.1.4 Generate Automated Reports

■ To generate automated reports in R, first we have to install the package ‘rmarkdown’ in RStudio from ‘Tools → Install Packages’, type ‘rmarkdown’ in packages from ‘Repository(CRAN)’ with ‘Install dependencies’.

- ▶ Go to ‘File → New File → R Markdown → Document → HTML’, save the file as ‘Report1’. The file extension is ‘.Rmd’.
- ▶ Click ‘knit’ button to compile. It will open a different window where you can see the default report (Open in browser is also available). Note that, instead of HTML, you can save other file formats (e.g. pdf, word) also.
- ▶ RStudio has a default report format (see Fig. 2.1). Now you can edit the file ‘Report1.Rmd’ to modify the report.

Untitled

R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.

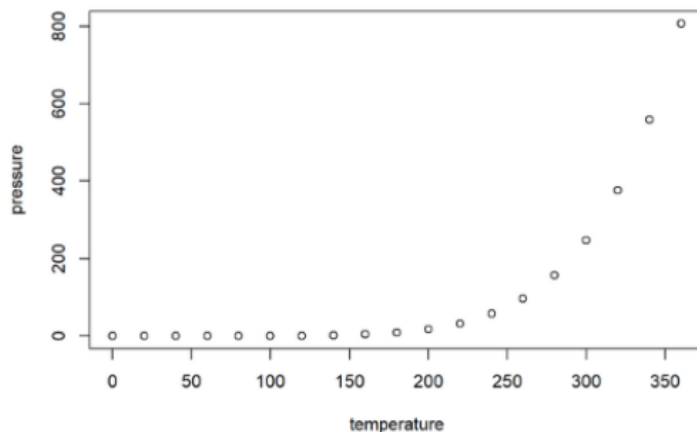
When you click the Knit button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
summary(cars)
```

```
##      speed      dist
## Min.   : 4.0   Min.   : 2.00
## 1st Qu.:12.0   1st Qu.: 26.00
## Median :15.0   Median : 36.00
## Mean   :15.4   Mean   : 42.98
## 3rd Qu.:19.0   3rd Qu.: 56.00
## Max.   :25.0   Max.   :120.00
```

Including Plots

You can also embed plots, for example:



Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.

Figure 2.1: Default R Markdown Report.

Example 2.11. Using R Markdown write down a file name 'Report1.Rmd' which gives the output below.

Skill Enhancement Elective Course By Dr. S. Rana

The Interface is R Markdown

Your Introduction. For more details of my social networking chain, please see my facebook account <https://www.facebook.com/> and my Twitter account <https://www.twitter.com/>.

In this course, we are learning **R Programming** and it has a nice feature named **R Markdown**. Using that package, we can easily generate a document that includes **R Code**, **Report Writing** and the **R Output**. Here I will describe a step by step process to write a report in **R Markdown**.

There are several inbuilt data in R, one of them is 'mtcars'. So you can go to **R Console** and type 'mtcars'. Then you will see the data below with 32 Rows and 11 Columns. First few rows are shown here with the command 'head(mtcars)'.

```
head(mtcars)
```

##	mpg	cyl	disp	hp	drat	wt	qsec	vs	am	gear	carb
## Mazda RX4	21.0	6	160	110	3.90	2.620	16.46	0	1	4	4
## Mazda RX4 Wag	21.0	6	160	110	3.90	2.875	17.02	0	1	4	4
## Datsun 710	22.8	4	108	93	3.85	2.320	18.61	1	1	4	1
## Hornet 4 Drive	21.4	6	258	110	3.08	3.215	19.44	1	0	3	1
## Hornet Sportabout	18.7	8	360	175	3.15	3.440	17.02	0	0	3	2
## Valiant	18.1	6	225	105	2.76	3.460	20.22	1	0	3	1

Here second and last four columns are categorical variables and we will discard those columns and save the data in a new variable name 'A'. First few rows are shown here with the command 'head(A)'.

```
A = mtcars[,c(1,3,4,5,6,7)]
head(A)
```

##	mpg	disp	hp	drat	wt	qsec
## Mazda RX4	21.0	160	110	3.90	2.620	16.46
## Mazda RX4 Wag	21.0	160	110	3.90	2.875	17.02
## Datsun 710	22.8	108	93	3.85	2.320	18.61
## Hornet 4 Drive	21.4	258	110	3.08	3.215	19.44
## Hornet Sportabout	18.7	360	175	3.15	3.440	17.02
## valiant	18.1	225	105	2.76	3.460	20.22

Here the data A have 6 columns and 32 rows. If you write A in the console, you will be able to visualize the whole data. However, here we will compute the **correlation matrix (R)** using that data A.

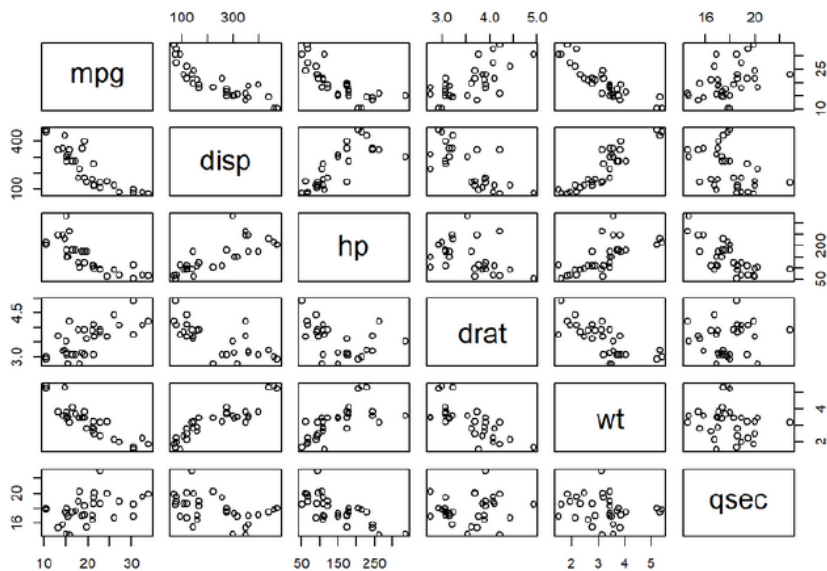
```
R = cor(A)
R
```

##	mpg	disp	hp	drat	wt	qsec
## mpg	1.0000000	-0.8475514	-0.7761684	0.6811719	-0.8676594	0.4186840
## disp	-0.8475514	1.0000000	0.7909486	-0.7102139	0.8879799	-0.4336978
## hp	-0.7761684	0.7909486	1.0000000	-0.4487591	0.6587479	-0.7082233
## drat	0.6811719	-0.7102139	-0.4487591	1.0000000	-0.7124406	0.0912047
## wt	-0.8676594	0.8879799	0.6587479	-0.7124406	1.0000000	-0.1747158
## qsec	0.4186840	-0.4336979	-0.7082234	0.0912047	-0.1747159	1.0000000

Next, we will draw the **scatterplot matrix** using the data A.

Figure 2.2: R Markdown Report Output (Part I).

```
pairs(A)
```



Here the data **A** have six columns and we will also compute the **variance covariance matrix (V)** using that data. We also use `[r, echo=FALSE]` to hide the **R Code**.

```
##          mpg          disp          hp          drat          wt          qsec
## mpg    36.324103  -633.09721  -320.73206   2.19506351  -5.1166847   4.50914919
## disp  -633.097208 15360.79983  6721.15867  -47.06401915  107.6842040  -96.05168145
## hp    -320.732056  6721.15867  4700.86694  -16.45110887  44.1926613  -86.77008065
## drat   2.195064   -47.06402  -16.45111   0.28588135  -0.3727207   0.08714073
## wt    -5.116685   107.68420   44.19266  -0.37272073   0.9573790  -0.30548161
## qsec   4.509149  -96.05168  -86.77008   0.08714073  -0.3054816   3.19316613
```

Figure 2.3: R Markdown Report Output (Part II).

► **R Code**: The R Markdown code (‘.Rmd’) is below.

```
1 ---
2 title: "Skill Enhancement Elective Course By Dr. S. Rana"
3 output:
4   html_document: default
5   pdf_document: default
6 ---
7
8 ---{r setup, include=FALSE}
9 knitr::opts_chunk$set(echo = TRUE)
10 ---
11
12 ## The Interface is R Markdown
13
14 Your Introduction. For more details of my social networking chain, please see my
15 facebook account <https://www.facebook.com/> and my Twitter account
16 <https://www.twitter.com/>.
17
18 In this course, we are learning R Programming and it has a nice feature named R
19 Markdown. Using that package, we can easily generate a document that includes R
20 Code, Report Writing and the R Output. Here I will describe a step by step
21 process to write a report in R Markdown.
```

```

18 There are several inbuilt data in R, one of them is 'mtcars'. So you can go
to R Console and type 'mtcars'. Then you will see the data below with 32 Rows
and 11 Columns. First few rows are shown here with the command 'head(mtcars)'.
19
20 {r mtcars}
21 head(mtcars)
22
23 Here second and last four columns are categorical variables and we will discard
those columns and save the data in a new variable name 'A'. First few rows are
shown here with the command 'head(A)'.
24
25 {r A = mtcars[,c(1,3,4,5,6,7)]}
26 A = mtcars[,c(1,3,4,5,6,7)]
27 head(A)
28
29 Here the data A have 6 columns and 32 rows. If you write A in the console,
you will be able to visualize the whole data. However, here we will compute the
correlation matrix (R) using that data A.
30
31 {r}
32 R = cor(A)
33 R
34
35
36 Next, we will draw the scatterplot matrix using the data A.
37
38 {r }
39 pairs(A)
40
41
42 Here the data A have six columns and we will also compute the variance
covariance matrix (V) using that data. We also use {r, echo=FALSE} to hide the
R Code.
43
44 {r, echo=FALSE}
45 V = cov(A)
46 V
47

```

Figure 2.4: The R Markdown Code for Example 2.11.

[Do It Yourself] 2.5. *Generate a report on 'R Markdown' which includes a project idea based on some data and its graphical representation through R Code. A typical example may be: "Collect 15 students marks in two subjects, Draw the scatter diagram, Check the correlation coefficient r , If $|r| \geq 0.75$ then fit a simple linear regression and write down the equation of the fitted line, Lastly draw the line over the scatter". Explain the whole project using 'R Markdown' and save the report in a pdf file.*