

Practical 7(A): Time Series

```
#rainfall <- c(799,1174.8,865.1,1334.6,635.4,918.5,685.5,998.6,784.2,985,882.8,1071)
```

```
#rainfall.timeseries <- ts(rainfall,start = c(2012,1),frequency = 12)
```

```
#print(rainfall.timeseries)
```

```

      Jan  Feb  Mar  Apr  May  Jun  Jul  Aug  Sep  Oct
2012 799.0 1174.8 865.1 1334.6 635.4 918.5 685.5 998.6 784.2 985.0
      Nov  Dec
2012 882.8 1071.0

```

```
#png(file = "rainfall.png")
```

```
#plot(rainfall.timeseries)
```

```
#dev.off()
```

```

null device

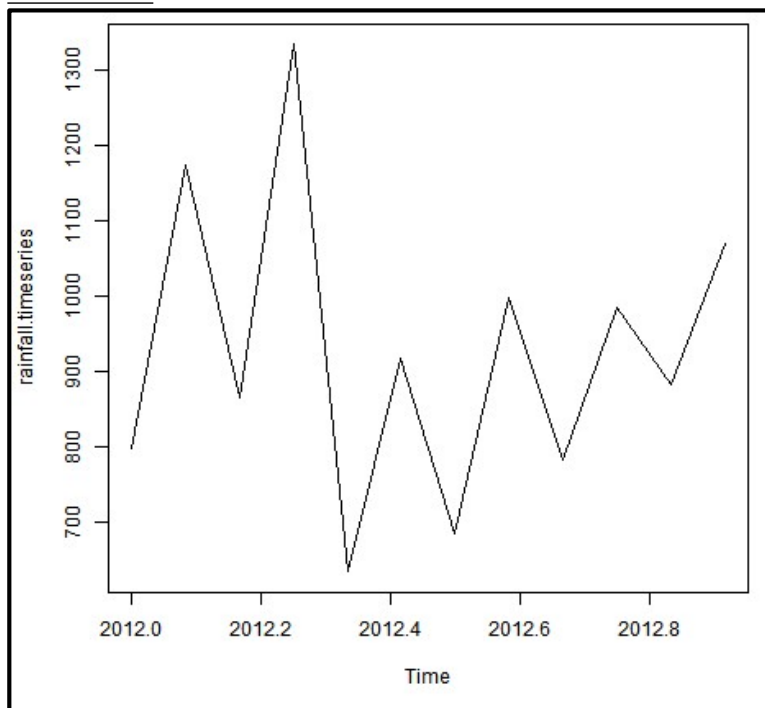
```

```

1

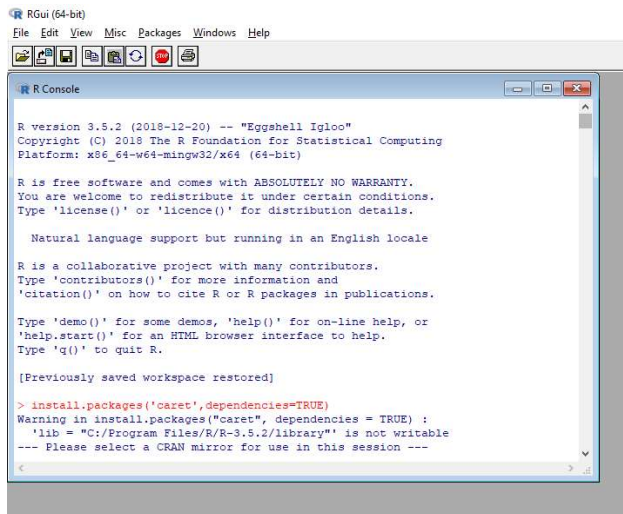
```

OUTPUT:-

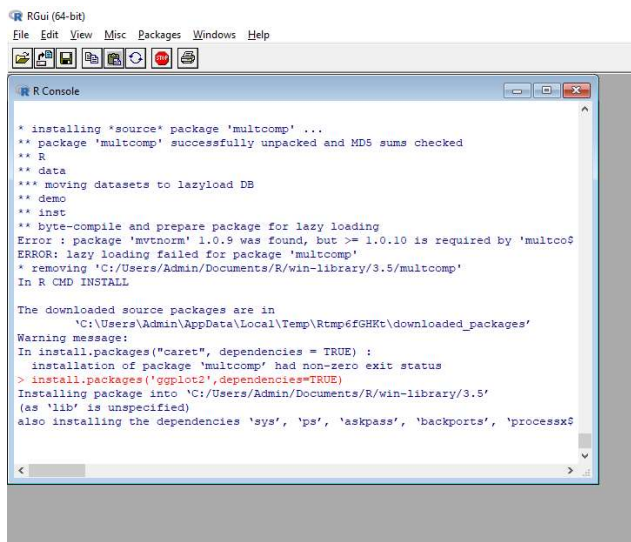


Practical 8: Perform the data clustering using clustering algorithm

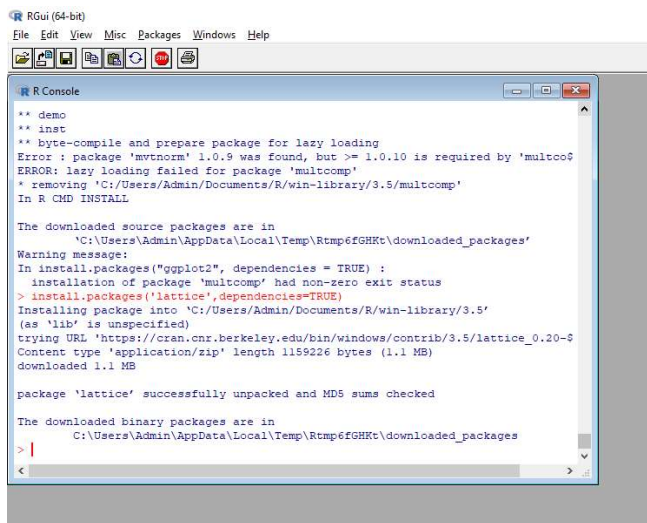
Step 1 : Install Library → `install.packages('caret',dependencies=TRUE)`



Step 2 : Install Library → `install.packages('ggplot2',dependencies=TRUE)`



Step 3 : Install Library → `install.packages('lattice',dependencies=TRUE)`



```

RGui (64-bit)
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R Console
** demo
** inst
** byte-compile and prepare package for lazy loading
Error: package 'mvtnorm' 1.0.9 was found, but >= 1.0.10 is required by 'multcomp'
ERROR: lazy loading failed for package 'multcomp'
* removing 'C:/Users/Admin/Documents/R/win-library/3.5/multcomp'
In R CMD INSTALL

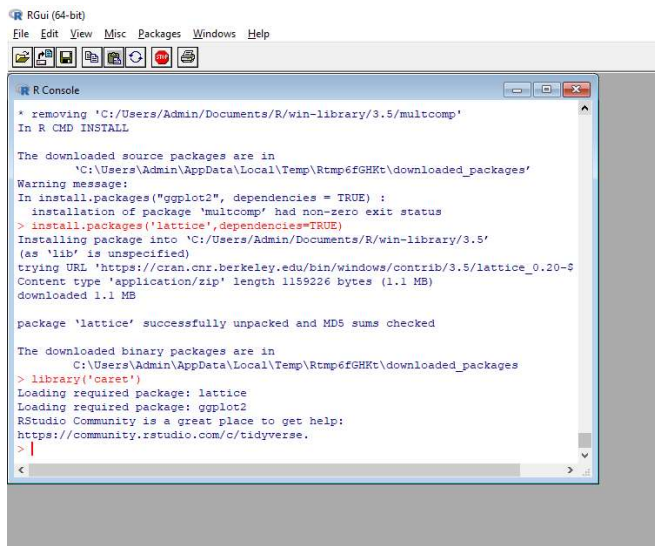
The downloaded source packages are in
  'C:/Users/Admin/AppData/Local/Temp/Rtmp6fGHKt/downloaded_packages'
Warning message:
In install.packages("ggplot2", dependencies = TRUE) :
  installation of package 'multcomp' had non-zero exit status
> install.packages('lattice',dependencies=TRUE)
Installing package into 'C:/Users/Admin/Documents/R/win-library/3.5'
(as 'lib' is unspecified)
trying URL 'https://cran.cnr.berkeley.edu/bin/windows/contrib/3.5/lattice_0.20-8'
Content type 'application/zip' length 1159226 bytes (1.1 MB)
downloaded 1.1 MB

package 'lattice' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
  C:/Users/Admin/AppData/Local/Temp/Rtmp6fGHKt/downloaded_packages
> |
<

```

Step 4 : `library('caret')`



```

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R Console
* removing 'C:/Users/Admin/Documents/R/win-library/3.5/multcomp'
In R CMD INSTALL

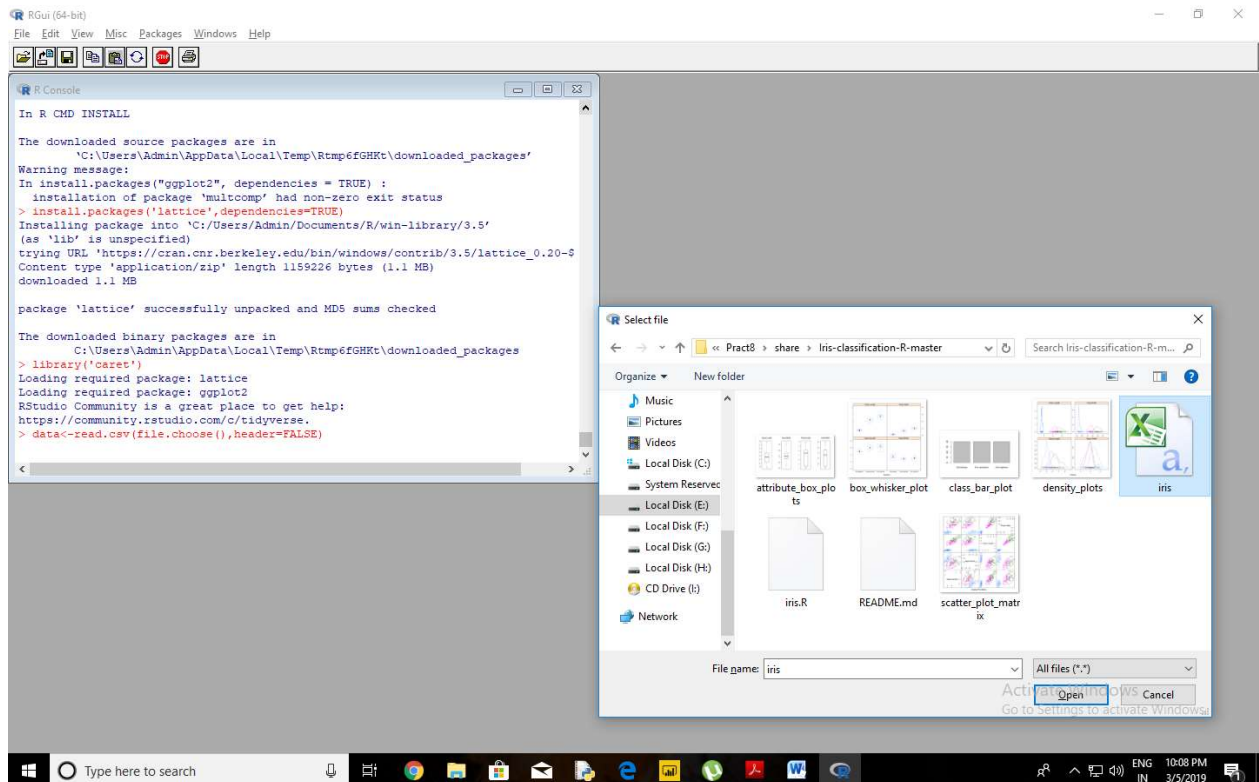
The downloaded source packages are in
  'C:/Users/Admin/AppData/Local/Temp/Rtmp6fGHKt/downloaded_packages'
Warning message:
In install.packages("ggplot2", dependencies = TRUE) :
  installation of package 'multcomp' had non-zero exit status
> install.packages('lattice',dependencies=TRUE)
Installing package into 'C:/Users/Admin/Documents/R/win-library/3.5'
(as 'lib' is unspecified)
trying URL 'https://cran.cnr.berkeley.edu/bin/windows/contrib/3.5/lattice_0.20-8'
Content type 'application/zip' length 1159226 bytes (1.1 MB)
downloaded 1.1 MB

package 'lattice' successfully unpacked and MD5 sums checked

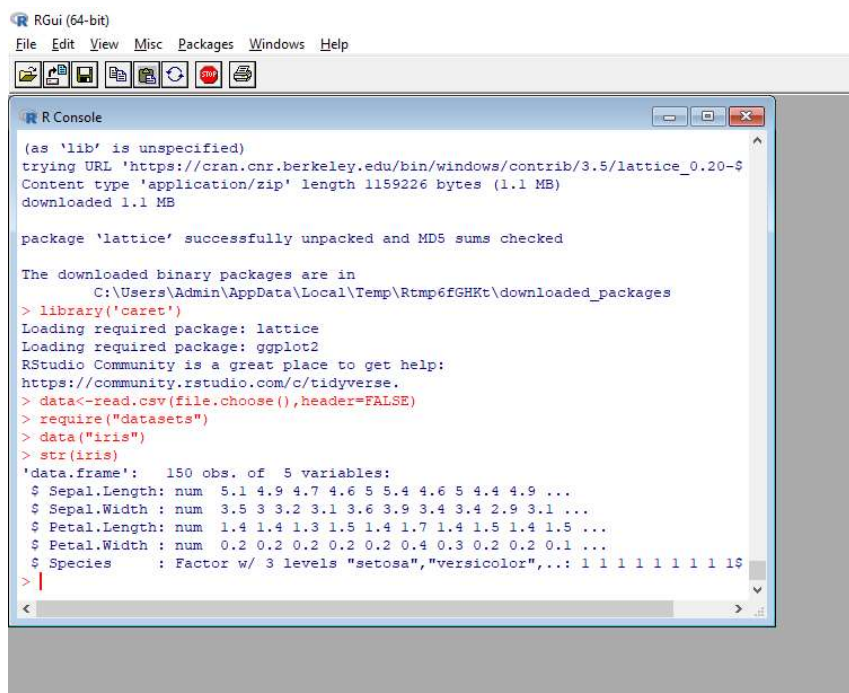
The downloaded binary packages are in
  C:/Users/Admin/AppData/Local/Temp/Rtmp6fGHKt/downloaded_packages
> library('caret')
Loading required package: lattice
Loading required package: ggplot2
RStudio Community is a great place to get help:
https://community.rstudio.com/c/tidyverse.
> |
<

```

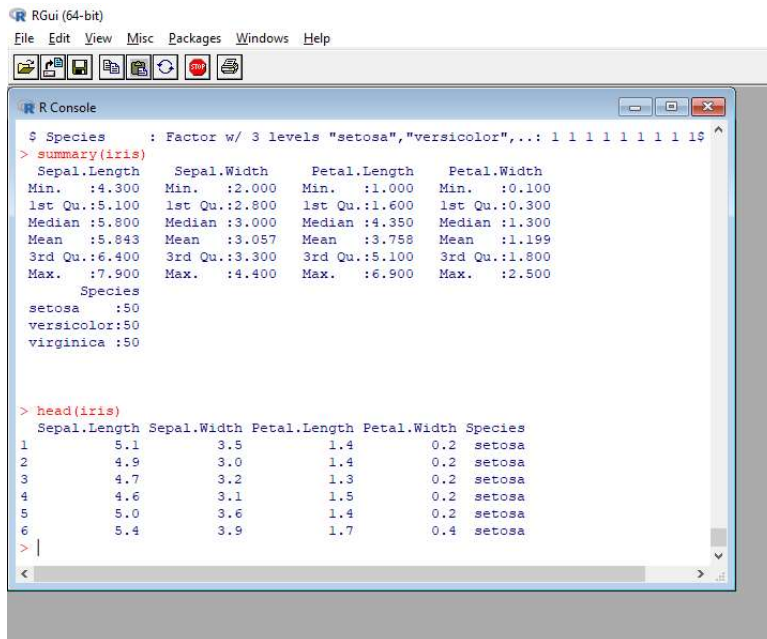
Step 5 : Choose file(.csv) → `data<-read.csv(file.choose(),header=FALSE)`



Step 6 : Display data in the file.



Step 7 : View the summary and table headers of the data.



```

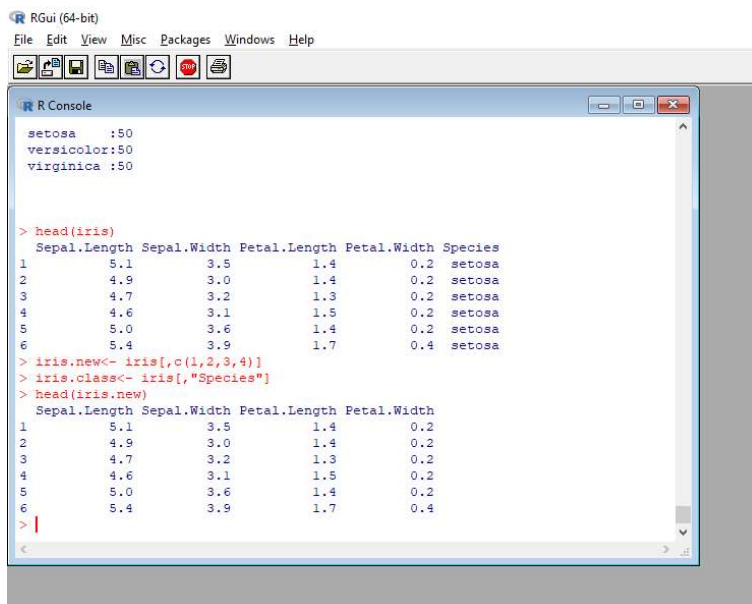
RGui (64-bit)
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R Console
$ Species : Factor w/ 3 levels "setosa","versicolor",...: 1 1 1 1 1 1 1 1 1 1
> summary(iris)
  Sepal.Length    Sepal.Width    Petal.Length    Petal.Width
Min.   :4.300    Min.   :2.000    Min.   :1.000    Min.   :0.100
1st Qu.:5.100    1st Qu.:2.800    1st Qu.:1.600    1st Qu.:0.300
Median :5.800    Median :3.000    Median :4.350    Median :1.300
Mean   :5.843    Mean   :3.057    Mean   :3.758    Mean   :1.199
3rd Qu.:6.400    3rd Qu.:3.300    3rd Qu.:5.100    3rd Qu.:1.800
Max.   :7.900    Max.   :4.400    Max.   :6.900    Max.   :2.500
Species
setosa   :50
versicolor:50
virginica :50

> head(iris)
  Sepal.Length Sepal.Width Petal.Length Petal.Width Species
1          5.1         3.5          1.4         0.2  setosa
2          4.9         3.0          1.4         0.2  setosa
3          4.7         3.2          1.3         0.2  setosa
4          4.6         3.1          1.5         0.2  setosa
5          5.0         3.6          1.4         0.2  setosa
6          5.4         3.9          1.7         0.4  setosa

```

Step 8 : Create a new class having only the data that we want.



```

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R Console
setosa   :50
versicolor:50
virginica :50

> head(iris)
  Sepal.Length Sepal.Width Petal.Length Petal.Width Species
1          5.1         3.5          1.4         0.2  setosa
2          4.9         3.0          1.4         0.2  setosa
3          4.7         3.2          1.3         0.2  setosa
4          4.6         3.1          1.5         0.2  setosa
5          5.0         3.6          1.4         0.2  setosa
6          5.4         3.9          1.7         0.4  setosa

> iris.new<- iris[,c(1,2,3,4)]
> iris.class<- iris[, "Species"]
> head(iris.new)
  Sepal.Length Sepal.Width Petal.Length Petal.Width
1          5.1         3.5          1.4         0.2
2          4.9         3.0          1.4         0.2
3          4.7         3.2          1.3         0.2
4          4.6         3.1          1.5         0.2
5          5.0         3.6          1.4         0.2
6          5.4         3.9          1.7         0.4

```

Step 9 : Viewing the headers of our new class

```

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R Console

> head(iris)
  Sepal.Length Sepal.Width Petal.Length Petal.Width Species
1          5.1         3.5          1.4          0.2  setosa
2          4.9         3.0          1.4          0.2  setosa
3          4.7         3.2          1.3          0.2  setosa
4          4.6         3.1          1.5          0.2  setosa
5          5.0         3.6          1.4          0.2  setosa
6          5.4         3.9          1.7          0.4  setosa

> iris.new<- iris[,c(1,2,3,4)]
> iris.class<- iris[, "Species"]
> head(iris.new)
  Sepal.Length Sepal.Width Petal.Length Petal.Width
1          5.1         3.5          1.4          0.2
2          4.9         3.0          1.4          0.2
3          4.7         3.2          1.3          0.2
4          4.6         3.1          1.5          0.2
5          5.0         3.6          1.4          0.2
6          5.4         3.9          1.7          0.4

> head(iris.class)
[1] setosa setosa setosa setosa setosa setosa
Levels: setosa versicolor virginica
>

```

Step 10 : Normalize the data.

```

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R Console

1          5.1         3.5          1.4          0.2
2          4.9         3.0          1.4          0.2
3          4.7         3.2          1.3          0.2
4          4.6         3.1          1.5          0.2
5          5.0         3.6          1.4          0.2
6          5.4         3.9          1.7          0.4

> head(iris.class)
[1] setosa setosa setosa setosa setosa setosa
Levels: setosa versicolor virginica

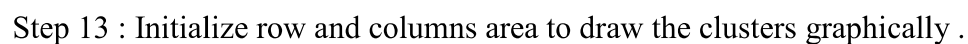
> normalize <- function(x){
+   return ((x-min(x))/(max(x)-min(x)))
+ }

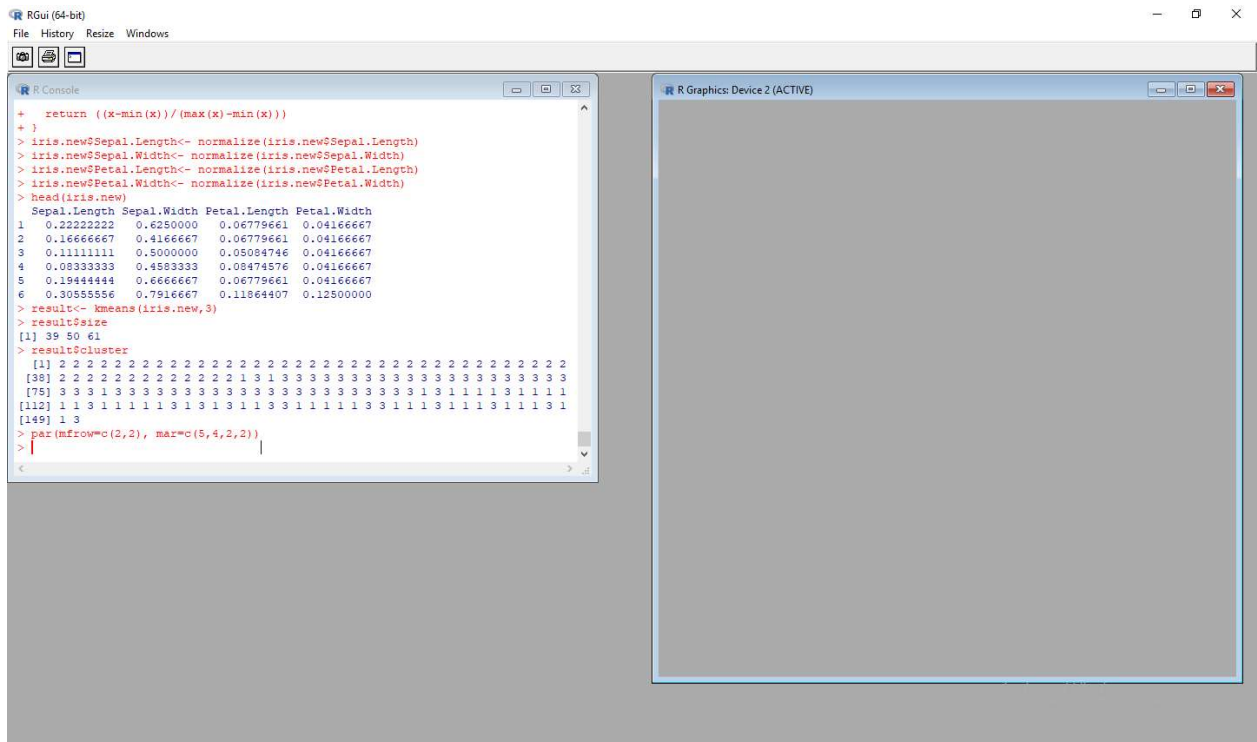
> iris.new$Sepal.Length<- normalize(iris.new$Sepal.Length)
> iris.new$Sepal.Width<- normalize(iris.new$Sepal.Width)
> iris.new$Petal.Length<- normalize(iris.new$Petal.Length)
> iris.new$Petal.Width<- normalize(iris.new$Petal.Width)
> head(iris.new)
  Sepal.Length Sepal.Width Petal.Length Petal.Width
1  0.22222222  0.6250000  0.06779661  0.04166667
2  0.16666667  0.4166667  0.06779661  0.04166667
3  0.11111111  0.5000000  0.05084746  0.04166667
4  0.08333333  0.4583333  0.08474576  0.04166667
5  0.19444444  0.6666667  0.06779661  0.04166667
6  0.30555556  0.7916667  0.11864407  0.12500000

>

```

Step 11 : Apply K-Means Clustering with 3 clusters using kmeans function.





Step 14 : Draw the clusters with respect to sepal length and width and petal length and width.

