R Programming

- R is a popular programming language used for statistical computing and graphical presentation.
- Its most common use is to analyze and visualize data.

Why Use R?

- It is a great resource for data analysis, data visualization, data science and machine learning
- It provides many statistical techniques (such as statistical tests, classification, clustering and data reduction)
- It is easy to draw graphs in R, like pie charts, histograms, box plot, scatter plot, etc++
- It works on different platforms (Windows, Mac, Linux)
- It is open-source and free
- It has a large community support
- It has many packages (libraries of functions) that can be used to solve different problems

Variables

- Variables are containers for storing data values.
- A variable is created the moment you first assign a value to it. To assign a value to a variable, use the <- sign.

- In other programming language, it is common to use = as an assignment operator.
- In R, we can use both = and <- as assignment operators.
- However, <- is preferred in most cases because the = operator can be forbidden in some context in R.

Basic Data Types

Basic data types in R can be divided into the following types:

- *numeric - (10.5, 55, 787)*
- *integer - (1L, 55L, 100L, where the letter "L" declares this as an integer)*
- *complex - (9 + 3i, where "i" is the imaginary part)*
- *character (a.k.a. string) - ("k", "R is exciting", "FALSE", "11.5")*
- *logical (a.k.a. boolean) - (TRUE or FALSE)*

We can use the class() function to check the data type of a variable:

Type Conversion

You can convert from one type to another with the following functions:

- *as.numeric()*
- *as.integer()*
- *as.complex()*

R if-else

```
a <- 33
b <- 200

if (b > a) {
  print("b is greater than a")
}
```

Loops

- Loops can execute a block of code as long as a specified condition is reached.
- R has two loop commands:
    - while loops
    - for loops

R While Loops

With the while loop we can execute a set of statements as long as a condition is TRUE:

```
i <- 1
while (i < 6) {
  print(i)
  i <- i + 1
}
```

For Loops

- A for loop is used for iterating over a sequence:

```
for (x in 1:10) {
  print(x)
}
```

```
for (i in seq(1,20,3)){

  print(i)

}
```

R Functions

- A function is a block of code which only runs when it is called.
- You can pass data, known as parameters, into a function.
- A function can return data as a result.

Creating a Function

- To create a function, use the function() keyword:

```
my_function <- function() {
  print("Hello World!")
}
```

R Graphics

R - Bar Charts

- A bar chart represents data in rectangular bars with length of the bar proportional to the value of the variable.
- R uses the function **barplot()** to create bar charts.
- R can draw both vertical and Horizontal bars in the bar chart.
- In bar chart each of the bars can be given different colors.

Syntax: The basic syntax to create a bar-chart in R is −

barplot(H,xlab,ylab,main, names.arg,col)

Following is the description of the parameters used −

- **H** is a vector or matrix containing numeric values used in bar chart.
- **xlab** is the label for x axis.
- **ylab** is the label for y axis.
- **main** is the title of the bar chart.
- **names.arg** is a vector of names appearing under each bar.
- **col** is used to give colors to the bars in the graph.

```
# Creating the data for Bar chart

 H <- c(12,35,54,3,41)

M <- c("Feb","Mar","Apr","May","Jun")

 # Giving the chart file a name  #png(file = "bar_properties.png")  #

Plotting the bar chart

barplot(H,names.arg=M,xlab="Month",ylab="Revenue",col="Green",main="Revenue Bar
chart",border="red")
```

R - Line Graphs

- A line chart is a graph that connects a series of points by drawing line segments between them.
- Line charts are usually used in identifying the trends in data.
- The **plot()** function in R is used to create the line graph.

Syntax

The basic syntax to create a line chart in R is :

plot(x,y)

plot(v,type,col,xlab,ylab)

plot(1:10, type=“o”,col=“red”, xlab="The x-axis", ylab="The y axis")

plot(1:10, main="My Graph", xlab="The x-axis", ylab="The y axis")

- Following is the description of the parameters used −
  - v is a vector containing the numeric values.
  - type takes the value "p" to draw only the points, "l" to draw only the lines and "o" to draw both points and lines.
  - xlab is the label for x axis.
  - ylab is the label for y axis.
  - main is the Title of the chart.
  - col is used to give colors to both the points and lines.