Terna Engineering College

Department of Artificial Intelligence and Data Science

Program: Sem VI

Course: Data Analytics and Visualization Lab

Experiment No.01

PART A

(PART A: TO BE REFERRED BY STUDENTS)

A.1 Aim: Getting introduced to R programming.

A.2 Theory:

R is a programming language and free software developed by Ross Ihaka and Robert Gentleman in 1993. R possesses an extensive catalog of statistical and graphical methods. It includes machine learning algorithms, linear regression, time series, statistical inference to name a few. Most of the R libraries are written in R, but for heavy computational tasks, C, C++ and Fortran codes are preferred. R is not only entrusted by academic, but many large companies also use R programming language, including Uber, Google, Airbnb, Facebook and so on. Data analysis with R is done in a series of steps; programming, transforming, discovering, modelling and communicate the results.

Program: R is a clear and accessible programming tool

Transform: R is made up of a collection of libraries designed specifically for data science

Discover: Investigate the data, refine your hypothesis and analyze them

Model: R provides a wide array of tools to capture the right model for your data

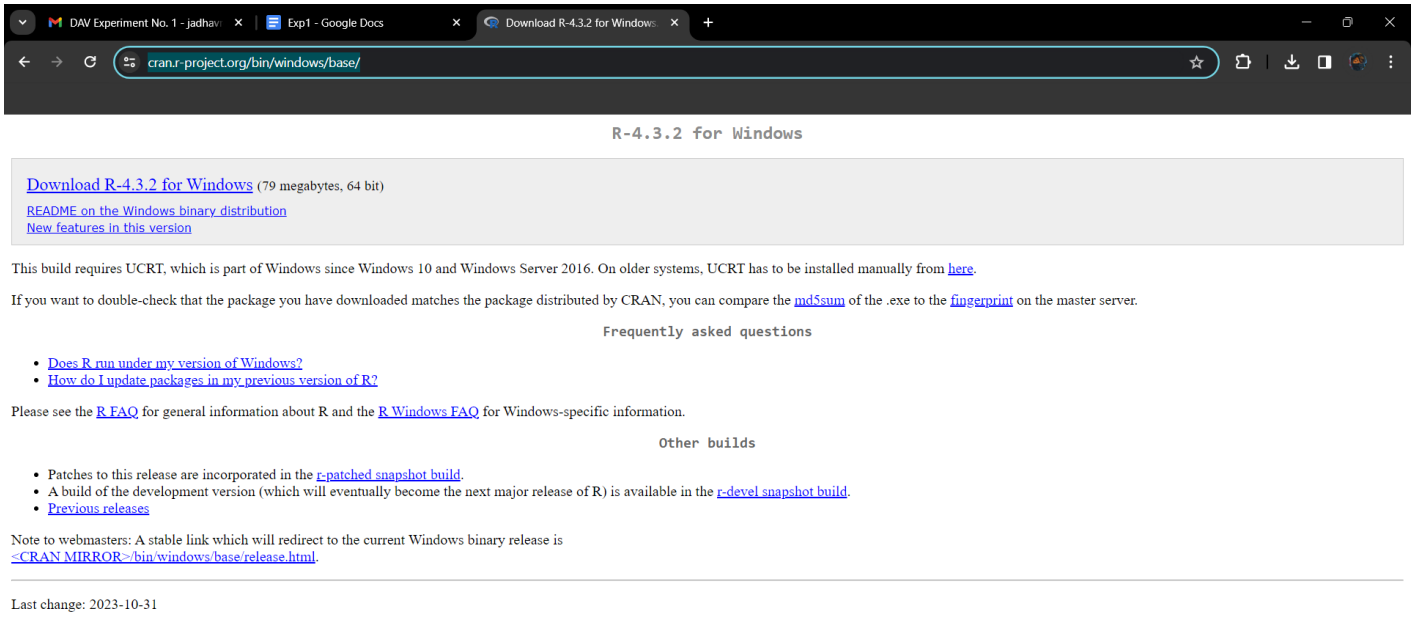
Communicate: Integrate codes, graphs, and outputs to a report with R Markdown or build Shiny apps to share with the world

What is R used for?

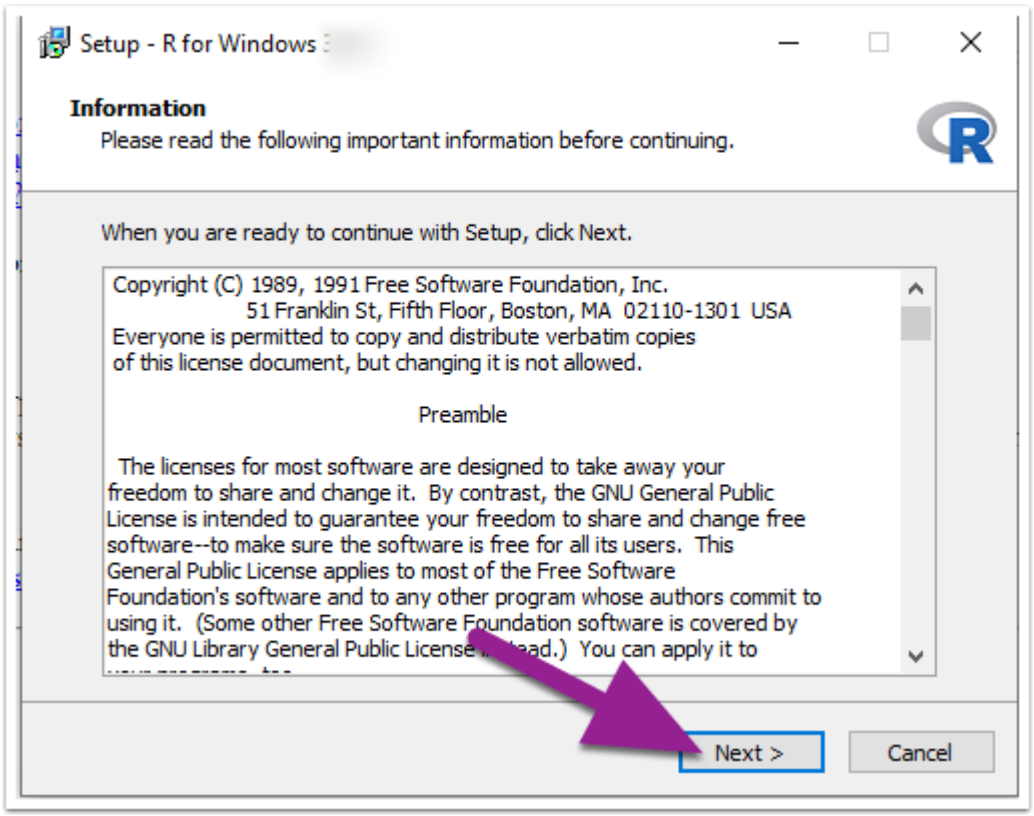
- Statistical inference
- Data analysis
- Machine learning algorithms

Installation of R on Windows:

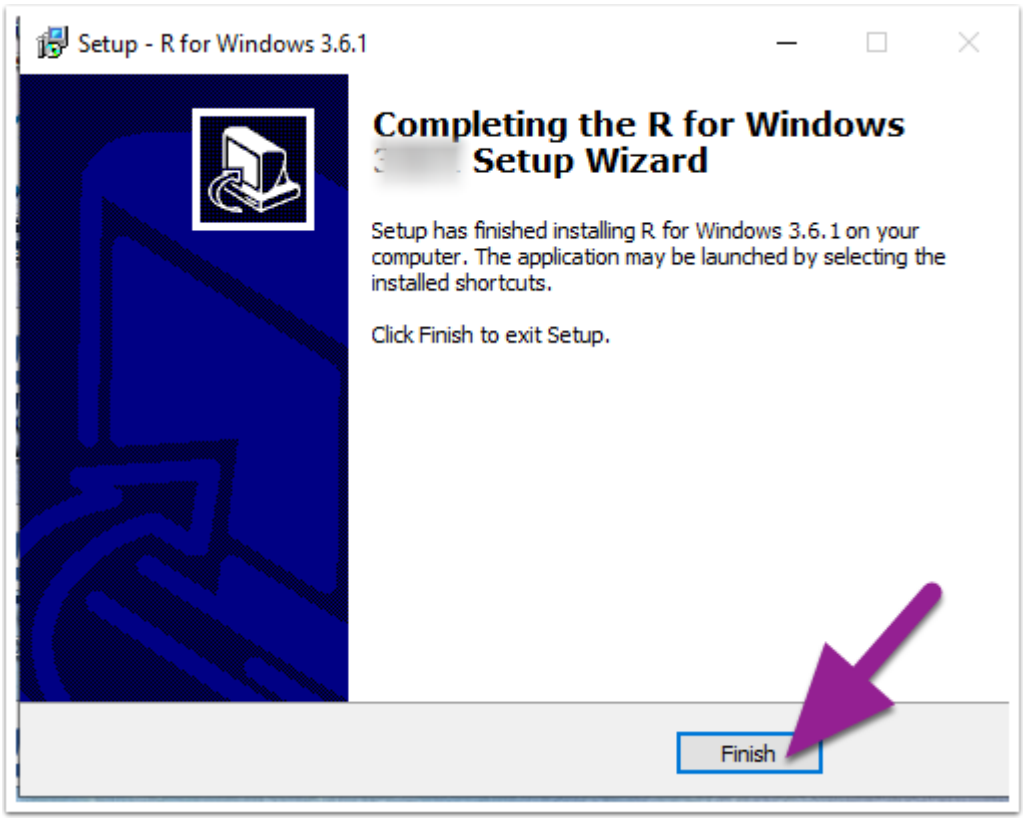
1. Go to https://cran.r-project.org/bin/windows/base/
2. Click on download for Windows



3. Once the file is downloaded setup the installation wizard and follow the instructions and provide permissions and data wherever necessary.



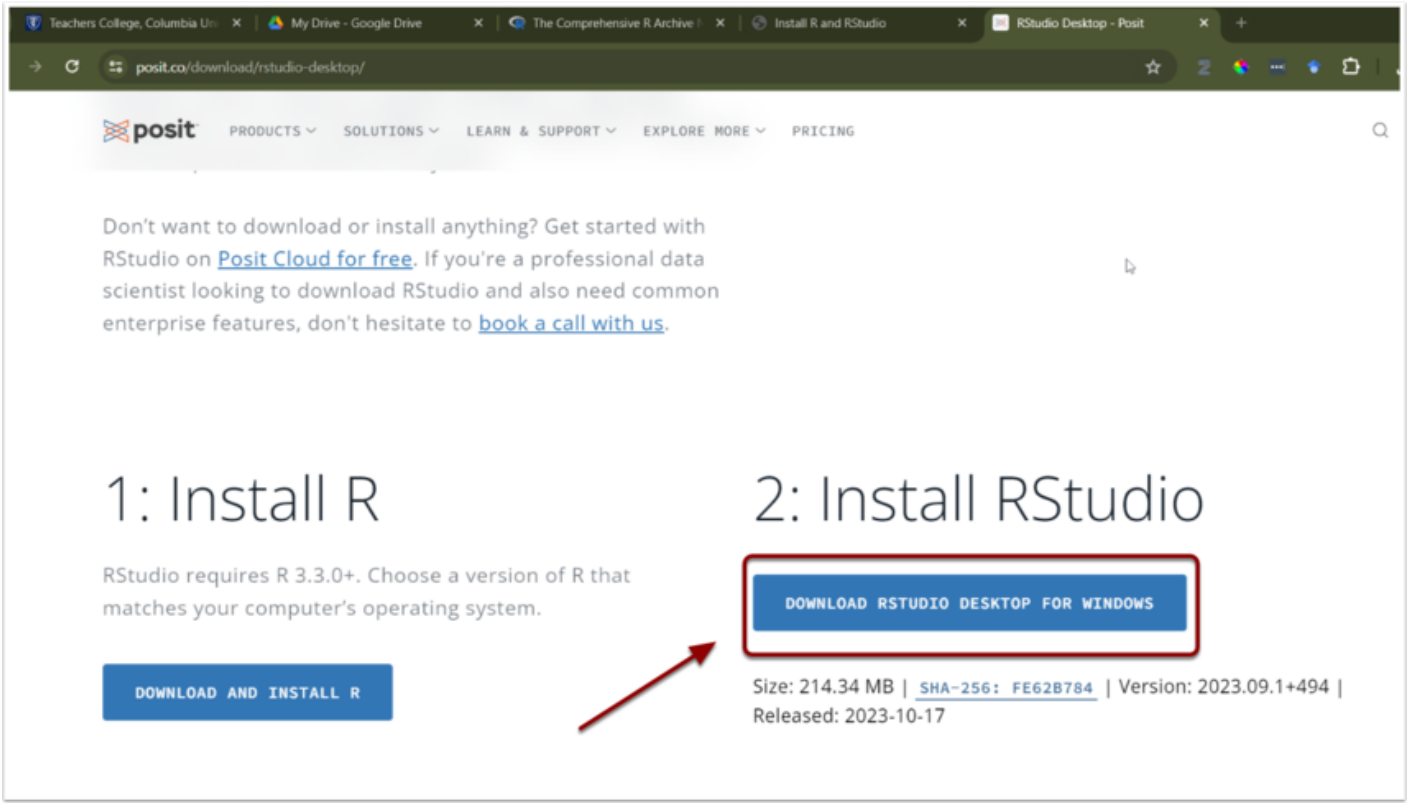
4. Once the installation is done click on finish.



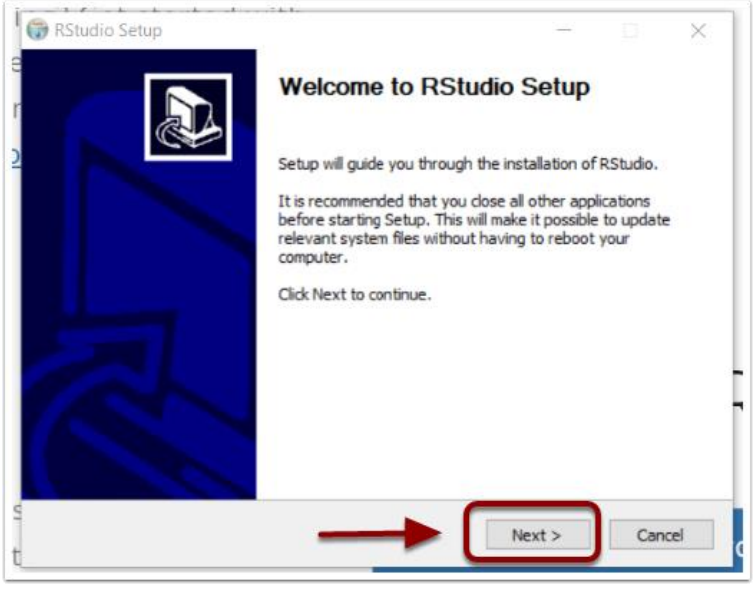
RStudio is an integrated development environment for R, a programming language for statistical computing and graphics.

Installation of R-Studio on Windows:

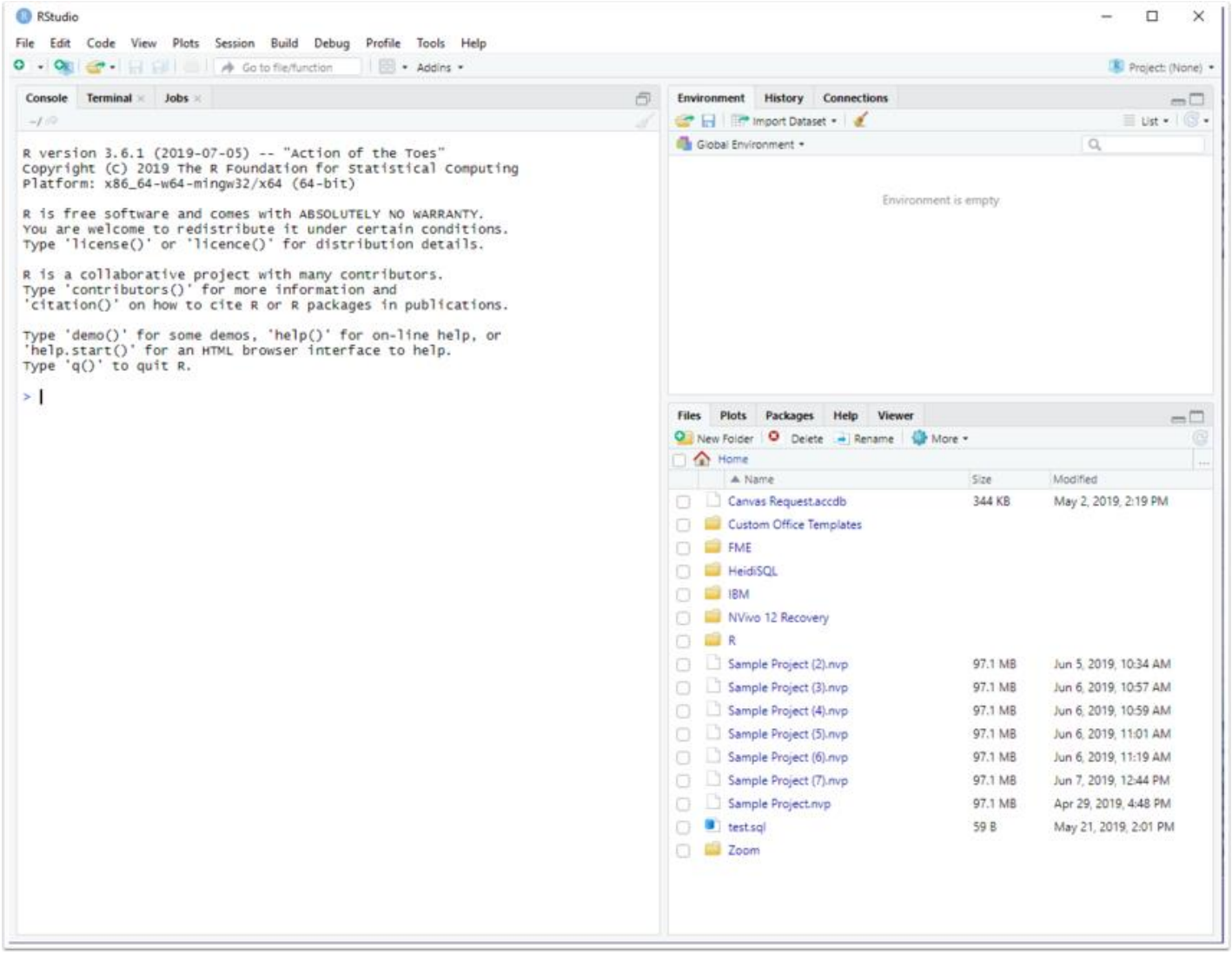
1. Go to https://posit.co/download/rstudio-desktop/
2. Click on install RStudio Desktop for windows



3. Open the installation wizard and complete the installation as per instructions.



4. After the Setup Wizard finishing the installation, RStudio will open.



PART B

(PART B: TO BE COMPLETED BY STUDENTS)

(Students must submit the soft copy as per following segments within two hours of the practical. The soft copy must be uploaded on the Blackboard or emailed to the concerned lab in charge faculties at the end of the practical in case the there is no Black board access available)

Roll. No. A12	Name: Sufiyan Khan
Class: TE – AI & DS	Batch: A1
Date of Experiment:	Date of Submission: 18/02/24
Grade:	

B.1 Input and Output:

Code:

variable value assignment and arithmetic -

```
x <- 3
print(x + 1)
5 -> y
print(x*y)
sqrt(y-1)
cos(x+1)
```

Objects in R: Vectors, Lists, Matrices, Data Frames -

```
apple <- c('red','green',"yellow")
print(apple)
print(class(apple)
k <- list(1:3, TRUE, "Hello", list(1:2, 5))
```

```
k[[3]]

matrix(1:12, nrow=3, ncol=4)


emp.data <- data.frame(

  emp_id = c (1:5),

  emp_name =

    c("Rick","Dan","Michelle","Ryan","Gary"),salary =

    c(623.3,515.2,611.0,729.0,843.25),

  start_date = as.Date(c("2012-01-01", "2013-09-23", "2014-11-15",
"2014-05-11", "2015-03-27")),

  stringsAsFactors = FALSE

)

print(summary(emp.data))
```

Control Flow Statements: If else and For Loop-

```
x <- c(2,5,3,9,8,11,6)

count <- 0

for (val in x) {

  if(val %% 2 == 0) count = count+1

}

print(count)
```

Visualization: Barplot and Histogram-

```
A <- c(17, 32, 8, 53, 1)

barplot(A, xlab = "X-axis", ylab = "Y-axis", main ="Bar-Chart")

v <- c(19, 23, 11, 5, 16, 21, 32, 14, 19, 27, 39)

hist(v, xlab = "No.of Articles ",col = "green", border = "black")
```

Output:

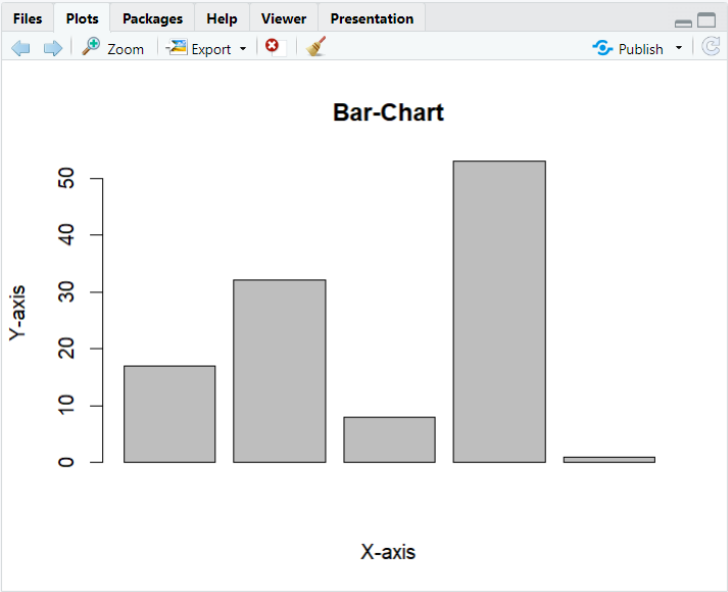
```
Console  Terminal  Background Jobs
R 4.3.2 · ~/
> x <- 3
> print(x + 1)
[1] 4
> 5 -> y
> print(x*y)
[1] 15
> sqrt(y-1)
[1] 2
> cos(x+1)
[1] -0.6536436
>
```

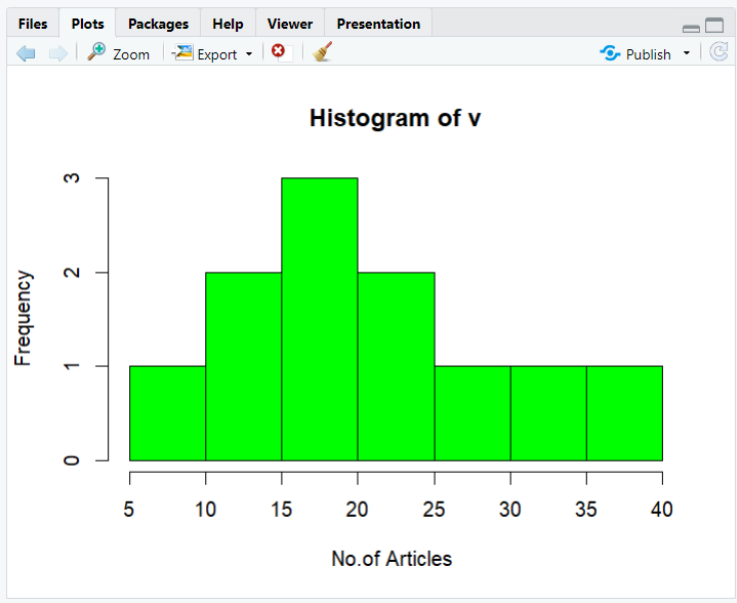
```
Console  Terminal  Background Jobs
R 4.3.2 · ~/
> apple <- c('red','green',"yellow")
> print(apple)
[1] "red"    "green"  "yellow"
> print(class(apple))
[1] "character"
>
> k <- list(1:3, TRUE, "Hello", list(1:2, 5))
> k[[3]]
[1] "Hello"
>
> matrix(1:12, nrow=3, ncol=4)
     [,1] [,2] [,3] [,4]
[1,]    1    4    7   10
[2,]    2    5    8   11
[3,]    3    6    9   12
>
```

```
Console  Terminal  Background Jobs
R 4.3.2 · ~/
> emp.data <- data.frame(
+   emp_id = c (1:5),
+   emp_name =
+     c("Rick","Dan","Michelle","Ryan","Gary"),salary =
+     c(623.3,515.2,611.0,729.0,843.25),
+   start_date = as.Date(c("2012-01-01", "2013-09-23", "2014-11-15", "2014-05-11", "2015-03-27")),
+   stringsAsFactors = FALSE
+ )
> print(summary(emp.data))
     emp_id    emp_name            salary        start_date
 Min.   :1   Length:5           Min.   :515.2   Min.   :2012-01-01
 1st Qu.:2   Class :character   1st Qu.:611.0   1st Qu.:2013-09-23
 Median :3   Mode  :character   Median :623.3   Median :2014-05-11
 Mean   :3                      Mean   :664.4   Mean   :2014-01-14
 3rd Qu.:4                      3rd Qu.:729.0   3rd Qu.:2014-11-15
 Max.   :5                      Max.   :843.2   Max.   :2015-03-27
>
```

```
Console  Terminal  Background Jobs
R 4.3.2 · ~/
> x <- c(2,5,3,9,8,11,6)
> count <- 0
> for (val in x) {
+
+   if(val %% 2 == 0) count = count+1
+ }
> print(count)
[1] 3
>
```

```
39:1  (Top Level)                                                    R Script
Console  Terminal  Background Jobs
R 4.3.2 · ~/
> A <- c(17, 32, 8, 53, 1)
> barplot(A, xlab = "X-axis", ylab = "Y-axis", main ="Bar-Chart")
> A <- c(17, 32, 8, 53, 1)
> barplot(A, xlab = "X-axis", ylab = "Y-axis", main ="Bar-Chart")
>
> v <- c(19, 23, 11, 5, 16, 21, 32, 14, 19, 27, 39)
> hist(v, xlab = "No.of Articles ",col = "green", border = "black")
>
```





B.2 Conclusion:

Thus we have successfully studied R programming where we learnt about assigning values to variables, Objects in R, Control Flow Statements, Visualization, etc. We have also successfully learnt how to install R as well R-Studio on Windows.