Project Title: Interactive Dashboard using Shiny based on Web Scraping Data

Project Overview:

The focus of this project is to scrape data from a website and create an interactive dashboard which in turn will provide an efficient way to visualize and analyze data. Using Shiny, interactive dashboard provides a real-time platform for data exploration. Web scraping, being one of the most efficient and useful ways to extract data from a website, is used to collect data from websites and then transferred to the Shiny app for a proper view of the data.

## Project Solution Design:

To design an interactive dashboard:
- Data must be scraped,
- Data cleaning shall be done next, by applying the steps of pre-processing.
- Data must be described by many statistical terms and plotted.
- Finally the dashboard must be created by displaying, and analyzing the data along with data visualization

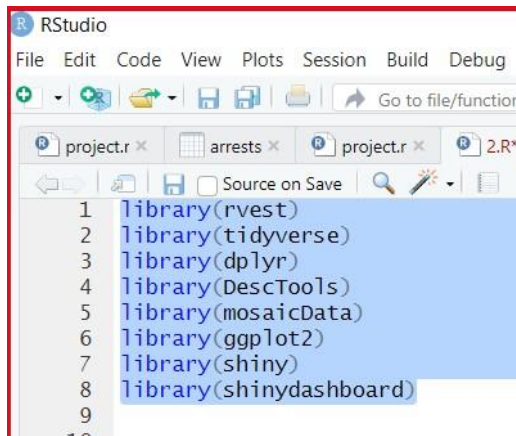**Here are several steps to completely design the project:**

WEB SCRAPING

At first, after opening the RStudio application, several packages, such as **rvest**, **tidyverse** must be installed.
Below are the attached figures that show the installation process of these packages.
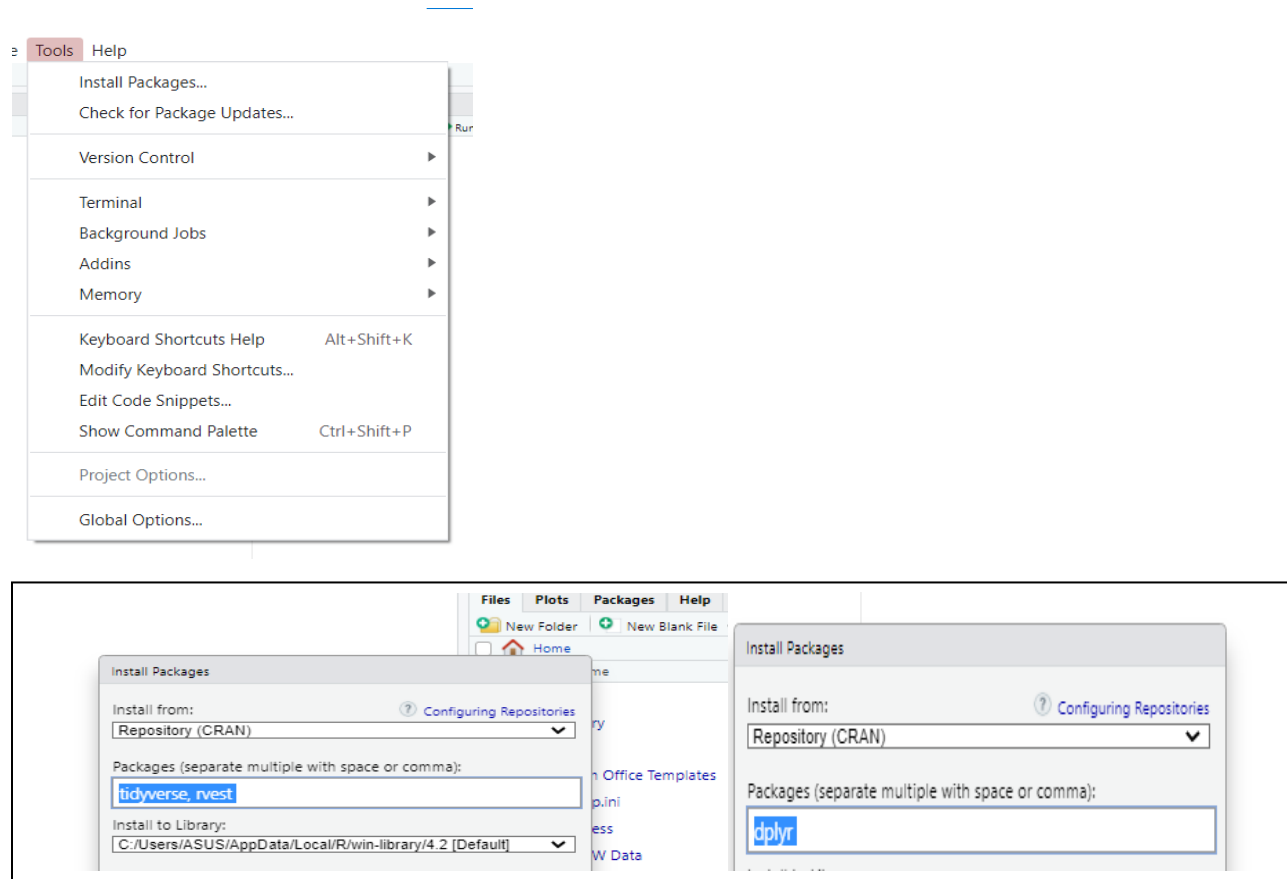
The purpose of **rvest** is to scrape data from web pages, **tidyverse** helps to transform and better present data and **dplyr** package makes data manipulation easier, **DescTools** have been installed to find mode and **mosaicData** and **ggplot2** is used for data visualization.
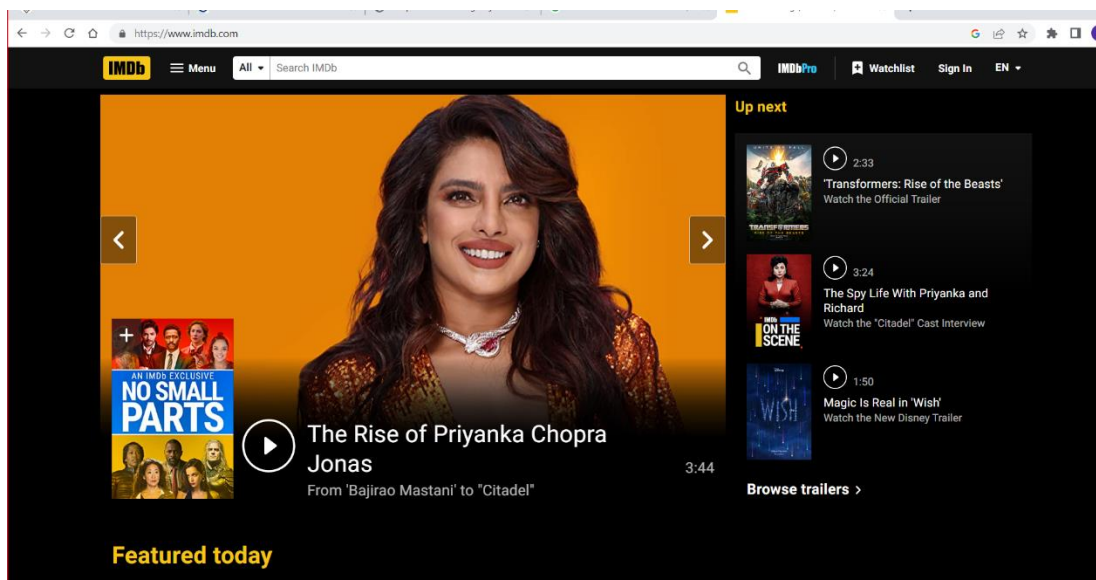
Now as the installation has been completed, the location of these packages, where they are stored, is found. The figure below shows the process:

Next the website from where data is to be scraped has been opened and its URL has been copied.

Link used: https://www.imdb.com.

Next the information of the web page has been stored and the movie name, ratings, synopsis, and date of release have been inspected and read.

```
get_cast = function(movie_link) {
  movie_page = read_html(movie_link)
  movie_cast = movie_page %>% html_nodes(".primary_photo+ td a") %>%
    html_text() %>% paste(collapse = ",")
  return(movie_cast)
}

movies = data.frame()

for (page_result in seq(from = 1, to = 901, by = 300)) {
  link = paste0("https://www.imdb.com/search/title/?title_type=feature&num_votes=25000,&genres=adventure&sort=user_rating,desc&start=",
                page_result, "&ref_=adv_nxt")
  page = read_html(link)

  name = page %>% html_nodes(".lister-item-header a") %>% html_text()
  movie_links = page %>% html_nodes(".lister-item-header a") %>%
    html_attr("href") %>% paste("https://www.imdb.com", ., sep="")
  year = page %>% html_nodes(".text-muted.unbold") %>% html_text()
  rating = page %>% html_nodes(".ratings-imdb-rating strong") %>% html_text()
  synopsis = page %>% html_nodes(".ratings-bar+ .text-muted") %>% html_text()
  cast = sapply(movie_links, FUN = get_cast, USE.NAMES = FALSE)

  movies = rbind(movies, data.frame(name, year, rating, synopsis, cast, stringsAsFactors = FALSE))

  print(paste("Page:", page_result))
}
```

Here is the description of some functions and tags mentioned above:

- **read_html:** creates an R object, basically a list, that stores information about the web page.
- **html_nodes:** given the html source code pull out the actual elements that is to be grabbed.
- **html_text:** returns the raw underlying text.
- **%>%:** to link a sequence of analysis steps.

To treat the variables, i.e., name, rate, synopsis, and date as columns for data frame, the following has been performed.

```
movies = rbind(movies, data.frame(name, year, rating, synopsis, cast, stringsAsFactors = FALSE))
```
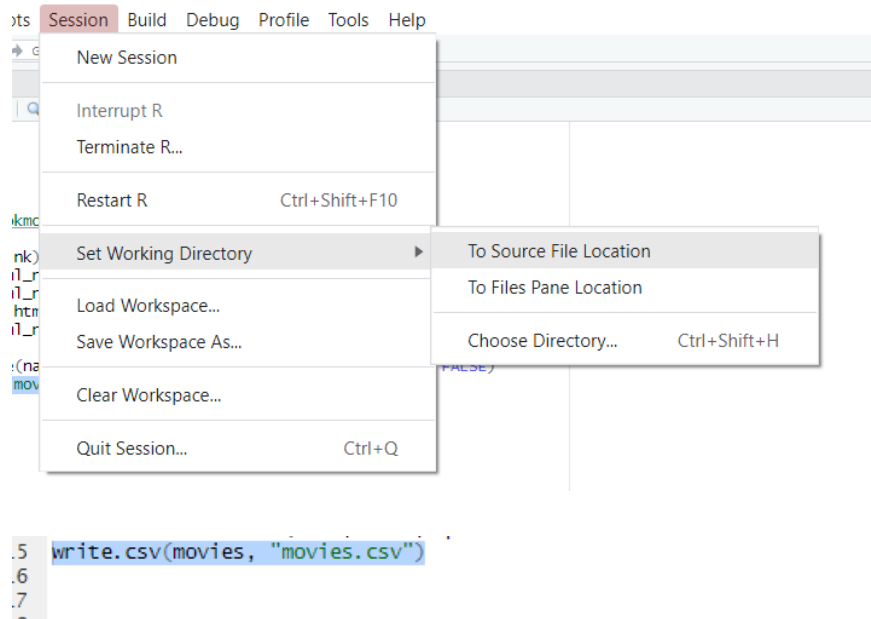
1	The Lord of the Rings: The Return of the King	(2003)	9.0	Gandalf and Aragorn lead the World of Men against Sauron'...
2	Inception	(2010)	8.8	A thief who steals corporate secrets through the use of drea...
3	The Lord of the Rings: The Fellowship of the Ring	(2001)	8.8	A meek Hobbit from the Shire and eight companions set ou...
4	Il buono, il brutto, il cattivo	(1966)	8.8	A bounty hunting scam joins two men in an uneasy alliance ...
5	The Lord of the Rings: The Two Towers	(2002)	8.8	While Frodo and Sam edge closer to Mordor with the help ...
6	777 Charlie	(2022)	8.8	Dharma is stuck in a rut with his negative and lonely lifestyle...
7	The Empire Strikes Back	(1980)	8.7	After the Rebels are overpowered by the Empire, Luke Skyw...
8	Interstellar	(2014)	8.6	A team of explorers travel through a wormhole in space in a...
9	Star Wars	(1977)	8.6	Luke Skywalker joins forces with a Jedi Knight, a cocky pilot, ...
10	Sen to Chihiro no kamikakushi	(2001)	8.6	During her family's move to the suburbs, a sullen 10-year-ol...
11	Gladiator	(2000)	8.5	A former Roman General sets out to exact vengeance again...
12	Back to the Future	(1985)	8.5	Marty McFly, a 17-year-old high school student, is accidenta...
13	The Lion King	(1994)	8.5	Lion prince Simba and his father are targeted by his bitter u...
14	Kaithi	(2019)	8.5	Dilli, an ex-convict, endeavours to meet his daughter for the...
15	Avengers: Endgame	(2019)	8.4	After the devastating events of Avengers: Infinity War (2018)...
16	Spider-Man: Into the Spider-Verse	(2018)	8.4	Teen Miles Morales becomes the Spider-Man of his universe...
17	Raiders of the Lost Ark	(1981)	8.4	In 1936, archaeologist and adventurer Indiana Jones is hired...
18	Aliens	(1986)	8.4	Decades after surviving the Nostromo incident, Ellen Ripley i...
19	Avengers: Infinity War	(2018)	8.4	The Avengers and their allies must be willing to sacrifice all i...
20	WALL·E	(2008)	8.4	In the distant future, a small waste-collecting robot inadvert...
21	Coco	(I) (2017)	8.4	Aspiring musician Miguel, confronted with his family's ances...
22	Inglourious Basterds	(2009)	8.3	In Nazi-occupied France during World War II, a plan to assas...
23	Star Wars: Episode VI - Return of the Jedi	(1983)	8.3	After rescuing Han Solo from Jabba the Hutt, the Rebels att...
24	2001: A Space Odyssey	(1968)	8.3	After uncovering a mysterious artifact buried beneath the L...
25	Toy Story	(1995)	8.3	A cowboy doll is profoundly threatened and jealous when a ...
26	Up	(2009)	8.3	78-year-old Carl Fredricksen travels to Paradise Falls in his h...
27	Mononoke-hime	(1997)	8.3	On a journey to find the cure for a Tatarigami's curse, Ashita...
28	Toy Story 3	(2010)	8.3	The toys are mistakenly delivered to a day-care center inste...
29	Lawrence of Arabia	(1962)	8.3	The story of T.E. Lawrence, the English officer who successfu...
30	North by Northwest	(1959)	8.3	A New York City advertising executive goes on the run after ...
31	Kantara	(2022)	8.3	When greed paves the way for betrayal, scheming and mur...
32	Spider-Man: No Way Home	(2021)	8.2	With Spider-Man's identity now revealed, Peter asks Doctor ...
33	Jurassic Park	(1993)	8.2	A pragmatic paleontologist touring an almost complete the...
34	Indiana Jones and the Last Crusade	(1989)	8.2	In 1938, after his father goes missing while pursuing the Hol...
35	Finding Nemo	(2003)	8.2	After his son is captured in the Great Barrier Reef and taken ...
36	Hauru no ugoku shiro	(2004)	8.2	When an unconfident young woman is cursed with an old b...

515	Inkheart	(2008)	6.1	A teenage girl discovers her father has an amazing talent to ...
516	Flight of the Phoenix	(2004)	6.1	Survivors of a plane crash in the Mongolian desert work tog...
517	The Collection	(II) (2012)	6.1	A man who escapes from the vicious grips of the serial killer...
518	Hit and Run	(I) (2012)	6.1	Former getaway driver Charles Bronson jeopardizes his Witn...
519	Sky Captain and the World of Tomorrow	(2004)	6.1	After New York City receives a series of attacks from giant fl...
520	The Mexican	(2001)	6.1	A man tries to transport an ancient gun called The Mexican, ...
521	The Jewel of the Nile	(1985)	6.1	When Joan Wilder is abducted while on a trip along the Nile...
522	Solomon Kane	(2009)	6.1	A ruthless mercenary renounces violence after learning his s...
523	Tomorrow, When the War Began	(2010)	6.1	When their country is invaded and their families are taken, e...
524	The Tale of Despereaux	(2008)	6.1	An unusually brave mouse helps to restore happiness to a f...
525	Pathaan	(2023)	6.0	An Indian agent races against a doomsday clock as a ruthles...
526	Exodus: Gods and Kings	(2014)	6.0	The defiant leader Moses rises up against Egyptian Pharaoh ...
527	Mortal Kombat	(2021)	6.0	MMA fighter Cole Young seeks out Earth's greatest champio...
528	Shark Tale	(2004)	6.0	A son of a gangster shark boss is accidentally killed w...
529	Van Helsing	(2004)	6.0	The famed monster hunter is sent to Transylvania to stop Co...
530	Godzilla: King of the Monsters	(2019)	6.0	The crypto-zoological agency Monarch faces off against a b...
531	Hercules	(I) (2014)	6.0	Having endured his legendary twelve labors, Hercules, the G...
532	Sucker Punch	(2011)	6.0	A young girl institutionalized by her abusive stepfather retre...
533	Hotel Transylvania: Transformania	(2022)	6.0	After one experiment, Johnny turns into a monster and ever...
534	Speed Racer	(2008)	6.0	Young driver Speed Racer aspires to be champion of the rac...
535	Bedtime Stories	(2008)	6.0	A hotel handyman's life changes when the lavish bedtime st...
536	S.W.A.T.	(2003)	6.0	An imprisoned drug kingpin offers a huge cash reward to a...
537	Free Willy	(1993)	6.0	When a boy learns that a beloved killer whale is to be killed ...
538	The Time Machine	(2002)	6.0	Hoping to alter the events of the past, a 19th century invent...
539	Night at the Museum: Battle of the Smithsonian	(2009)	6.0	Security guard Larry Daley infiltrates the Smithsonian Institu...
540	Miami Vice	(2006)	6.0	Based on the 1980s TV action/drama, this update focuses o...
541	Stuart Little	(1999)	6.0	The Little family adopt a charming young mouse named Stu...
542	Joe Dirt	(2001)	6.0	After being abandoned by his parents at the Grand Canyon,...
543	Sahara	(2005)	6.0	Master explorer Dirk Pitt goes on the adventure of a lifetime...
544	Beneath the Planet of the Apes	(1970)	6.0	The sole survivor of an interplanetary rescue mission search...
545	The Promise	(II) (2016)	6.0	Set during the last days of the Ottoman Empire, The Promis...
546	Dante's Peak	(1997)	6.0	A volcanologist arrives at a countryside town recently name...
547	The Spy Who Dumped Me	(2018)	6.0	Best friends Audrey and Morgan unwittingly become entan...
548	Teenage Mutant Ninja Turtles II: The Secret of the Ooze	(1991)	6.0	The Turtles and the Shredder battle once again, this time for...
549	The SpongeBob Movie: Sponge Out of Water	(2015)	6.0	When a diabolical pirate above the sea steals the secret Kra...
550	Arthur et les Minimoys	(2006)	6.0	Ten-year-old Arthur, in a bid to save his grandfather's house...

Showing 514 to 550 of 550 entries, 5 total columns

Finally, to complete the data collection process, the data is stored in a csv file.


```
write.csv(movies, "movies.csv")
```


movies.csv

	name	year	rating	synops
1	The Lord of the Rings: The Return of the King	2003	9	
2	Inception	2010	8	
3	The Lord of the Rings: The Fellowship of the Ring	2001	8	
4	Il buono, il brutto, il cattivo	1966	8	
5	The Lord of the Rings: The Two Towers	2002	8	
6	777 Charlie	2022	8	
7	The Empire Strikes Back	1980	8	
8	Interstellar	2014	8	
9	Star Wars	1977	8	
10	Sen to Chihiro no kamikakushi	2001	8	
11	Gladiator	2000	8	

To import data from CSV file in R,

```
#import data from csv in r
read.csv("movies.csv")
```

```
> read.csv("movies.csv")
      X                                          name      year rating
1     1             The Lord of the Rings: The Return of the King   (2003)   9.0
2     2                                      Inception   (2010)   8.8
3     3      The Lord of the Rings: The Fellowship of the Ring   (2001)   8.8
4     4                     Il buono, il brutto, il cattivo   (1966)   8.8
5     5             The Lord of the Rings: The Two Towers   (2002)   8.8
6     6                                    777 Charlie   (2022)   8.8
7     7                        The Empire Strikes Back   (1980)   8.7
8     8                                   Interstellar   (2014)   8.6
9     9                                      Star Wars   (1977)   8.6
10   10                    Sen to Chihiro no kamikakushi   (2001)   8.6
11   11                                      Gladiator   (2000)   8.5
12   12                              Back to the Future   (1985)   8.5
13   13                                  The Lion King   (1994)   8.5
14   14                                         Kaithi   (2019)   8.5
15   15                              Avengers: Endgame   (2019)   8.4
16   16                  Spider-Man: Into the Spider-Verse   (2018)   8.4
17   17                          Raiders of the Lost Ark   (1981)   8.4
18   18                                         Aliens   (1986)   8.4
19   19                          Avengers: Infinity War   (2018)   8.4
20   20                                        WALL·E   (2008)   8.4
21   21                                      Coco  (I)  (2017)   8.4
22   22                            Inglourious Basterds   (2009)   8.3
23   23      Star Wars: Episode VI - Return of the Jedi   (1983)   8.3
24   24                           2001: A Space Odyssey   (1968)   8.3
25   25                                      Toy Story   (1995)   8.3
26   26                                             Up   (2009)   8.3
27   27                                 Mononoke-hime   (1997)   8.3
28   28                                    Toy Story 3   (2010)   8.3
29   29                            Lawrence of Arabia   (1962)   8.3
30   30                             North by Northwest   (1959)   8.3
31   31                                        Kantara   (2022)   8.3
32   32                        Spider-Man: No Way Home   (2021)   8.2
33   33                                 Jurassic Park   (1993)   8.2
34   34              Indiana Jones and the Last Crusade   (1989)   8.2
```

PRE- PROCESSING

1) Data cleaning:

Data cleaning is the process of removing incorrect, duplicate or otherwise erroneous data from a dataset. These errors can include incorrectly formatted data, redundant entries, mislabeled data, and other issues.

Removing Special Character and Empty string: This dataset contains unwanted variables in year.


```
48
49  #remove () from rate column data
50  movies$year <- gsub("\\(|\\?", "", as.character(movies$year))
51  movies$year <- gsub("\\)|\\?", "", as.character(movies$year))
52  movies$year <- gsub("\\I|\\?", "", as.character(movies$year))
53
```

	name	year	rating	synopsis	cast
384	Speed Racer	2008	6	Young driver Speed Racer aspires to be champion of the rac...	
385	Bedtime Stories	2008	6	A hotel handyman's life changes when the lavish bedtime st...	
386	S.W.A.T.	2003	6	An imprisoned drug kingpin offers a huge cash reward to a...	
387	Free Willy	1993	6	When a boy learns that a beloved killer whale is to be killed ...	
388	The Time Machine	2002	6	Hoping to alter the events of the past, a 19th century invent...	
389	Night at the Museum: Battle of the Smithsonian	2009	6	Security guard Larry Daley infiltrates the Smithsonian Institu...	
390	Miami Vice	2006	6	Based on the 1980s TV action/drama, this update focuses o...	
391	Stuart Little	1999	6	The Little family adopt a charming young mouse named Stu...	
392	Joe Dirt	2001	6	After being abandoned by his parents at the Grand Canyon,...	
393	Sahara	2005	6	Master explorer Dirk Pitt goes on the adventure of a lifetime...	
394	Beneath the Planet of the Apes	1970	6	The sole survivor of an interplanetary rescue mission search...	
395	The Promise	2016	6	Set during the last days of the Ottoman Empire, The Promis...	
396	Dante's Peak	1997	6	A volcanologist arrives at a countryside town recently name...	

Handling Missing Data: If there have missing data in dataset, there are several ways to handle it in R programming. One way is to simply remove any rows or columns that contain missing data. Another way to handle missing data is to impute the missing values using a statistical method.

In R programming the missing value will be undefiled and with undefiled, any arithmetic operation will produce a NAN.

By using the "sum(is.na(column_name))" method, missing data can be checked.

```
> View(movies)
> sum(is.na(movies$name))
[1] 0
> sum(is.na(movies$year))
[1] 0
> sum(is.na(movies$rating))
[1] 0
> sum(is.na(movies$synopsis))
[1] 0
```

Here, in our project there is no missing data. So, no need to replace missing values with the mean values of the respective variables.

Now, the data type of rating and year variable is character, and we need to convert the year and rating variable to integer.

```
56
57  #data transformation
58  movies <- transform(movies, year = as.integer(year))
59  movies <- transform(movies, rating = as.integer(rating))
60
```

```
> movies <- transform(movies, rating = as.integer(rating))
> movies <- transform(movies, year = as.integer(year))
> movies <- transform(movies, rating = as.integer(rating))
> #data type
> typeof(movies$year)
[1] "integer"
> typeof(movies$rating)
[1] "integer"
```
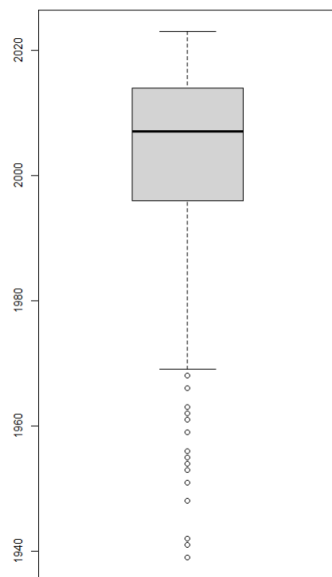
Smooth Noisy Data:

Noisy data are data with a large amount of additional meaningless information in it called noise. noise can be defined as mislabeled examples (class noise) or errors or outliers in the values of attributes (attribute noise).

By using the boxplot() method, we can detect the outliers.
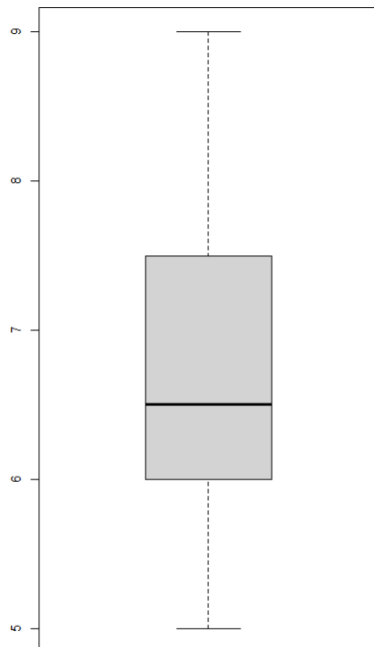
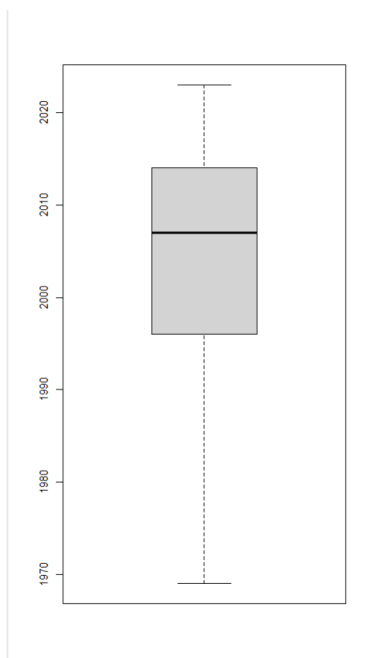There is no outlier for rating.

There are outliers for the year section.

To remove the outliers

```
> boxplot(movies$year, outline = FALSE)
```

has been used.

Year section without outlier

2) Data Integration:

Data integration is the process of combining data from different sources to help data managers and executives analyze it and make smarter business decisions.

There is no need to do data integration. Because there is no other dataset on this project.

3) Data Transformation:

Data transformation is the process of converting, cleansing, and structuring data into a usable format that can be analyzed to support decision making processes, and to propel the growth of an organization. Data transformation is used when data needs to be converted to match that of the destination system.

4) Data Reduction:

Data reduction is a capacity optimization technique in which data is reduced to its simplest possible form to free up capacity on a storage device. Data reduction reduces the amount of data that is stored on the system using a number of methods. When dealing with high dimensional data, it is often useful to reduce the dimensionality by projecting the data to a lower dimensional subspace which captures the "essence" of the data.
For this dataset, the rating section has been rounded.

```
#rounding to 2dp
movies$rating = round(movies$rating, 2)
```

	name	year	rating	synopsis	cast
384	Speed Racer	2008	6	Young driver Speed Racer aspires to be champion of the rac...	
385	Bedtime Stories	2008	6	A hotel handyman's life changes when the lavish bedtime st...	
386	S.W.A.T.	2003	6	An imprisoned drug kingpin offers a huge cash reward to a...	
387	Free Willy	1993	6	When a boy learns that a beloved killer whale is to be killed ...	
388	The Time Machine	2002	6	Hoping to alter the events of the past, a 19th century invent...	
389	Night at the Museum: Battle of the Smithsonian	2009	6	Security guard Larry Daley infiltrates the Smithsonian Institu...	
390	Miami Vice	2006	6	Based on the 1980s TV action/drama, this update focuses o...	
391	Stuart Little	1999	6	The Little family adopt a charming young mouse named Stu...	
392	Joe Dirt	2001	6	After being abandoned by his parents at the Grand Canyon,...	
393	Sahara	2005	6	Master explorer Dirk Pitt goes on the adventure of a lifetime...	
394	Beneath the Planet of the Apes	1970	6	The sole survivor of an interplanetary rescue mission search...	
395	The Promise	2016	6	Set during the last days of the Ottoman Empire, The Promis...	
396	Dante's Peak	1997	6	A volcanologist arrives at a countryside town recently name...	

5) Data Discretization:

Data discretization is defined as a process of converting continuous data attribute values into a finite set of intervals and associating with each interval some specific data value. The goal of discretization is to reduce the number of values a continuous variable assumes by grouping them.

For the following dataset, data discretization is not needed.

Descriptive Statistics

Descriptive statistics is a crucial tool for simplifying large amounts of data in a meaningful manner. It involves using various measures of central tendency and dispersion to describe the basic features of a sample in a study. These measures provide a summary of the sample data and serve as an approximation of the population being studied. Along with simple graphics, descriptive statistics form the foundation of any quantitative analysis of data.
In short, descriptive statistics simplifies large amounts of data by providing meaningful summaries of the sample being studied. It forms the basis of every quantitative analysis of data and, when used in conjunction with simple graphics, provides valuable insights that are essential in drawing conclusions and making data-driven decisions.

Here are some of the techniques applied for descriptive statistics.

```
1   #mean of rating
2   mean(movies$rating)
3
4   #median of rating
5   median(movies$rating)
6
7   #mode of rating
8   Mode(movies$rating)
9
0   #range of rating
1   max(movies$rating) - min(movies$rating)
2
3   #variance of rating
4   var(movies$rating)
5
6   #Standard deviation
7   sd(movies$rating)
8
9   #Quartile of rating
0   quantile(movies$rating)
1
2   #Interquartile range
3   IQR(movies$rating)
4
5   #histogram of rating
6   Movie_Rating = hist(movies$rating)
7
```

```
> mean(movies$rating)
[1] 6.63
> max(movies$rating) - min(movies$rating)
[1] 4
> var(movies$rating)
[1] 1.005614
> sd(movies$rating)
[1] 1.002803
> quantile(movies$rating)
   0%   25%   50%   75%  100%
 5.00  6.00  6.50  7.25  9.00
```
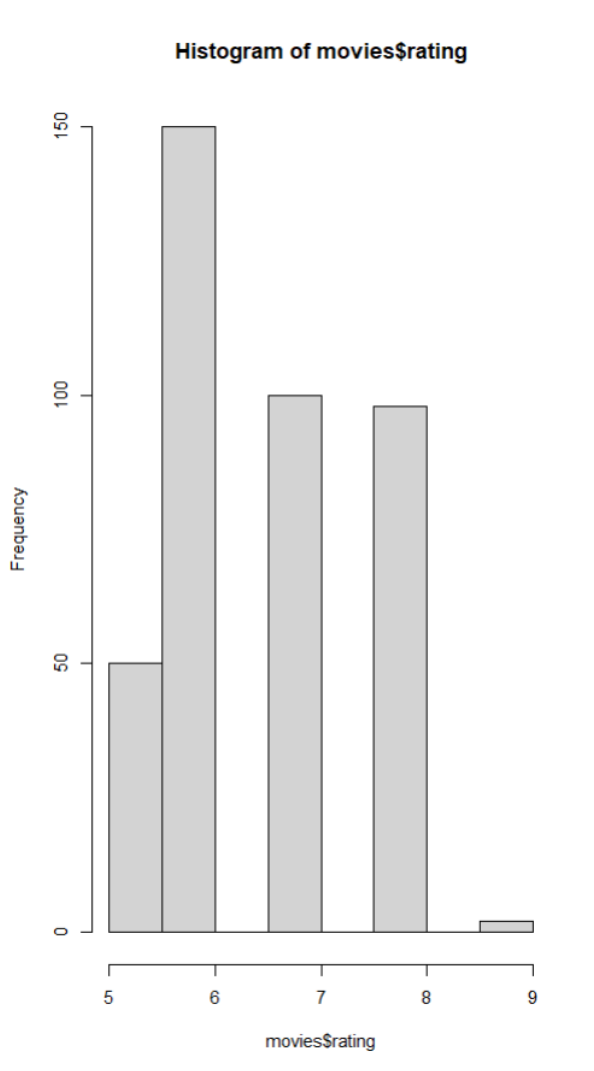
```
> median(movies$rating)
[1] 6.5
```

```
> Mode(movies$rating)
[1] 6
```


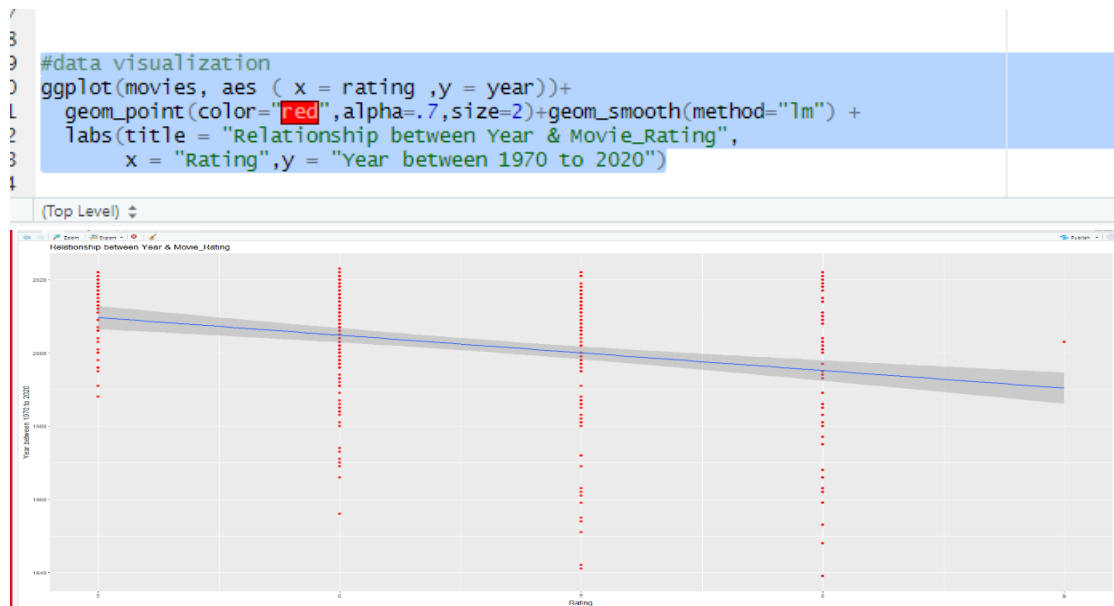Histogram of movies$rating

Data Visualization

Data visualization plays a critical role in expressing a dataset in a way that is accessible and informative. The use of charts, graphs, and other visual representations helps convey complex data in a simplified manner, making it easier for viewers to understand and interpret the information.

One of the most important aspects of data visualization is that it provides insights into the data that might not be immediately apparent through other methods. By using visual representations, patterns and trends can be identified more easily, which can help in understanding the data and making informed decisions.

Additionally, data visualization enhances understanding of complex data, making it more accessible to a broader audience. This is particularly important when communicating results to stakeholders with varying levels of technical expertise. Data visualization can help break down complex information into smaller, more manageable parts, making it easier for viewers to grasp the overall picture.

Data visualization also supports communication of data analysis results. The visual representations help convey the data in a way that is easily understandable, regardless of the viewer's level of technical expertise. This is particularly valuable when communicating results to non-technical stakeholders, such as executives or investors.

Finally, data visualization can improve decision-making. By presenting data in a clear and concise manner, data visualization helps support informed decision-making. It can help identify potential problem areas, areas of improvement, and other key factors that may influence decision-making.

```
#data visualization
ggplot(movies, aes ( x = rating ,y = year))+
  geom_point(color="red",alpha=.7,size=2)+geom_smooth(method="lm") +
  labs(title = "Relationship between Year & Movie_Rating",
       x = "Rating",y = "Year between 1970 to 2020")
```

(Top Level)

Interactive Dashboard Creation with Shiny

An interactive dashboard provides several benefits when included in a report with a dataset. Firstly, it makes the data more easily accessible and understandable for the intended audience. By allowing users to view the data in real-time through user-friendly visualizations, an interactive dashboard highlights key trends and insights within the data.

Additionally, an interactive dashboard promotes collaboration and communication among team members. Users can engage with the data in a meaningful way by manipulating the dashboard to uncover new insights, share observations, and develop data-driven strategies. This leads to faster decision-making and a more streamlined workflow.

An effective interactive dashboard also enhances data security by providing role-based access controls and ensuring that sensitive data is only visible to authorized users. This prevents unauthorized access to data, which is particularly important for organizations working with confidential or proprietary information.

Finally, an interactive dashboard improves overall productivity by enabling users to quickly analyze and understand complex datasets without having to spend time manually scrubbing through spreadsheets or reports. This frees up time for other important tasks and allows teams to focus on higher-level strategic initiatives.

```r
# Define UI
ui <- dashboardPage(
  dashboardHeader(title = "Adventure Movie Ratings"),
  dashboardSidebar(),
  dashboardBody(
    fluidRow(
      box(
        title = "Distribution of Movie Ratings",
        status = "primary",
        solidHeader = TRUE,
        width = 6,
        plotOutput("rating_hist")
      ),
      box(
        title = "Relationship between Year and Movie Rating",
        status = "primary",
        solidHeader = TRUE,
        width = 6,
        plotOutput("rating_year")
      )
    ),
    fluidRow(
      box(
        title = "Top 10 Movies",
        status = "primary",
        solidHeader = TRUE,
        width = 12,
        dataTableOutput("top10_movies")
      )
    )
  )
)
```

Here the UI was designed.

```r
# Define server
server <- function(input, output) {

  # Movie rating histogram
  output$rating_hist <- renderPlot({
    ggplot(movies, aes(x = rating)) +
      geom_histogram(color = "black", fill = "blue", binwidth = 0.25) +
      ggtitle("Distribution of Movie Ratings") +
      labs(x = "Movie Rating", y = "Frequency")
  })
```

Then the server was defined.

```r
  # Movie rating vs year scatterplot
  output$rating_year <- renderPlot({
    ggplot(movies, aes(x = rating, y = year)) +
      geom_point(color = "red", alpha = .7, size = 2) +
      geom_smooth(method = "lm") +
      ggtitle("Relationship between Year and Movie Rating") +
      labs(x = "Rating", y = "Year between 1970 to 2020")
  })
```

Now, scatterplot diagram was created.

```r
  # Top 10 movies table
  output$top10_movies <- renderDataTable({
    movies %>%
      arrange(desc(rating)) %>%
      select(name, rating, year, cast) %>%
      head(10)
  })

}
```

The top 10 movies are shown.

```
}

# Run the app
shinyApp(ui, server)
```