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CLASS: AIA-1

ROLL NO:2213191

BATCH: B

Assignment No 1

Title: Getting data to work with R Programming:

i. Download the sample dataset locally for any application (Kaggle)

ii. Setting up the working directory.

iii. Unpacking the data. Decompress the file locally.

iv. Looking at the data. Display the top (10) and bottom (10) of the file.

v. Measuring the length of the data set. Count the number of lines in the file.

vi. Encode the categorical data

vi. Plot a graph and give your insights for the application selected cases.

Theory:

Setting Up the Working Directory

To set the working directory in R, you can use the `setwd()` function. Make sure to provide the path to your desired directory. Here's an example:

```
# Replace 'path_to_your_directory' with your actual directory path
setwd("path_to_your_directory")
```

Alternatively, if you prefer a more interactive way, you can use RStudio's interface to set the working directory:

1. Go to **Session** in the top menu.
2. Select **Set Working Directory**.
3. Choose **Choose Directory...** and navigate to the directory you want.

Unpacking Data (Decompressing Files)

To decompress files in R, you typically use functions that correspond to the compression format of your file. Here are examples for common compression formats:

Decompressing ZIP Files

For ZIP files, you can use the `unzip()` function in R:

```
# Replace 'file.zip' with the name of your ZIP file
unzip("file.zip", exdir = "output_directory")
```

- `file.zip` is the name of your ZIP file.
- `exdir = "output_directory"` specifies the directory where you want to extract the contents. Replace `"output_directory"` with your desired output directory path.

Decompressing GZIP Files

For GZIP files, you can use the `untar()` function in R:

```
# Replace 'file.tar.gz' with the name of your GZIP file
untar("file.tar.gz", exdir = "output_directory")
```

- `file.tar.gz` is the name of your GZIP file.
- `exdir = "output_directory"` specifies the directory where you want to extract the contents. Replace `"output_directory"` with your desired output directory path.

Example Workflow

Here's a complete example that sets the working directory and decompresses a ZIP file:

```
# Set the working directory
setwd("path_to_your_directory")

# Unzip the file
unzip("data.zip", exdir = "data")
```

Replace `"path_to_your_directory"` with your actual directory path, `"data.zip"` with your actual ZIP file name, and `"data"` with the directory where you want to extract the contents.

Notes

- Make sure you have appropriate permissions to write to the specified directory.
- Adjust the file names and paths according to your specific case.
- Depending on your system and R setup, you may need additional packages for handling specific compression formats not covered here (like `.tar.gz` or `.7z`).

To achieve tasks related to inspecting data in R, such as displaying the top and bottom rows of a file and measuring the length (number of lines) of the dataset, you can use the following R code snippets.

Loading and Viewing Data

Assume you have a CSV file named `data.csv` that you want to inspect.

```
# Set the working directory if not already set
setwd("path_to_your_directory")
```

```
# Read the CSV file into a data frame
data <- read.csv("data.csv")

# Display the top 10 rows
head(data, 10)

# Display the bottom 10 rows
tail(data, 10)
```

- `read.csv("data.csv")` reads the CSV file `data.csv` into a data frame named `data`.
- `head(data, 10)` displays the top 10 rows of the data frame `data`.
- `tail(data, 10)` displays the bottom 10 rows of the data frame `data`.

Measuring the Length of the Dataset

To count the number of lines (observations) in the dataset:

```
# Count the number of rows (length of the dataset)
num_rows <- nrow(data)
print(num_rows)
```

- `nrow(data)` returns the number of rows (observations) in the data frame `data`.
- `print(num_rows)` prints the number of rows to the console.

Example Workflow

Here's a combined example that demonstrates how to load a CSV file, display its top and bottom rows, and measure its length:

```
# Set the working directory
setwd("path_to_your_directory")

# Read the CSV file into a data frame
data <- read.csv("data.csv")

# Display the top 10 rows
cat("Top 10 rows:\n")
print(head(data, 10))

# Display the bottom 10 rows
cat("\nBottom 10 rows:\n")
print(tail(data, 10))

# Count the number of rows (length of the dataset)
num_rows <- nrow(data)
cat("\nNumber of rows in the dataset:", num_rows, "\n")
```

Replace `"path_to_your_directory"` with the actual directory path where your `data.csv` file is located.

Notes

- Ensure that your CSV file (`data.csv` in this example) is in the specified directory and that you have permission to read from that directory.

- Adjust the number `10` in `head(data, 10)` and `tail(data, 10)` to display more or fewer rows as needed.
- This approach assumes your data is in CSV format. If your data is in a different format (e.g., Excel, text files), you'll need to use corresponding functions (`read.xlsx`, `read.table`, etc.) to read the data into R.

r language program for Encode the categorical data vi. Plot a graph and give your insights for the application selected cases.

To encode categorical data and then plot a graph for insights, we'll go through the steps using R. Let's assume you have a dataset with categorical variables that you want to encode and visualize. Here's a step-by-step approach:

Step 1: Loading and Preparing the Data

Assume you have a dataset `data.csv` that includes categorical variables. We will use the `read.csv()` function to read the data into R.

```
# Set the working directory
setwd("path_to_your_directory")

# Read the CSV file into a data frame
data <- read.csv("data.csv", stringsAsFactors = TRUE)  # Ensure strings are
read as factors for encoding
```

Step 2: Encoding Categorical Variables

To encode categorical variables, we will use the `factor()` function in R. If your data is already read with `stringsAsFactors = TRUE`, factors are automatically created. Otherwise, you can explicitly convert character columns to factors.

```
# Check the structure of your data
str(data)

# If needed, convert character columns to factors
# Example:
# data$Category <- factor(data$Category)
```

Step 3: Plotting a Graph and Providing Insights

Now, let's plot a graph to visualize insights from the encoded categorical data. Depending on your data and the insights you want to gain, you can choose appropriate types of plots such as bar plots, pie charts, etc.

Here's an example using a bar plot to show the distribution of a categorical variable `Category`:

```
# Load ggplot2 library for plotting
library(ggplot2)

# Plot a bar plot of Category
  ggplot(data, aes(x = Category)) +
  geom_bar(fill = "blue") +
```

```
  labs(title = "Distribution of Categories",
       x = "Category",
       y = "Count") +
  theme_minimal()
```

Example Workflow

Assuming `Category` is a categorical variable in your dataset:

```
# Example data loading and encoding
setwd("path_to_your_directory")
data <- read.csv("data.csv", stringsAsFactors = TRUE)

# Plotting a bar plot for Category
library(ggplot2)
ggplot(data, aes(x = Category)) +
  geom_bar(fill = "blue") +
  labs(title = "Distribution of Categories",
       x = "Category",
       y = "Count") +
  theme_minimal()
```

Replace `"path_to_your_directory"` with the actual path where your `data.csv` file is located. Ensure your dataset contains a column named `Category` or adjust the plot code accordingly based on your actual data structure.

Insights

- **Visualization**: The bar plot visualizes the distribution of categories within your dataset, allowing you to see the frequency or proportion of each category.
- **Interpretation**: From the plot, you can identify which categories are most common or least common, which may provide insights into the characteristics of your data.

Notes

- Depending on your specific dataset and research questions, you might need to customize the plot further or use different types of plots (e.g., pie chart, stacked bar chart) for better visualization.
- Ensure to install and load necessary packages (`ggplot2` in this case) using `install.packages("ggplot2")` and `library(ggplot2)` respectively, if you haven't already.

- **Link for dataset https://www.kaggle.com/datasets/tomaslui/healthcare-dataset?resource=download**

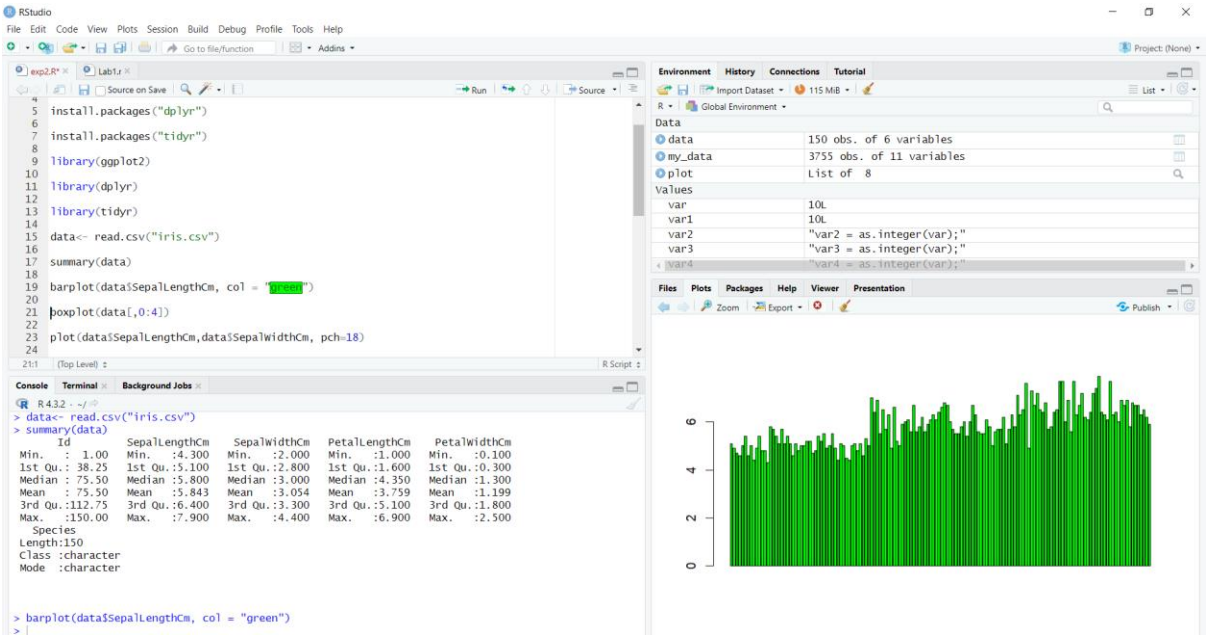
Conclusion: We have understood the environment of R Programming and basic commands of R programming. We have also used the concepts of data frames and operations on it. Further we have visualised the data using different graphs.

CODE:

```
install.packages("ggplot2")

install.packages("dplyr")

install.packages("tidyr")

library(ggplot2)

library(dplyr)

library(tidyr)

data<- read.csv("Iris.csv")

summary(data)

barplot(data$sepal_length, col = "green")

boxplot(data[,0:4])

plot(data$sepal_length,data$sepal_width, pch=18)

hist(data$sepal_length, col="purple",border="black")

pairs(~data$sepal_length+data$sepal_width+data$petal_length+data$petal_w
idth)

# Install and load necessary packages

install.packages("plotly")

library(plotly)

set.seed(123)

data <- data.frame(

  X = rnorm(100, mean = 20, sd = 5),

  Y = rnorm(100, mean = 30, sd = 8),

  Z = rnorm(100, mean = 40, sd = 10)
```

```
)

plot <- plot_ly(data, x = ~X, y = ~Y, z = ~Z, type = "scatter3d", mode =
"markers",

            marker = list(size = 5, color = "blue")) %>%

  layout(scene = list(

    xaxis = list(title = "X Variable"),

    yaxis = list(title = "Y Variable"),

    zaxis = list(title = "Z Variable")

  ))

print(plot)
```

OUTPUT:



RStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

```
install.packages("tidyr")

library(ggplot2)

library(dplyr)

library(tidyr)

data<- read.csv("iris.csv")

summary(data)

barplot(data$SepalLengthCm, col = "green")

boxplot(data[,0:4])

plot(data$SepalLengthCm,data$SepalWidthCm, pch=18)

hist(data$SepalLengthCm, col="purple",border="black")
```

```
> summary(data)
       Id          SepalLengthCm    SepalWidthCm   PetalLengthCm    PetalWidthCm
 Min.   :  1.00   Min.   :4.300   Min.   :2.000   Min.   :1.000   Min.   :0.100
 1st Qu.: 38.25   1st Qu.:5.100   1st Qu.:2.800   1st Qu.:1.600   1st Qu.:0.300
 Median : 75.50   Median :5.800   Median :3.000   Median :4.350   Median :1.300
 Mean   : 75.50   Mean   :5.843   Mean   :3.054   Mean   :3.759   Mean   :1.199
 3rd Qu.:112.75   3rd Qu.:6.400   3rd Qu.:3.300   3rd Qu.:5.100   3rd Qu.:1.800
 Max.   :150.00   Max.   :7.900   Max.   :4.400   Max.   :6.900   Max.   :2.500
   Species
 Length:150
 Class :character
 Mode  :character


> barplot(data$SepalLengthCm, col = "green")
> boxplot(data[,0:4])
>
```

Environment History Connections Tutorial

Import Dataset 116 MiB

Global Environment

Data

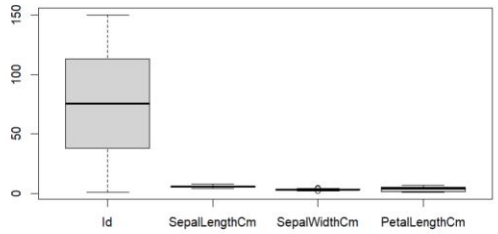
data	150 obs. of 6 variables
my_data	3755 obs. of 11 variables
plot	List of 8

Values

var	10L
var1	10L
var2	"var2 = as.integer(var);"
var3	"var3 = as.integer(var);"
var4	"var4 = as.integer(var);"

Files Plots Packages Help Viewer Presentation

Zoom Export Publish



RStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

```
library(ggplot2)

library(dplyr)

library(tidyr)

data<- read.csv("iris.csv")

summary(data)

barplot(data$SepalLengthCm, col = "green")

boxplot(data[,0:4])

plot(data$SepalLengthCm,data$SepalWidthCm, pch=18)

hist(data$SepalLengthCm, col="purple",border="black")

pairs(~data$SepalLengthCm+data$SepalWidthCm+data$PetalLengthCm+data$PetalWidthCm)
```

```
> summary(data)
       Id          SepalLengthCm    SepalWidthCm   PetalLengthCm    PetalWidthCm
 Min.   :  1.00   Min.   :4.300   Min.   :2.000   Min.   :1.000   Min.   :0.100
 1st Qu.: 38.25   1st Qu.:5.100   1st Qu.:2.800   1st Qu.:1.600   1st Qu.:0.300
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   Species
 Length:150
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> barplot(data$SepalLengthCm, col = "green")
> boxplot(data[,0:4])
> plot(data$SepalLengthCm,data$SepalWidthCm, pch=18)
>
```

Environment History Connections Tutorial

Import Dataset 117 MiB

Global Environment

Data

data	150 obs. of 6 variables
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plot	List of 8

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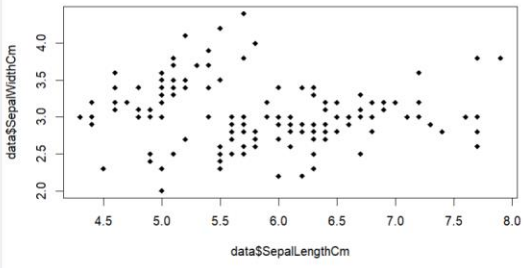
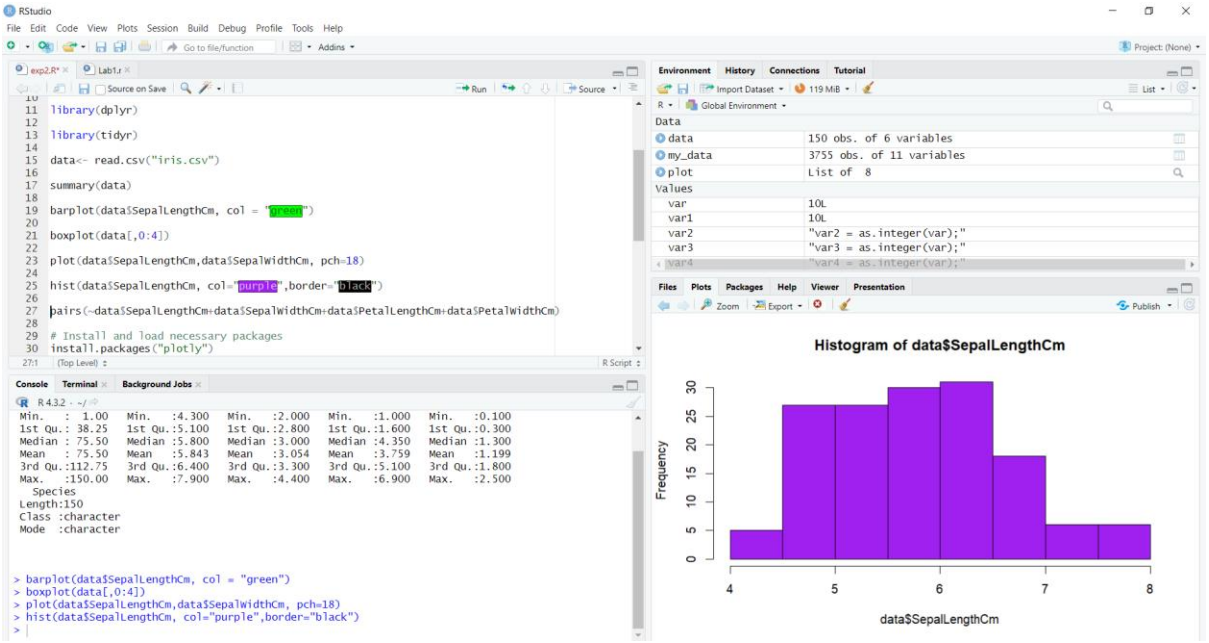
Files Plots Packages Help Viewer Presentation

Zoom Export Publish




RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
exp2.R* Lab1.r
Source on Save
Run
Source
11 library(dplyr)
12
13 library(tidyr)
14
15 data<- read.csv("iris.csv")
16
17 summary(data)
18
19 barplot(data$SepalLengthCm, col = "green")
20
21 boxplot(data[,0:4])
22
23 plot(data$SepalLengthCm,data$SepalWidthCm, pch=18)
24
25 hist(data$SepalLengthCm, col="purple",border="black")
26
27 pairs(~data$SepalLengthCm+data$SepalWidthCm+data$PetalLengthCm+data$PetalWidthCm)
28
29 # Install and load necessary packages
30 install.packages("plotly")
27:1 (Top Level) R Script
Console Terminal Background Jobs
R 4.3.2 · ~/
Min. : 1.00 Min. :4.300 Min. :2.000 Min. :1.000 Min. :0.100
1st Qu.: 38.25 1st Qu.:5.100 1st Qu.:2.800 1st Qu.:1.600 1st Qu.:0.300
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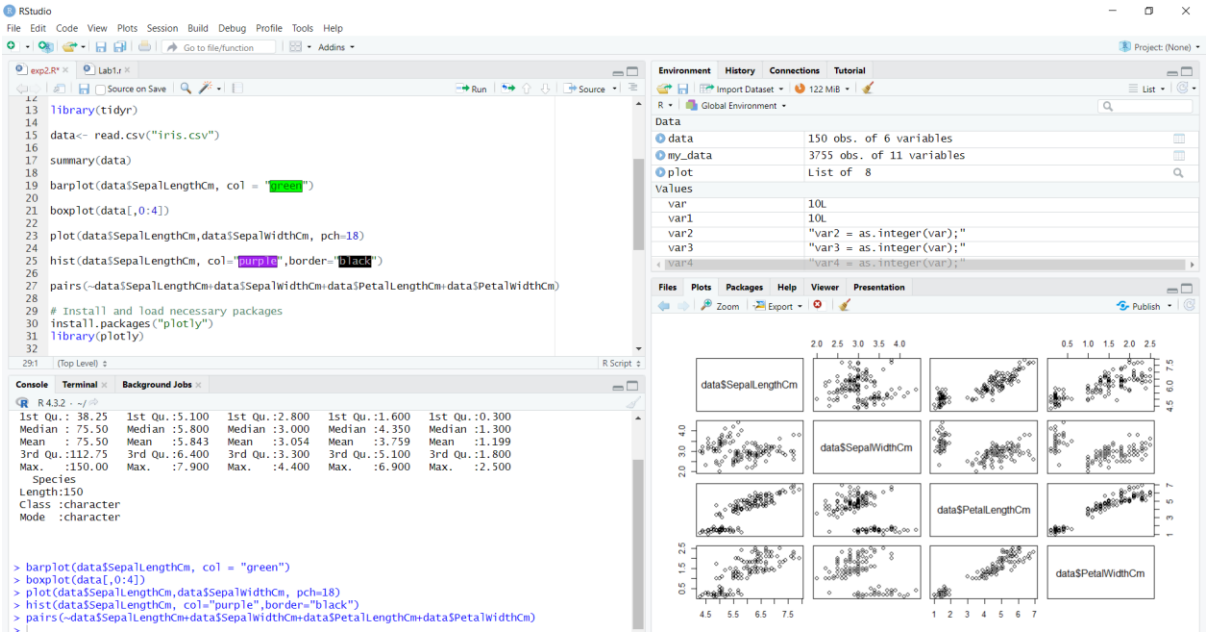
Environment History Connections Tutorial
Import Dataset 119 MiB
R Global Environment
Data
data 150 obs. of 6 variables
my_data 3755 obs. of 11 variables
plot List of 8
Values
var 10L
var1 10L
var2 "var2 = as.integer(var);"
var3 "var3 = as.integer(var);"
var4 "var4 = as.integer(var);"
Files Plots Packages Help Viewer Presentation
Zoom Export Publish
Histogram of data$SepalLengthCm
Frequency
0 5 10 15 20 25 30
4 5 6 7 8
data$SepalLengthCm


RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
exp2.R* Lab1.r
Source on Save
Run
Source
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16
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18
19 barplot(data$SepalLengthCm, col = "green")
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21 boxplot(data[,0:4])
22
23 plot(data$SepalLengthCm,data$SepalWidthCm, pch=18)
24
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Environment History Connections Tutorial
Import Dataset 122 MiB
R Global Environment
Data
data 150 obs. of 6 variables
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Values
var 10L
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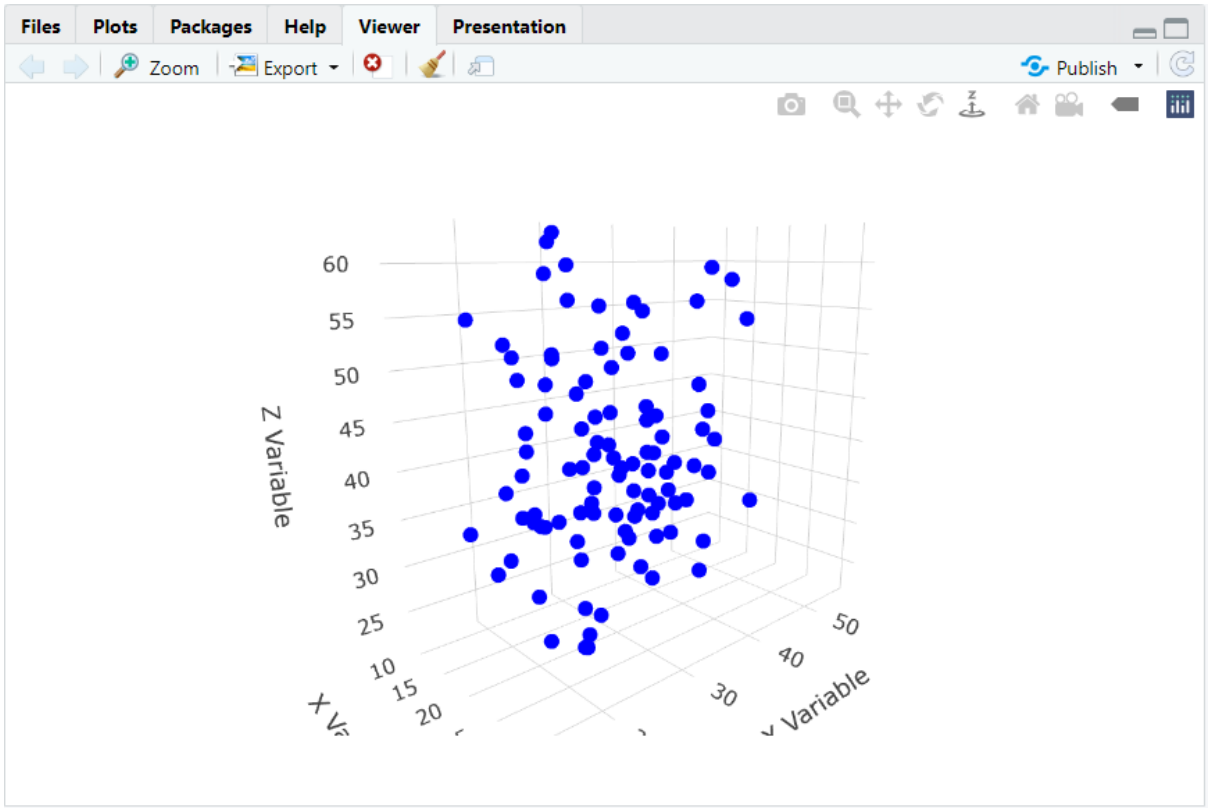
Files Plots Packages Help Viewer Presentation
Zoom Export Publish
data$SepalLengthCm
data$SepalWidthCm
data$PetalLengthCm
data$PetalWidthCm


Files
Plots
Packages
Help
Viewer
Presentation
Zoom
Export
Publish
Z Variable
60
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10
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40
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Variable