<u>**Experiment No - 7**</u>

Aim - Data Visualization: Data Visualization: Use different R libraries for data visualization

Objective:- Tounderstand and apply the Rlibraries for visualization usingpython.

Description:-

ggplot2

ggplot2 is an R data visualization library that is based on The Grammar of Graphics. ggplot2 can create data visualizations such as bar charts, pie charts, histograms, scatterplots, error charts, etc. using high- level API. It also allows you to add different types of data visualization components or layers in a single visualization. Once ggplot2 has been told which variables to map to which aesthetics in the plot, it does the rest of the work so that the user can focus on interpreting the visualizations and take less time in creating them. But this also means that it is not possible to create highly customized graphics in ggplot2. But there are a lot of resources in the RStudio community and Stack Overflow which can provide help in ggplot2 when needed. Just like dplyr, if you want to install ggplot2, you can install the tidyverse or you canjust install ggplot2 using install.packages("ggplot2")

Plotly:

Plotly is a free open-source graphing library that can be used to form data visualizations. Plotly is an R package that is built on top of the Plotly JavaScript library (plotly.js) and can be used to create w eb-based data visualizations that can be displayed in Jupyter notebooks or web applications using Dash or saved as individual HTML files. Plotly provides more than 40 unique chart types like scatter plots, histograms, line charts, bar charts, pie charts, error bars, box plots, multiple axes, sparklines, dendrograms, 3-D charts, etc. Plotly also provides contour plots, which are not that common in other data visualization libraries. In addition to all this, Plotly can be used offiine with no internet connection. You can install Plotly from CRAN using install.packages('plotly') or install the latest development version from GitHub using devtools:: install_github("ropensci/plotly").

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Lattice:

Lattice is a data visualization tool that is primarily used to implement Trellis graphs in R. These Trellis graphs are used to view many complicated and multi-variable data sets at the same time so they can be compared. Since all these different plots end up looking like a Trellis, this is called a Trellis graph. Since Lattice is a high-level data visualization library, it can handle many of the typical graphics without needing many customizations. In case you want to extend the capabilities of Lattice, they can download the LatticeExtra package which is an extended version. You can install Lattice from CRAN using install.packages("lattice") or install the development version from GitHub usmg remotes: :install_github("deepayan/lattice ").

RGL

The RGL package in R is created specifically for making 3-D data visualizations and data plots. It has many graphics commands that work in 3 dimensions but is modeled loosely after the classic 2-D graphics in R. RGL is also inspired by the grid package in R but it is incompatible with it. However, seasoned R coders can easily use RGL because of an existing familiarity with the grid. And RGL is very cool! It has a lot of options for 3-D shapes, various lighting effects, creating new shapes, and also animations. You can install RGL from CRAN using install.packages("rgl ").

Leaflet

Just like dygraphs, the Leaflet package is an **R** interface to the JavaScript Leaflet library that is extremely popular. Leaflet is very useful in creating interactive but lightweight maps that are seen on various websites such as the Washington Post, the New York Times, etc. There are many useful features in this package such as interactive panning and zooming in the charts, the option to combine Polygons, Lines, Popups, etc. to create charts, embed maps in knitr, create maps in mercator projections that are non- spherical and so on. The Leaflet package can be used at the **R** console after installing it from CRAN using the command install.packages("leaflet").

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Program:

1. **Visualization using ggplot2**

```
%%R
install.packages("dplyr")
library(dplyr)
# Load the ggplot2 library
install.packages("ggplot2")
library(ggplot2)
# Summary of the mtcars dataset
summary(mtcars)
# Create a scatter plot using ggplot2
ggplot(data = mtcars, aes(x = hp, y = mpg, col = disp)) + geom_point() + labs(title =
"Scatter Plot of Horsepower vs. MPG", x = "Horsepower", y = "MPG", color =
"Displacement")
```

Output:

`

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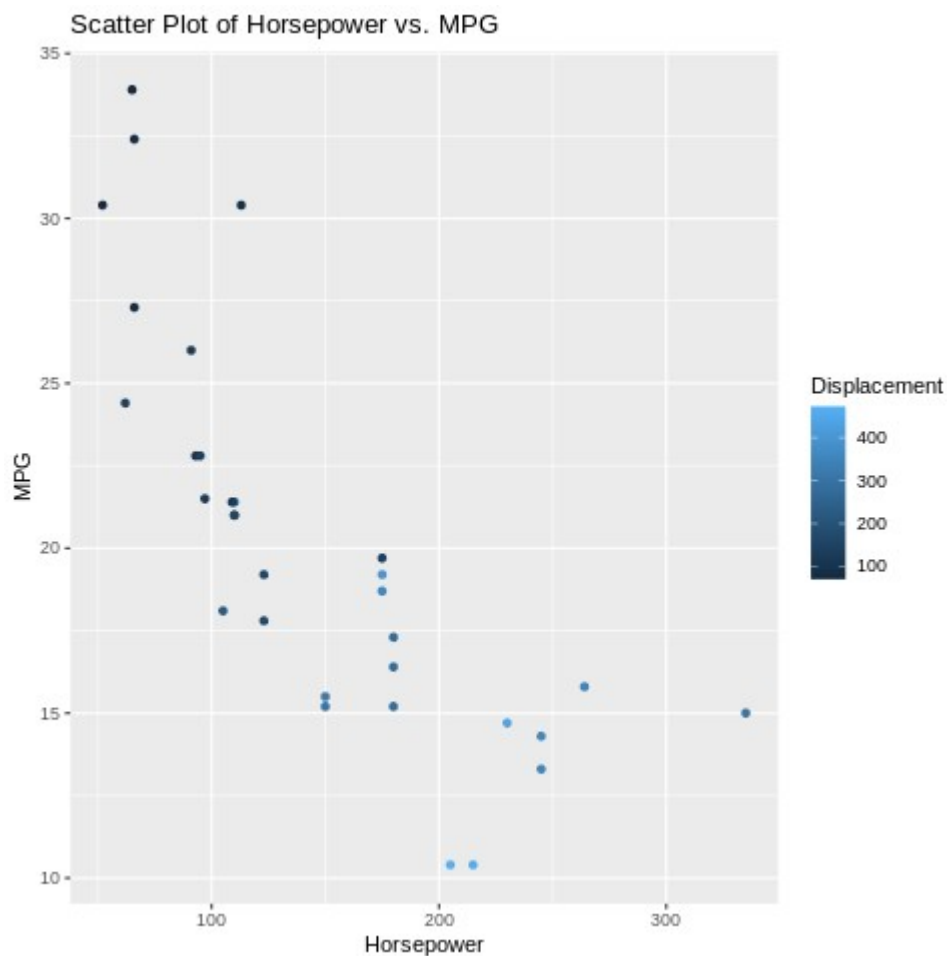
2. **Visualization using plotly**

%%R

Load the required packages

install.packages("plotly")

library(plotly)

Create the data frame

USPersonalExpenditure <- data.frame("Categorie" = rownames(USPersonalExpenditure), USPersonalExpenditure)

data <- USPersonalExpenditure[, c('Categorie', 'X1960')]

Create the pie chart

fig <- plot_ly(data, labels = ~Categorie, values = ~X1960, type = 'pie')
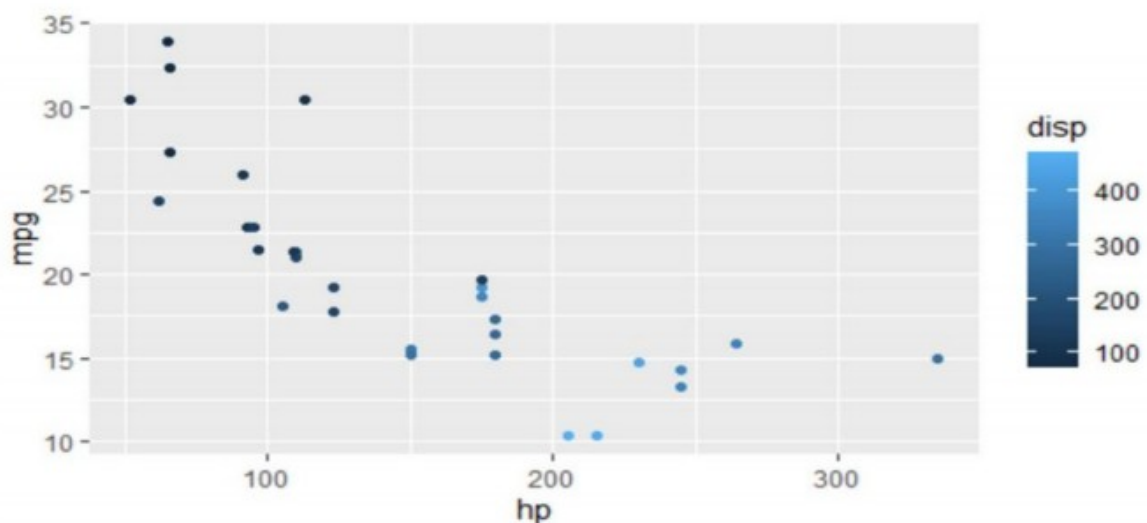
Customize layout

fig <- fig %>% layout(title = 'United States Personal Expenditures by Categories in 1960',

xaxis = list(showgrid = FALSE, zeroline = FALSE, showticklabels = FALSE),

yaxis = list(showgrid = FALSE, zeroline = FALSE, showticklabels = FALSE))

fig

Conclusion-

1. **Features of plotly and ggplot2 libraries are**
   - **ggplot2:**
     - Based on The Grammar of Graphics.
     - Creates various types of plots like scatter plots, histograms, bar charts, etc.
     - Easy to use and allows adding different layers to a plot.
   - **Plotly:**
     - Built on top of the Plotly JavaScript library.
     - Provides over 40 unique chart types including scatter plots, histograms, pie charts, etc.
     - Can create web-based interactive visualizations.
     - Can be used offline.

2. **What is Plotly?**
   - Plotly is an R package built on top of the Plotly JavaScript library.
   - It provides a high-level interface for creating web-based interactive visualizations.
   - Plotly offers various chart types and customization options.

3. **Which programming languages can be used with Plotly?**
   - Plotly is primarily used with R, but it also has interfaces for other programming languages such as Python, MATLAB, Julia, and JavaScript.