Malla Reddy University

Data Visualization in R (DVR)

MR22-1CS0301

COURSE OBJECTIVES:

- To learn different statistical methods for Data visualization.
- To learn basics of R for data visualization.
- To learn Data Manipulation using R.
- To use effectively the various visualization structures like bar charts, histograms, pie charts, scatter plots, line plots, box plots, maps.
- To Design and build data visualization systems.

UNIT-I

Introduction to Statistics

Introduction to Statistics, Difference between inferential statistics and descriptive statistics, Random Variables, Sampling , Sample Statistics and Sampling Distributions.

Introduction to Data Visualization:

Data visualization and its importance, Characteristics of Effective Graphical Visual, Advantages and Disadvantages of using R for data Visualization, Application areas,

R and R studio Installation

UNIT-II

R overview

Features of R, Variables and Data Types in R, Operators in R, Vectors, Factors ,Lists and Data Frames in R, Importing Data, reading in .csv files, Statistical Functions in R**,** Descriptive Data analysis using R, **Packages in R**: Repositories**,** Installing Packages, Loading Packages, R Data Visualization Packages.

Data manipulation with R packages- dplyr, Readr, Reshape2, Tidyr, lubridate,

UNIT-III

R – Charts and Graphs: Types of R charts**:** Bar Plot or Bar Chart, Histogram, Pie Diagram or Pie Chart, Scatter Plot, Box Plot.

Data visualization in R using ggplot2- Grammar of graphics**,** layers with the grammar of graphics, line plot, jitter plot, scatter plot, box plots, bar plot, histogram, pie chart and subplots.

UNIT-IV

Specialized Visualization: Word Clouds, Radar Charts, and Waffle Charts and their implementation in R.

Creating Maps in R: Packages for maps in R**,** Plotting Simple Features (sf) with Plot, Creating a Choropleth Map with ggplot2, Plotting Points on a Map with mapview, Labelled maps, creating an Interactive Web Map with a leaflet

UNIT-V

Interactive ggplot2 graphs with Plotly in R:

Plotly Features, Scatter plot, Bar plot, Bubble Plot, Difference between ggplt2 and plotly.

A Gentle Introduction to Shiny: Shiny Installation**,** Basic Structure of a Shiny, Adding control widgets, Standard Shiny widgets, Create reactive output User Interface Section Structure, The Server Section

TEXT BOOKS:

1. R for Data Science by Garrett Grolemund and Hadley Wickham, O'REILLY
2. ggplot2: Elegant Graphics for Data Analysis By Hadley Wickham.
3. Interactive Web-Based Data Visualization with R, plotly, and shiny By Carson Sievert

REFERENCE BOOKS:

1. The Art of R Programming, Norman Matloff.
2. R graphics code book, Winston Chang,O'REILLY
3. Introduction to statistics by Pk Giri and Banerjee, Acaemic publishers

COURSE OUTCOMES:

- Apply statistical methods for Data visualization.
- Gain knowledge of R for Data visualization
- Understand usage of various packages in R.
- Apply data visualization tools on various data sets
- Demonstrate knowledge of Interactive Visualization.

EXERCISES:

1. Installation of R and R-Studio on windows and understand the basics of R.
2. Working with R Objects: Vectors, lists, Factors and Data Frame.
3. How to Import Data into R from different sources.
4. Write a code for Descriptive Data Analysis in R
5. Write a code to load the different packages and use the different functions to perform Data manipulation in R
6. Working with R – Charts and Graphs**.**
7. Write a code to draw graphs like scatter plot, box plots, bar plot, histogram on the different variables in the dataset using ggplot2.
8. Write a code to implement Word Clouds, Radar Charts, Waffle Charts in R.
9. Write a code to draw maps using different packages in R.
10. Creating Interactive ggplot2 graphs with Plotly in R: Scatter plot, Bar plot, Bubble Plot.