R Programming (2 Days)

OVERVIEW

Over the past few years, R has been steadily gaining popularity with business analysts, statisticians and data scientists as a tool of choice for conducting statistical analysis of data as well as supervised and unsupervised machine learning.

OBJECTIVES

This intensive training course helps students learn the practical aspects of the R programming language. The course is supplemented by many hands-on labs which allow attendees to immediately apply their theoretical knowledge in practice.

TOPICS

- High octane introduction to R programming
- Learning about R data structures
- Working with R functions
- Statistical data analysis with R
- Supervised and unsupervised machine learning with R

AUDIENCE

Business Analysts, Technical Managers, and Programmers

PREREQUISITES

Participants should have the general knowledge of statistics and programming

COURSE OUTLINE

CHAPTER 1. INTRODUCTION

- Installing R
- Character Terminal and GUI Interfaces to R
- Other GUI Integrated Development Environments

CHAPTER 2. WORKING WITH R

- Running R
- Learning GUI Integrated Development Environment
- Interacting with R Interpreter
- R Sessions and Workspaces
- Saving Your Workspace
- Loading Your Workspace
- Removing Objects in Workspace
- Getting Help
- Getting System Information
- Standard R Packages
- Loading Packages
- CRAN (The Comprehensive R Archive Network)
- Extending R

CHAPTER 3. R SYNTAX

- General Notes on R Commands and Statements
- Variables
- Assignment Operators
- Arithmetic Operators
- Logical Operators

CHAPTER 4. R DATA STRUCTURES

- R Objects
- Vectors
- Logical Vectors
- Character Vectors
- Creating and Working with Vectors
- Lists
- Creating and Working with Lists
- Matrices
- Creating and Working with Matrices
- Data Frames
- Creating and Working with Data Frames
- Interactive Creation of Data Frames
- Getting Info about a Data Frame
- Sorting Data in Data Frames
- Matrices vs Data Frames

CHAPTER 5. FUNCTIONS

- Using R Common Functions
- Numeric Functions
- Character / String Functions
- Date and Time Functions
- Other Useful Functions
- Applying Functions to Matrices and Data Frames
- Type Conversion
- Creating and Using User-Defined Functions

CHAPTER 6. CONTROL STATEMENTS

- Conditional Execution
- Repetitive Execution

CHAPTER 7. SCRIPTS

- Creating Scripts
- Loading and Executing Scripts
- Batch Execution Mode

CHAPTER 8. INPUT / OUTPUT

- Reading Data from Files
- Writing Data to Files
- Getting the List of Files in a Directory
- Diverting System Output to a File

CHAPTER 9. DATA IMPORT AND EXPORT

- Import and Export Operations in R
- Working with CSV Files
- Reading Data from Excel
- Exporting Data in SPSS Data Format

CHAPTER 10. R STATISTICAL COMPUTING FEATURES

- Basic Statistical Functions
- Writing Your Own skew and kurtosis Functions
- Generating Normally Distributed Random Numbers
- Generating Uniformly Distributed Random Numbers
- Using the summary() Function
- Math Functions Used in Data Analysis
- Correlations
- Testing Correlation Coefficient for Significance
- Regression Analysis
- Types of Regression
- Simple Linear Regression Model
- Least-Squares Method (LSM)
- LSM Assumptions
- Fitting Linear Regression Models in R

- Confidence Intervals for Model Parameters
- Multiple Regression Analysis
- Finding the Best-Fitting Regression Model
- Comparing Regression Models with anova and AIC

CHAPTER 11. DATA VISUALIZATION

- R Graphics
- Graphics Export Options
- Creating Bar Plots in R
- Using barplot() with Matrices
- Stacked vs Juxtaposed Layouts
- Customizing Plots
- Histograms
- Building Histograms with hist()
- Pie Charts
- Generic X-Y Plotting
- Dot Plots

CHAPTER 12. DATA SCIENCE ALGORITHMS AND ANALYTICAL METHODS

- Supervised and Unsupervised Machine Learning Algorithms
- k-Nearest Neighbors
- Monte Carlo Simulation