Applied Data Analysis with R: A Hands-On Training Program

Course Outline

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Contents	
Chapter 1	**Introduction to Computer Programming and R** • Computer programming (basic concept) • Limited capabilities of the computer. • Sample computer program using basic steps. • Variable, function & package concept. • Programming structures. • Introducing R Programming • R Advantages and Disadvantages • Environment setup • Installation of R • Installation of RStudio • Run some basic code.
Chapter 2	**Core Concepts of Data Types, Structures, and Control Flow** • Data types • Data Structure • Variable, Keywords • Operators, Comment • Input from user • Data Structure in detail • Vectors, Lists, Arrays • Matrix, Data frames, Factors • R Statements (If, if-else, else if, switch) • R Loops (For loop, repeat loop, while loop) • R Functions • Built-in functions
Chapter 3	**R Packages and Repositories: Installation and Usage** • Packages in R Programming • What are repositories? • Install an R-Package • Update, remove, and check installed packages • Installing packages using RStudio UI • Load packages in R • Difference between a package and a library

	• Load more than one package at a time • Choose the right R Packages • Using package- gapminder
Chapter 4	**Data Transformation and Manipulation** • Uses dplyr. • File Handling. • Creating a file, write into a file, rename a file, check existence of a file, reading a file, list all files, copy a file, create a directory. • Reading a text file, using readr package, read tabular data. • Working with CSV, Excel, JSON, XML file.
Chapter 5	**Visualization Using R** • Basic ploting, Heatmap. • ggplot2 (grammar of graphics), Tidyverse. • Pie chart, Bar chart, Boxplot. • Histogram, Line graph, Scatterplot.
Chapter 6	**Descriptive Statistics** • Central tendency: mean, median, mode. • Variability analysis or Dispersion: range, variance, standard deviation, minimum, maximum. • Normality test • Outlier detection • Create t-score and z-score • Percentile Score
Chapter 7	**Correlation & Regression** • Definition of correlation • Pearson correlation, Spearman correlation, Kendall's tau • Partial correlation • Definition & Types of regression • Simple linear regression • Linear bi-variate regression • Multiple linear regression • Non-linear regression • Logistic regression • Multinomial logistic regression
Chapter 8	**Statistical Inference and Tests** • Some definitions of related terms. • Distinguish between parametric and non-parametric tests. • Crosstabs analysis • t-test and z-test • ANOVA • Median Test • Chi-square • Mann-Whitney U Test, K-S test

	• Wilcoxon Rank Test • Kruskal-Wallis