



Data Science

Mode of Training: Online, Classroom, Corporate

Faculty: Mr. BHANU

Course Duration: 60 Days

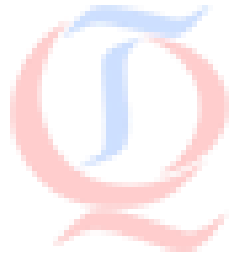
A woman with dark curly hair and glasses, wearing a pink top, stands with her arms crossed in front of a large window with a grid pattern. The window is out of focus, showing a grid of light and dark squares.

Course Curriculum

SATASTICS

Understanding the Data

- Data, Data Types
- Meaning of variables
- Central Tendency
- Measures of Dispersion
- Measures of Variability
- Measures of Shape
- Data Distribution
- Correlation, Covariance
- Practical Examples



Probability Distributions

- Mean, Expected value
- Binomial Random Variable
- Normal Distribution
- Poisson Random Variable
- Continuous Random Variable
- Discrete Random Variable
- Practical Examples

Sampling Distributions

- Central Limit Theorem
- Sampling Distributions for Sample Proportion, p -hat

- Sampling Distributions for Sample Mean, \bar{x}
- Z- Scores
- Practical Examples

Hypothesis Testing

- Type I and Type II Errors
- Decision Making
- Power
- Testing for mean, variance, proportion
- Practical Examples

Association between Categorical Variables

- Contingency Tables
- Independent and Dependent
- Pearson's Chi-Square Test
- Misuses of Chi-Squared Test
- Measures of Association
- Practical Examples



ANOVA Analysis

- Analysis of Variance & Co-Variance
- ANOVA Assumptions & Comparisons
- F-Tests
- Practical Examples

PYTHON

Introduction to Python

- installation of Python framework and packages: Anaconda & pip
- Working with Jupiter notebooks
- Creating Python variables
- Numeric , strings
- logical operations
- Lists
- Dictionaries
- Tuples
- Sets
- Practice assignment



Iterative Operations & Functions in Python

- Writing for loops in Python
- While loops and conditional blocks
- List/Dictionary comprehensions with loops
- Writing your own functions in Python
- Writing your own classes and functions
- Practice assignment

Data Handling in Python using Packages

- Numpy
- Pandas
- Seaborn

- Scikit
- Matplotlib

Data Visualization in Python

- Need for data summary & visualization
- Summarizing numeric data in pandas
- Summarizing categorical data
- Group wise summary of mixed data
- Basics of visualization with Seaborn
- Inferential visualization with Seaborn
- Visual summary of different data combinations
- Practice assignment

Data preparation using Python

- Needs & methods of data preparation
- Handling missing values
- Outlier treatment
- Transforming variables
- Data processing
- Practice



R Programing

Fundamentals of R

- Installation of R & R Studio
- Getting started with R
- Basic and Advanced Data types in R
- Variable operators in R
- Working with R data frames
- Reading and writing data files to R
- R functions and loops

Data visualization in R

- Introduction exploratory data analysis
- Need for data summary & visualization
- Summarizing numeric data
- Summarizing categorical data
- R Packages for Exploratory Data Analysis (dplyr, plyr, gmodes, car, vcd, Hmisc, psych, dooby etc)
- R Packages for Graphical Analysis (base, ggplot, lattice,etc)
- Basics of visualization with plot
- Inferential visualization with plot
- Visual summary of different data combinations (Bar/pie/line chart/ histogram/ boxplot/scatter/density etc.) Practice assignment



Hypothesis testing and ANOVA in R

- Introducing statistical inference
- Estimators and confidence intervals
- Central Limit theorem
- Parametric and non-parametric statistical tests
- Analysis of variance (ANOVA)

Data preparation using R

- Needs & methods of data preparation
- Handling missing values
- Outlier treatment

Transforming variables

- Data processing with dplyr package
- Practice



Machine Learning

Supervised Learning

- An Approach to Prediction
- Least Squares and Nearest Neighbors
- Statistical Decision
- Regression Models

Linear Methods for Regression

- The Gauss–Markov Theorem

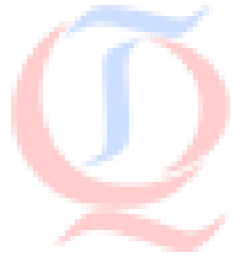
- Multiple Regression
- Forward- and Backward-Stepwise Selection
- Ridge Regression
- Lasso Regression
- Example using R / Python

Linear Methods for Classification

- Linear Regression of an Indicator Matrix
- Linear Discriminant Analysis
- Logistic Regression
- Rosenblatt's Perceptron Learning Algorithm
- Example using R / Python

Tree-Based Methods

- Regression Trees
- Classification Trees
- Bump Hunting
- MARS: Multivariate Adaptive Regression Splines
- Example using R / Python



Boosting

- Steepest Descent
- Gradient Boosting
- Regularization
- Interpretation
- Example using R / Python

Neural Networks

- Fitting Neural Networks
- Over fitting
- Hidden Unit
- Multiple Minima
- Single, Multi-Layer Perceptron
- Example using R / Python

Support Vector Machines (SVM)

- Support Vector Classifier
- Generalizing Linear Discriminant Analysis
- Flexible Discriminant Analysis
- Penalized Discriminant Analysis
- Example using R / Python



K-Nearest-Neighbor Classifiers

- Prototype Methods
- K-means Clustering
- Vector Quantization
- Gaussian Mixtures
- k-nearest Neighbors
- Example using R / Python

Unsupervised Learning

- The Apriority Algorithm
- Unsupervised as Supervised Learning
- Generalized Association Rules

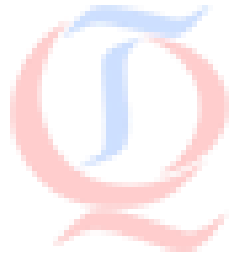
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- K-means Cluster Analysis
- Hierarchical Clustering
- Principal Components, Curves and Surfaces
- Non-Linear Dimension Reduction
- The Google Page Rank Algorithm
- Example using R / Python

Random Forests

- Variable Importance
- Random Forests and Over fitting
- Bias
- Adaptive Nearest Neighbors
- Example using R / Python



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