

DATA VISUALIZATION TECHNIQUES

B.TECH-VI Semester

L/T/P/C

3/0 /0 /3

Pre-requisites: Data Analysis and Programming Knowledge on Python

Course Objectives:

- To understand the basic concepts of Data Visualization
- Explore the different visualization tools of Python
- Understand the methods to visualize amounts, distribution and proportions.
- Gain knowledge on time-oriented, trees, graphs and network-based data visualization techniques.

UNIT-I:

Introduction to Data Visualization, Key elements of Data Visualization, importance of Data Visualization, benefits and examples of Data Visualization, Types of charts and graphs used in Data Visualization, methods for selection of right Data Visualization elements, Data Visualization software and tools.

UNIT-II:

Visualizing Data: Aesthetics and Types of Data, Scales Map Data Values onto Aesthetics, Coordinate Systems and Axes: Cartesian Coordinates, Nonlinear Axes, Directory of Visualizations, Visualizing Amounts: Bar Plots / charts, Grouped and Stacked Bars, Dot Plots and Heat maps. Using Matplotlib with Python: Introduction, plotting functions, modules and toolkits of Matplotlib.

UNIT-III:

Visualizing Distributions: Histograms and Density Plots: Visualizing a Single Distribution, Histograms, Visualizing Multiple Distributions at the Same Time, Empirical Cumulative Distribution Functions, Quantile-Quantile Plots, Visualizing Distributions Along the Vertical Axis: Boxplot, violin plot, strip charts. Visualizing Distributions Along the Horizontal Axis: ridgeline plot. Using Pandas for plotting: introduction, plotting functions, modules and extensions of pandas.

UNIT-IV:

Visualizing Proportions: pie charts, Side-by-Side Bars, stacked bars, Visualizing Proportions Separately as Parts of the Total. Visualizing Nested Proportions: Mosaic Plots and Treemaps, Nested Pies. Visualizing Associations Among Two or More Quantitative Variables: Scatter plots, Correlograms, Dimension Reduction, Paired Data. Using Seaborn for visualization: introduction, features and benefits, visualization functions.

UNIT-V:

Visualization Techniques for Time-Oriented Data: Introduction, Definitions, characterizing time-oriented data, Relating data and time, Visualizing time-oriented data, Categorization. Visualization Techniques for Trees, Graphs, and Networks: Displaying hierarchical structures, Displaying arbitrary graphs, networks, Node-link graphs, Matrix representations for graphs.