RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Artificial Intelligence & Data Science, VII-Semester

Open Elective-703 (A) Data Visualization

Course Objective:

1. To understand how to accurately represent voluminous complex data set on the web and from other data sources.
2. To understand the methodologies used to visualize large data sets.
3. To understand the various process involved in data visualization.
4. To get used to using interactive data visualization.
5. To understand the different security aspects involved in data visualization.

Course Outcomes

Upon completion of the course, the students will be able to

1. Understand the representation of complex and voluminous data.
2. Design and use various methodologies present in data visualization.
3. Understand the various process and tools used for data visualization.
4. Use interactive data visualization to make inferences.
5. Ability to visualize categorical, quantitative and text data.

Syllabus

Unit I:Introduction to Data Visualization
Overview of data visualization, Definition, Significance in AI and Data Science, Principal of Data Visualization, Methodology, Applications, Data pre-processing for visualization: Extraction, Cleaning, Transformation, Aggregation, Data Integration, Data Reduction.

Unit II: Data Visualization Techniques
Data Visualization Techniques– Pixel-Oriented Visualization Techniques- Geometric Projection Visualization Techniques- Icon-Based Visualization Techniques- Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.
Visualization Techniques, Scalar and point techniques, Color maps, Contouring Height Plots - Vector visualization techniques, Vector properties, Vector Glyphs, Vector Color Coding Stream Objects. Exploratory data analysis (EDA) Techniques

Unit III: Data Visualization Tools
Basic and advanced charts and graphs: bar charts, line charts, scatter plots, histograms, and heat maps. Geospatial visualization: maps, choropleth maps, geospatial heat maps, Network visualization: node-link diagrams, force-directed graphs, Interactive visualization: interactivity and user engagement techniques, Introduction to programming libraries for data visualization: Matplotlib, Seaborn, Plotly.
Introduction to data visualization tools- Tableau, Visualization using R.

Unit IV: Visualizing Multidimensional Data

Multivariate visualization techniques: parallel coordinates, scatter plot matrices, Dimensionality reduction techniques: PCA (Principal Component Analysis), t-SNE (t-Distributed Stochastic Neighbour Embedding), Clustering and classification visualization: dendrograms, decision trees, confusion matrices, Visualizing high-dimensional data: glyph-based visualization, parallel coordinates, dimension stacking.

Unit V:Advancements in Data Visualization

Time- Series data visualization, Big data visualization, Text data visualization Multivariate data visualization. Storytelling with data, Dashboard creation, Ethical considerations in data visualization, Case Studies for Finance-marketing, and insurance healthcare.

REFERENCES:

1. Tamara Munzer, "Visualization Analysis and Design", CRC Press 2014
2. Alexandru Telea, "Data Visualization Principles and Practice" CRC Press 2014.
3. Data Visualization: Storytelling Using Data by Sharada Sringeswara - John Wiley Publication
4. Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures Paperback – 31 March 2019 by Claus O. Wilke (Author), by O'Reilly.
5. Reimagining Data Visualization Using Python by Seema Acharya - John Wiley Publication.