**Experiment No. 9**

**Title:** Data Visualization Tools and Techniques

**Batch:** **Roll No.:** **Experiment No.: 9**

**Aim:** Exploration of data visualization tools and techniques

**Resources needed:** Package : Matplotlib, seaborn and Sklearn libraries in python,
Tools : Rapid Miner and Weka

**Theory:**

Graphical representation of any information or data is known as Data Visualization. This helps in segregating the data in an efficient manner by using various types of visuals such as graphs, maps, charts, maps, and visualization tools. Additionally, with the help of a data visualization tool, the data can be presented in a very unique and understandable manner so that people who are not from a technical background can understand everything easily.

Data Visualization Tools are software platforms that provide information in a visual format such as a graph, chart, etc. to make it easily understandable and usable. Data Visualization tools are so popular as they allow analysts and statisticians to create visual data models easily according to their specifications by conveniently providing an interface, database connections, and Machine Learning tools all in one place.

Data visualization techniques refer to the principles and methods used to create effective visual representations of data. These techniques encompass the fundamental concepts and practices that guide the design and creation of visualizations. Techniques include decisions about chart types, color schemes, layout, interactivity, and how data is encoded to effectively communicate information.

Categorization of visualization methods:

1. Pixel-oriented visualization techniques
2. Geometric projection visualization techniques
3. Icon-based visualization techniques
4. Hierarchical visualization techniques

We will go into details inside each technique:

1. Pixel-Oriented Visualization Techniques: We do the following functionality with pixel oriented visualization.

   Pixel Art: A form of digital art where images are created by placing individual pixels on a grid. While it's not typically used for data visualization, it is a pixel-oriented technique.

   Pixel Maps: These are often used for visualizing spatial data, where each pixel on a map represents a specific area, and the color or intensity of the pixel encodes data values. For example, a heat map is a pixel-oriented technique used to represent data density.

2. Geometric Projection Visualization Techniques:
   3D Scatter Plots: Represent data points in a 3D space using geometric projections.

2D to 3D Projections: Techniques like isometric projection or perspective projection are used to visualize 3D data in 2D space.

Orthographic Projection: Used to represent 3D objects or scenes on a 2D plane without any perspective distortion.

3. Icon-Based Visualization Techniques:

Glyphs: Icons or symbols that represent data attributes or characteristics. For example, using different icons to represent weather conditions on a map.

Sparklines: Small, simple graphs or icons used within text or tables to provide a visual summary of data trends.

Icon Arrays: Using a grid of icons to represent data, often in a 2D matrix format.

4. Hierarchical Visualization Techniques:

Tree Maps: Represent hierarchical data structures using nested rectangles to display data as a whole and its sub-components.

Sunburst Charts: Circular hierarchical visualizations that display data in a radial structure, often used to represent tree structures.

Dendrogram: Tree-like diagrams used to display hierarchical clustering relationships.

Organization Charts: Hierarchical diagrams used to visualize organizational structures or family trees.

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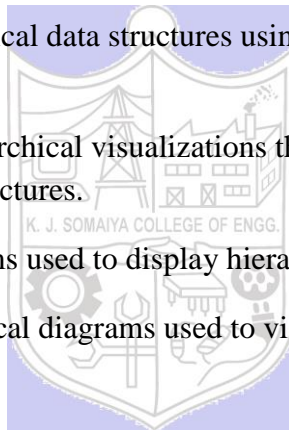
**Procedure / Approach /Algorithm / Activity Diagram:**
1. Analyze the data with data visualization techniques.
2. Implement the Pixel Based data visualization techniques.
3. Implement the Geometric data visualization techniques.
4. Implement the Icon Based Visualization technique.
5. Implement the Hierachy Based Visualization technique.
6. Explore the Any Data Visualization Tool.

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**Results: (Program printout with output / Document printout as per the format)**

**Questions:**
1. How data visualization plays roles in data mining?
2. What is chatboat? How it is differ from Dashboard?

**Outcomes:**

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**Conclusion: (Conclusion to be based on the objectives and outcomes achieved)**
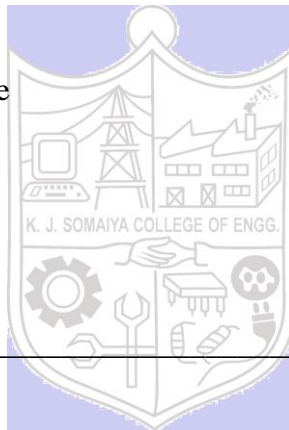
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**Grade: AA / AB / BB / BC / CC / CD /DD**

Signature of faculty in-charge with date

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**References:**

Books/ Journals/ Websites:

1. Han, Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann 3$^{nd}$ Edition