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Department of Computer Applications
Circular – 2023-24
BCA DS 6th Sem

Advanced Analytics and Data Visualization for Enterprise (UDS23602J)

Lab Manual

Lab 1: Data Visualization Tools

Title: Exploration of Data Visualization Tools

Aim: To introduce and familiarize students with various data visualization tools.

Procedure:

1. Identify and list popular data visualization tools (e.g., Tableau, SAP Analytics Cloud, Power BI, Python libraries like Matplotlib and Seaborn).
2. For each tool, explore its basic features, strengths, and weaknesses.
3. Perform simple data visualization tasks using at least two different tools.
4. Document the process and compare the tools based on ease of use, functionality, and output.

Source Code: (This section will contain code snippets or scripts used in the lab, if applicable. For tool-based labs, this might include sample data or configuration files. If the lab involves using a GUI tool, this section might be less code-focused and more about the steps taken within the tool.)

Input: Sample datasets (e.g., CSV files) for visualization.

Expected Output:

A comparison table of the explored data visualization tools.

Visualizations (charts, graphs) created using the tools.

A brief report summarizing the experience with each tool.

Lab 2: Visualizing Location-Based Data for Business Insights

Title: Visualizing Location-Based Data

Aim: To learn how to visualize location-based data and derive business insights.

Procedure:

1. Obtain a dataset containing location data (e.g., customer addresses, sales by region).
2. Choose a suitable visualization tool (e.g., SAP Analytics Cloud, Tableau, or a mapping library in Python).
3. Import the data into the tool.
4. Create visualizations such as maps, heatmaps, or choropleth maps to represent the location data.
5. Analyze the visualizations to identify patterns, trends, and potential business insights (e.g., areas with high sales, customer concentration).
6. Document the steps and findings.

Source Code: (Code or scripts for data processing and visualization, if applicable)

Input: Sample dataset with location information (e.g., CSV with latitude/longitude, or address data).

Expected Output:

Visualizations of the location data (maps).

A report outlining the business insights derived from the visualizations.

Lab 3: Techniques and Best Practices

Title: Data Visualization Techniques and Best Practices

Aim: To understand and apply effective data visualization techniques and best practices.

Procedure:

1. Review fundamental data visualization principles (e.g., choosing the right chart type, using clear labels, avoiding distortion).
2. Discuss best practices for different types of data (e.g., categorical, numerical, time-series).
3. Analyze examples of good and bad data visualizations.
4. Take a dataset and create visualizations using the best practices.
5. Document the techniques used and the rationale behind them.

Source Code: (Code or scripts used to create the visualizations)

Input: A sample dataset with various data types.

Expected Output:

A document summarizing key data visualization techniques and best practices.

Examples of visualizations demonstrating the application of these techniques.

Critique of poor visualization examples.

Lab 4: Working with Comment Widgets and Scripting Objects

Title: Working with Comment Widgets and Scripting Objects

Aim: To learn how to use comment widgets and scripting objects in a data visualization platform.

Procedure:

1. Select a data visualization platform that supports comment widgets and scripting (e.g., SAP Analytics Cloud).
2. Create a simple visualization.
3. Add comment widgets to the visualization to provide annotations and explanations.
4. Use scripting objects to add interactivity or dynamic elements to the visualization.
5. Document the steps involved in using these features.

Source Code: (Scripts used for scripting objects)

Input: Sample data for the visualization.

Expected Output:

A visualization with comment widgets.

A visualization with interactive elements added using scripting.

Documentation of the scripting code and its functionality.

Lab 5: Applying Color Theory in Data Visualization

Title: Applying Color Theory in Data Visualization

Aim: To understand and apply color theory principles to create effective data visualizations.

Procedure:

1. Study the basics of color theory (e.g., color schemes, color psychology, contrast).
2. Discuss how to use color effectively to represent data and convey meaning.
3. Analyze examples of visualizations with good and bad color choices.
4. Take a dataset and create visualizations using different color palettes.
5. Evaluate the effectiveness of the different color schemes.

Source Code: (Code or scripts used to create the visualizations with different color palettes)

Input: A sample dataset.

Expected Output:

A report on color theory principles relevant to data visualization.

Visualizations demonstrating the use of different color schemes.

An analysis of the impact of color choices on the interpretation of the data.

Lab 6: Types of Data Visualization

Title: Exploring Types of Data Visualization

Aim: To provide an overview of the different types of data visualization.

Procedure:

1. Identify and describe various types of data visualization (e.g., bar charts, line charts, scatter plots, pie charts, histograms, box plots).
2. Explain the purpose and use cases for each type of visualization.
3. Provide examples of each type of visualization.
4. Discuss the strengths and weaknesses of each type.

Source Code: (If applicable, the code used to generate the example visualizations)

Input: Sample datasets suitable for different visualization types.

Expected Output:

A classification of different data visualization types.

Examples of each type of visualization.

A comparison of the strengths and weaknesses of different visualization types.

Lab 7: Business Benefits of SAP Analytics Cloud Stories

Title: Exploring the Business Benefits of SAP Analytics Cloud Stories

Aim: To understand the business value of using SAP Analytics Cloud Stories.

Procedure:

1. Introduce SAP Analytics Cloud (SAC) Stories and their purpose.
2. Discuss how SAC Stories can be used to present data insights to business users.
3. Explore the features of SAC Stories that enhance business decision-making (e.g., interactive dashboards, storytelling capabilities).
4. Analyze case studies or examples of how SAC Stories have been used to achieve business outcomes.

Source Code: (If applicable, sample SAC Story configurations or scripts)

Input: Business scenarios or case studies.

Expected Output:

A description of SAP Analytics Cloud Stories and their features.

An explanation of the business benefits of using SAC Stories.

Examples or case studies illustrating the application of SAC Stories.

Lab 8: Data Modeling in SAP Analytics Cloud

Title: Data Modeling in SAP Analytics Cloud

Aim: To learn how to perform data modeling in SAP Analytics Cloud.

Procedure:

1. Introduce the concept of data modeling and its importance in data visualization.
2. Explain how to import data into SAP Analytics Cloud.
3. Demonstrate how to create and configure data models in SAP Analytics Cloud, including defining dimensions, measures, and hierarchies.
4. Discuss best practices for data modeling in SAP Analytics Cloud.

Source Code: (Instructions or scripts related to data modeling in SAC)

Input: Sample data to be imported into SAP Analytics Cloud.

Expected Output:

A data model created in SAP Analytics Cloud.

Documentation of the data modeling process.

Lab 9: Analytic Application in SAP Analytics Cloud

Title: Creating Analytic Applications in SAP Analytics Cloud

Aim: To learn how to create analytic applications in SAP Analytics Cloud.

Procedure:

1. Introduce SAP Analytics Cloud Analytic Applications and their purpose.
2. Explain the components of an analytic application.
3. Demonstrate how to design and build an analytic application, including adding visualizations, controls, and navigation elements.
4. Discuss how to enhance analytic applications with scripting.

Source Code: (Code for the analytic application)

Input: Data and design requirements for an analytic application.

Expected Output:

A functional analytic application in SAP Analytics Cloud.

Documentation of the application's design and functionality.

Lab 10: Placing the Right Information on the Page

Title: Principles of Information Placement in Data Visualization

Aim: To understand the principles of effective information placement in data visualizations and dashboards.

Procedure:

1. Discuss the importance of layout and information hierarchy in data visualization.
2. Explain principles such as visual hierarchy, balance, and proximity.
3. Analyze examples of dashboards and visualizations with good and bad information placement.
4. Design or redesign a dashboard to improve its information placement.

Source Code: (If applicable, code or design files for the dashboards)

Input: Sample dashboard layouts or visualization designs.

Expected Output:

A set of guidelines for effective information placement.

Examples of visualizations or dashboards demonstrating good and bad practices.

A redesigned dashboard with improved information placement (if applicable).

Lab 11: Scripting in SAP Analytics Cloud Analytic Applications

Title: Scripting in SAP Analytics Cloud Analytic Applications

Aim: To learn how to use scripting to enhance SAP Analytics Cloud Analytic Applications.

Procedure:

1. Introduce the scripting capabilities of SAP Analytics Cloud Analytic Applications.
2. Explain the scripting language (e.g., JavaScript) and its syntax.
3. Demonstrate how to use scripting to add interactivity, customize behavior, and automate tasks in analytic applications.
4. Provide examples of common scripting use cases.

Source Code: (JavaScript code snippets)

Input: A sample SAP Analytics Cloud Analytic Application.

Expected Output:

Examples of scripts used in SAP Analytics Cloud Analytic Applications.

A modified analytic application with added scripting functionality.

Documentation of the scripting code.

Lab 12: Scripting in SAP Analytics Cloud Analytic Applications

Title: Advanced Scripting in SAP Analytics Cloud Analytic Applications

Aim: To explore advanced scripting techniques in SAP Analytics Cloud Analytic Applications.

Procedure:

1. Build upon the knowledge from Lab 11, covering more complex scripting scenarios.
2. Demonstrate how to use scripting to interact with data, control visualizations, and create custom components.
3. Explore advanced scripting concepts such as functions, events, and APIs.
4. Work through examples of advanced scripting applications.

Source Code: (Advanced JavaScript code snippets)

Input: A sample SAP Analytics Cloud Analytic Application.

Expected Output:

Examples of advanced scripts.

A modified analytic application with advanced scripting.

Lab 13: Model Creation

Title: Data Model Creation

Aim: To learn the process of creating data models.

Procedure:

1. Introduce the concept of a data model.
2. Explain the different types of data models (e.g., relational, dimensional).
3. Discuss the steps involved in creating a data model, including identifying entities, attributes, and relationships.
4. Use a data modeling tool or language (e.g., SQL) to create a data model.

Source Code: (SQL code or data modeling tool configuration)

Input: Data requirements or a data source.

Expected Output:

A data model diagram or schema.

Documentation of the data model.

Lab 14: Predictive Modeling in SAP Analytics Cloud

Title: Predictive Modeling in SAP Analytics Cloud

Aim: To learn how to create and use predictive models in SAP Analytics Cloud.

Procedure:

1. Introduce the concept of predictive modeling and its applications.
2. Explain the predictive modeling capabilities of SAP Analytics Cloud.
3. Demonstrate how to create a predictive model in SAP Analytics Cloud, including selecting a model type, training the model, and evaluating its performance.
4. Show how to use the predictive model to make predictions.

Source Code: (Configuration and setup within SAP Analytics Cloud, any scripts)

Input: Historical data for training the predictive model.

Expected Output:

A predictive model in SAP Analytics Cloud.

Predictions generated by the model.

An evaluation of the model's accuracy.

Lab 15: Model Creation

Title: Advanced Data Model Creation

Aim: To explore advanced techniques in data model creation.

Procedure:

1. Cover advanced data modeling concepts such as normalization, denormalization, and data warehousing.
2. Discuss how to optimize data models for performance and scalability.
3. Explore techniques for handling complex data relationships and data structures.
4. Use a data modeling tool or language to create a complex data model.

Source Code: (Advanced SQL or data modeling tool configurations)

Input: Complex data requirements.

Expected Output:

A complex data model diagram or schema.

Documentation of the advanced modeling techniques used.