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<u>SORTING VISUALIZER</u>

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INTRODUCTION

- Sorting algorithms are widely used in computer software and are essential for tasks such as organizing files and efficient searching.

- The "Sorting Visualizer" project aims to provide a user-friendly tool to visualize and understand various sorting algorithms.

- Basic programming knowledge and familiarity with data structures and algorithms are expected from the readers/users.

- The project is implemented as a web application using web development technologies & Sorting Algorithms.

- The project allows users to shuffle and sort bars visually, step by step, using different sorting algorithms.

- Visualization techniques in education, such as this project, enhance the learning experience by allowing students to actively engage with the material.

Problem Statement

- Addressing the need for a pictorial explanation of algorithms.

- Emphasizing the importance of visualizing sorting algorithms for better comprehension.

- Algorithms can be hard to understand just by reading or studying them.

- We need a better way to explain algorithms using pictures or visuals.

Objective:

- Presenting the goal of the project: to develop a web application for visualizing sorting algorithms.

- The main objective is to provide a comfortable and easy learning experience for learners.

- The project includes a web-based animation tool to visualize the sorting algorithms.

- Data is represented as bar graphs and dot plots.

- Users can select a data ordering and algorithm, then run an automated animation or step through it at their own pace.

- It aims to help learners understand the sorting algorithms quickly and effectively.

- It provides a practical tool for learning and reinforcing algorithmic thinking and programming skills.

Sorting Algorithms:

- Briefly describe each sorting algorithm in more detail, highlighting their unique characteristics and operation principles.

- Provide visual representations for each algorithm to help illustrate their differences and similarities.

- Sorting algorithms are different ways to organize a list of things.

- Briefly introducing the most common sorting algorithms used in the web application:
  - Merge sort
  - Quick sort
  - Insertion sort
  - Bubble sort
  - Heap sort
  - Selection sort

TECHNOLOGIES:

- **HTML(Hyper Text Markup Language)**

  Html is a basic low level programming language used to make a base of the web .It stands for Hypertext Markup Language. For example, content could be structured within a set of paragraphs, a list of bulleted points, or using images and data tables.

- **CSS (Cascading Style Sheets)**

  CSS is the language for describing the presentation of Web pages, including colours, layout, and fonts. It allows one to adapt the presentation to different types of devices, such as large screens, small screens, or printers. CSS is independent of HTML and can be used with any XML-based markup language.

- **JavaScript**

  JavaScript is high- level, often just-in-time compiled, and multi-paradigm. It has curly- bracket syntax, dynamic typing, prototype-based object- orientation, and first-class functions. JavaScript is a text-based programming language used both on the client-side and server-side that allows you to make web pages interactive. Where HTML and CSS are languages that give structure and style to web pages, JavaScript gives web pages interactive elements that engage a user.

Real-Life Application:

- Explaining the practical use of the project in sorting a given set of numbers.

- Discussing the importance of comparing different sorting algorithms based on their pros and cons.

- We need sorting algorithms to organize data in different situations, like in business or scientific research.

- Each sorting algorithm has its own strengths and weaknesses, so it's important to compare them and choose the right one for each situation.

Importance of Efficient Sorting:

- Exploring the significance of efficient sorting in optimizing other algorithms.

- Highlighting how sorted input data enhances the efficiency of search and merge algorithms.

- Sorting things efficiently is important because it makes other algorithms work faster and better.

- For example, searching or merging data is much faster when the data is already sorted.

Visualization Benefits:

- Presenting the advantages of algorithm visualization through the web applications.
  - Enhanced understanding through visual representation of algorithmic logic.
  - Facilitated learning of complex sorting algorithms.
  - Improved grasp of algorithm performance and comparisons.

- Visualizing algorithms helps us understand them better because we can see how they work.

- It makes learning about sorting algorithms easier and more fun.

Web Application Features:

- Describing the features of the web application:
  - User-friendly interface for algorithm selection and input generation.
  - Step-by-step visualization of sorting algorithms.
  - Animation speed control and performance metrics display.

- Our web application lets you see sorting algorithms in action with interactive visuals.

- You can control the speed of the visualization and compare different algorithms.

Findings and Observations:

- Sharing insights from the project's own findings and observations.

- Discussing the objective checklist used to evaluate the web application's effectiveness.

- We learned a lot from our own tests and observations of the web application.

- We used an objective checklist to see how well the application worked.

Future Directions:

- Exploring potential future directions in algorithm visualization.

- Suggesting areas for improvement and expansion in the project.

- In the future, we can add more sorting algorithms or try new ways of visualizing them.

- We can work with teachers, researchers, and developers to make the application even better.

Conclusion:

- Summarizing the significance of algorithm visualization and the value of the web application.

- Reinforcing the benefits of visual learning and simplified understanding through pictorial explanations.

- Visual learning helps us understand algorithms better.

- Our web application makes it easy to learn and compare sorting algorithms, which can be useful in many real-life situations.

THANK YOU