Sort Visualizer

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Shreya Sandhanshive,Khushi Raval,Suraj Patil,Piyush Shah,Dhruv Sawant,Dhruv saini

Guide - Ms. V.A. Nemade

Mini Project Competition

PES Modern College of Engineering Department of Computer Engineering Savitribai Phule Pune University

Introduction

Welcome to the Sort Visualizer! In this interactive tool, we bring to life some of the most popular sorting algorithms used in computer science. From Bubble Sort to Quick Sort, we showcase the inner workings of these algorithms through visualizations that make it easier to understand their efficiency and behavior.

Objective

1. To provide a web-based tool for visualizing sorting algorithms.

2. To help users understand the concepts and workings of various sorting algorithms through interactive visualizations.

3. To facilitate learning and education by allowing users to explore different sorting algorithms and their efficiency.

Scope

1. Web-based tool for visualizing sorting algorithms.
2. Supports multiple sorting algorithms.
3. Allows users to input custom or random data sets.
4. Provides step-by-step visualizations of sorting process.
5. Adjustable speed controls for animation.
6. Displays basic statistical information.
7. User-friendly interface.
8. Cross-device and cross-browser compatibility.

Problems

01 **Insufficient Understanding:**

- Lack of interactive visualizations hampers understanding of sorting algorithms.
- Users find it difficult to comprehend the intricacies without visual aids.

02 **Inefficient Algorithm Comparison:**

- Users face challenges in comparing and evaluating the efficiency of sorting algorithms.
- Limited resources make it hard to make informed decisions about algorithm selection.

03 **Absence of User-Friendly Platforms:**

- Customers can't communicate real-time or last-minute changes to their existing platforms lack user-friendly interfaces for exploring sorting algorithms.
- Customization options are limited, hindering personalized learning experiences.

Solutions

01 **Enhanced Understanding:**

Provide interactive visualizations to enhance understanding of sorting algorithms.

Engage users through captivating visual aids to facilitate comprehension.

02 **Efficient Algorithm Comparison:**

Offer tools for comparing and analyzing the efficiency of different sorting algorithms.

Provide comprehensive visual representations to aid in informed decision-making.

03 **User-Friendly Learning Platform:**

Develop a user-friendly interface with intuitive navigation for seamless exploration.

Allow customization options to cater to individual learning preferences and needs.

Literature Survey

Title	Author	Publications	Technique	Remarks
Sorting Algorithm Visualization:A comparative study	John R. Smith Emily Johnson	Journal of Interactive Visualization ,2021	HTML,CSS,javascript,D3,js	Comapre the visual representation of sorting alogirthms and evaluates their effectiveness
Interactive Sorting Visualizations for Educational Puposes	Sarah Lee,Michael Brown	ACM Transcations on Computing Education,2019	HTML5,CSS3,Javascript,Canvas API	Presents interactive sorting visualizations designed for eduactional purposes

Title	Author	Publications	Technique	Remarks
Sorting Algorithm Visualization with Augmented Reality	William Brown, Emily Wilson	IEEE Transactions on Visualization,2017	Augmented Reality	Explores the use of augmented reality technology to visualize sorting algorithms in 3D space
Visual Sort: An Interactive Web-Based Sorting Visualization Tool	Jane Doe, Robert Johnson	International Journal of Computer Science,2019	HTML5,CSS3,Javascript,Canvas API	Presents interactive sorting visualizations designed for eduactional purposes

Architectural Diagram

System Specifications

The Software Requirements of the system are:

Operating System: The sorting visualizer should be compatible with popular operating systems like Windows, macOS, and Linux.

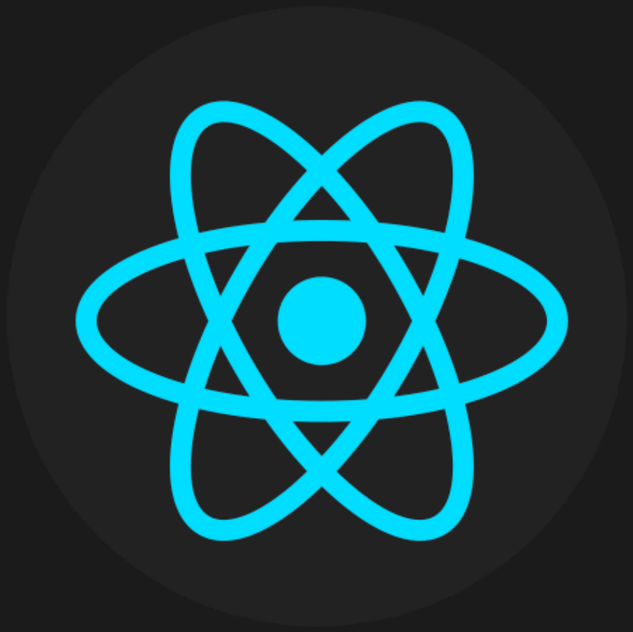
Programming Languages: The visualizer can be developed using languages such as Python, JavaScript, or Java, depending on the chosen platform and technology stack.

Development Frameworks: Utilize frameworks like Flask, Django, React, or Angular for web-based visualizers, or PyQt, Tkinter, or JavaFX for desktop applications.

HTML

CSS

REACT JS



Hardware Requirements:

Processor: A modern processor (e.g., Intel Core i5 or equivalent) that can handle the computational demands of running sorting algorithms efficiently.

Memory (RAM): Sufficient RAM (e.g., 4GB or higher) to accommodate the data sets used for sorting and ensure smooth execution of the visualizer.

Display: A monitor with a suitable resolution (e.g., 1280x720 or higher) to provide a clear and visually appealing representation of the sorting visualizer.

Algorithm

1. Initialize the data set with random or user-provided values.

2. Select a sorting algorithm to visualize (e.g., bubble sort, insertion sort, merge sort, etc.).

3. Start the visualization loop.

4. Perform the sorting algorithm's operations step by step while capturing the changes made to the data set

5. Update the visualization to reflect the current state of the data set (e.g., highlighting the elements being compared or swapped).

6. Pause the visualization for a brief period to allow users to observe the changes.

7. Repeat steps 4 to 6 until the sorting algorithm completes and the data set is sorted.

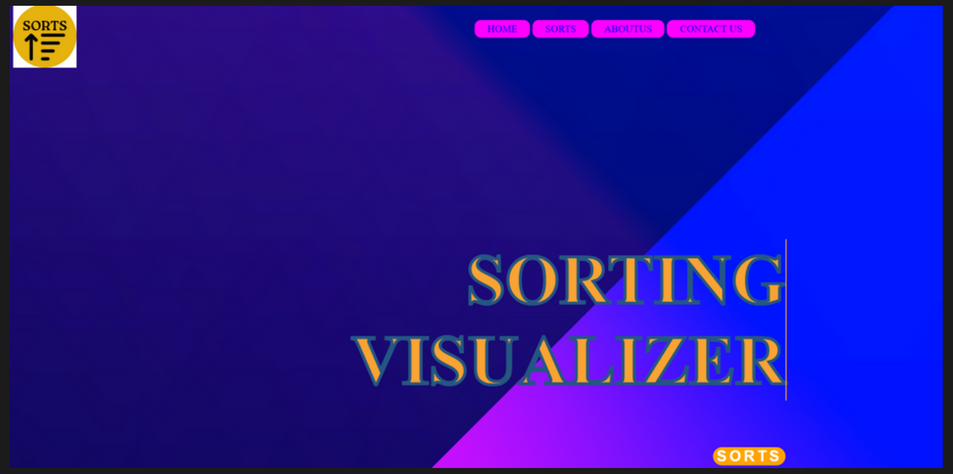
8. Display the final sorted data set.

9. Provide statistical information such as the number of comparisons and swaps made during the sorting process.

10. Allow users to control the visualization speed and interact with the visualizer (e.g., start, pause, reset, etc.).

11. Optionally, provide an option to switch between different sorting algorithms for comparison purposes.

Result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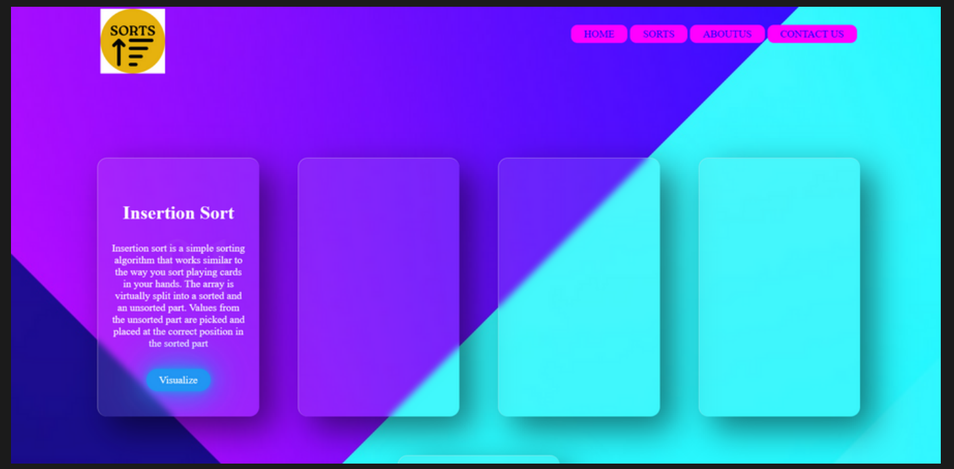
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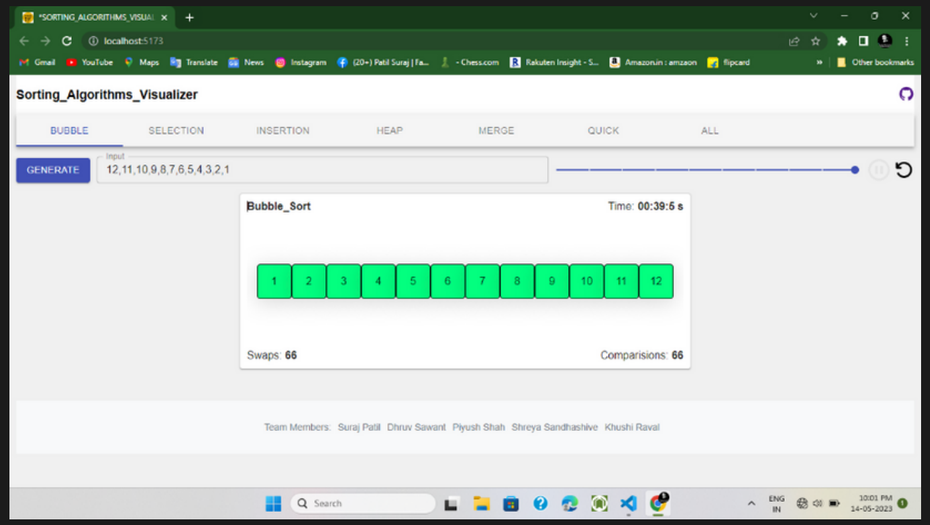
Insertion Sort
Insertion sort is a simple sorting algorithm that works similar to the way you sort playing cards in your hands. The array is virtually split into a sorted and an unsorted part. Values from the unsorted part are picked and placed at the correct position in the sorted part
Visualize


Sorting_Algorithms_Visualizer
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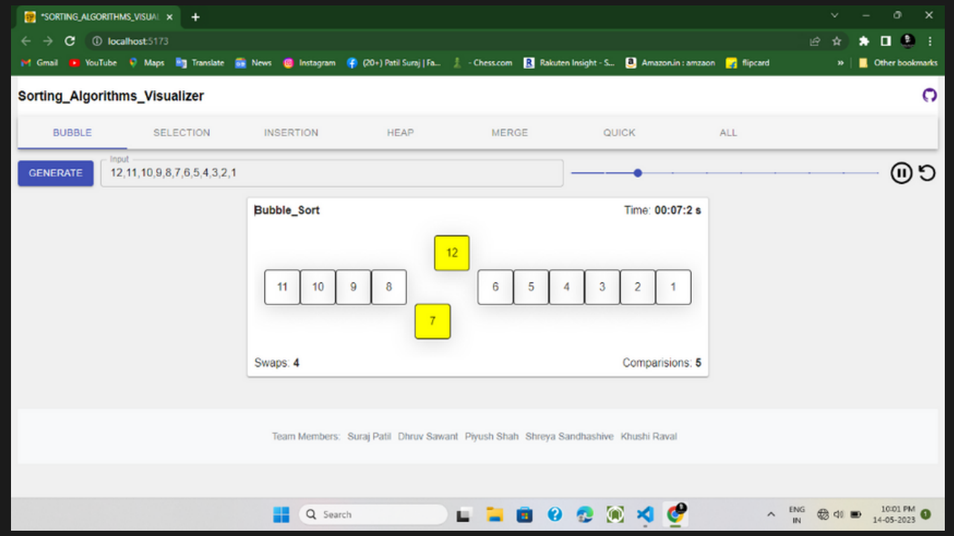
Bubble_Sort
Time: 00:39:6 s
1 2 3 4 5 6 7 8 9 10 11 12
Swaps: 66
Comparisions: 66
Team Members: Suraj Patil Dhruv Sawant Piyush Shah Shreya Sandhashive Khushi Raval


Sorting_Algorithms_Visualizer
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GENERATE
Input
12,11,10,9,8,7,6,5,4,3,2,1
Bubble_Sort
Time: 00:07:2 s
11 10 9 8 12 7 6 5 4 3 2 1
Swaps: 4
Comparisions: 5
Team Members: Suraj Patil Dhruv Sawant Piyush Shah Shreya Sandhashive Khushi Raval

1. Enhanced understanding of sorting algorithms through visual representations.

2.Interactive learning experience with adjustable animation speed and pause/resume functionality.

3.Comparative analysis of different sorting algorithms to observe their performance differences.

4.Statistical insights into the number of comparisons, swaps, and time complexity of sorting algorithms.

5.Customizability with the ability to input custom or random data sets for experimentation.

6. Cross-platform accessibility for users to access the visualizer on various devices.

7. Improved retention and application of sorting algorithm concepts.

8. Engaging and interactive tool for learning and exploring sorting algorithms.

9. Efficient visualization aids in grasping sorting algorithm operations.

10. Empowers users to make informed decisions regarding algorithm selection based on observed behavior.

Conclusion

In conclusion, the Sort Visualizer website revolutionizes learning by providing an interactive and captivating platform to explore sorting algorithms. Its intuitive interface, visual representations, and collaborative community make it an invaluable resource for individuals seeking to understand and appreciate the art of sorting.

References

1. "Sorting Algorithms Visualized" by David R. Martin: This website provides visualizations of various sorting algorithms using JavaScript. It offers step-by-step visualizations with adjustable speed controls. Visit: https://www.sorting-algorithms.com/

2. "Sorting Visualizer" by Clément Mihailescu: This is an open-source project on GitHub that provides a sorting visualizer implemented in React. It allows users to choose different sorting algorithms and adjust animation speed. Repository: https://github.com/clementmihailescu/Sorting-Visualizer

3. "Algorithm Visualizer" by VisuAlgo: This website offers visualizations of multiple algorithms, including sorting algorithms. It provides step-by-step visualizations with various customization options. Visit: https://visualgo.net/en/sorting

4. "Sorting Visualizer" by Tim Ruscica: This is another open-source sorting visualizer implemented in JavaScript and HTML/CSS. It supports different sorting algorithms and allows users to adjust the animation speed. Repository: https://github.com/tim-soft/Sorting-Visualizer

These references should provide you with examples and insights into different sorting visualizer implementations. You can study their source code, understand their visualization techniques, and customize them according to your requirements.

Thank you