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A

**Project-2 Synopsis On
“Sorting Visualizer”**

Presented By

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1. Introduction

Overview-

Sorting Visualizer a GUI based python program to visualize common Sorting Algorithms. This project is built using HTML, CSS, and JS. This project sorting visualizer is a very simple UI and it allows the users to select the sort algorithm, select the array size, and speed of the visualization. The main reason we chose this project to become more familiar with the javascript concepts, and CSS styling. So, we didn't use any frameworks other than HTML, CSS, and JS. We have learnt sorting algorithms like bubble sort, selection sort, insertion sort, quick sort. But often we fail to understand the core idea of a particular algorithm maybe because we are unable to visualize how they work. So the most important thing to understand about these algorithms is visualization. That's why we are making this project to let everyone understand how these algorithms work and through this project you also will get a deep understanding of such sorting algorithms. This project is a good start for beginners and a refresher for professionals who have dabbled in data structures and algorithms using Javascript before and also web developers. The methodology can be applied to showcase any algorithm of one's choosing. We wanted the animation to be web-based to appeal to a wide spectrum of people using different technology media. This way, the user would not need to worry about installing special software or trying to organize configurations to use the tool. The webpage is coded with HTML5 (Hypertext Markup Language, Version 5), JavaScript, and CSS (Cascading Style Sheets). The physical elements of the webpage (buttons and layout) are coded with very minimal HTML5 code. The next biggest contributor would be the CSS code, which is responsible for the appearance and behavior of the buttons and text. Finally, the rest is devoted to JavaScript, responsible for the histogram generation, movement, algorithm design, and sound. All the buttons refer to designated parts of the JavaScript code to perform the task

Objectives-

1. Creating the website's User Interface (UI) using HTML, CSS and enhancing it further using Bootstrap; without actually implementing any of the app's core features.

2. Implementation of animations, effects and core functionalities (sorting algorithms) using JavaScript.
3. Publish to GitHub and host your project live using Netlify.

2. Problem Statement

For a direct analysis of how students respond to sorting animation, the paper “Do Algorithm Animations Assist Learning? An Empirical Study and Analysis” provides an in-depth view. A post-test study was used to gather information on comparing the results of students who only had textbook resources to those who had a textbook as well as an animation for assistance. The post-test was the same for each group of students, which covered a comprehensive view of the topic. The study found no clear support that an animation would help students with the material significantly. The group of students that had the animation tool in addition to the textbook material averaged correctly answering two more questions than the control group. The paper concluded that visualizing algorithms sounds good, but may not achieve the desired results when implemented.

Some algorithms can be simple via learning the video animations but what about the complex algorithms like quick sort or heap sort. These algorithms are quite hard to implement and understand. To simplify that we will implement a system where we can actually see the code along with its visuals. Also, On all the previous systems, only either sorting or searching visuals were presented. We will try to give our maximum and implement various searching, sorting algorithms. We can say that this project is going to help familiar programmers or freshers for study of data structures.

3. Literature Review

On previous studies, the UI was pretty decent but not gave proper context of the algorithm i.e. bar representation. The bar doesn't give the proper information about a problem. So we will try to implement such feature where user can give his input and we will figure out how to work with it and give him the desired output. We will Provide more features like custom elements, values, array size control or different UI for visuals i.e. shapes or we will give the static value to the elements so the user can get perfect idea. The only thing here is

how many percentage we can simplify the UI i.e. shapes or other UI components so it will be easy to understand. Some previous projects on this topic had very dull design for the website and there was no attraction towards the working of actual function of visual. It minimizes the interest in the visuals. We will figure it out and provide an interactive website with good design, animations and the main visual function. The data structure complexities and definition can be also provided on the below of the visual. Which will make the website fully functional with proper information. In this milestone the basic structure of this website will be made. Challenges for us are through out this are-

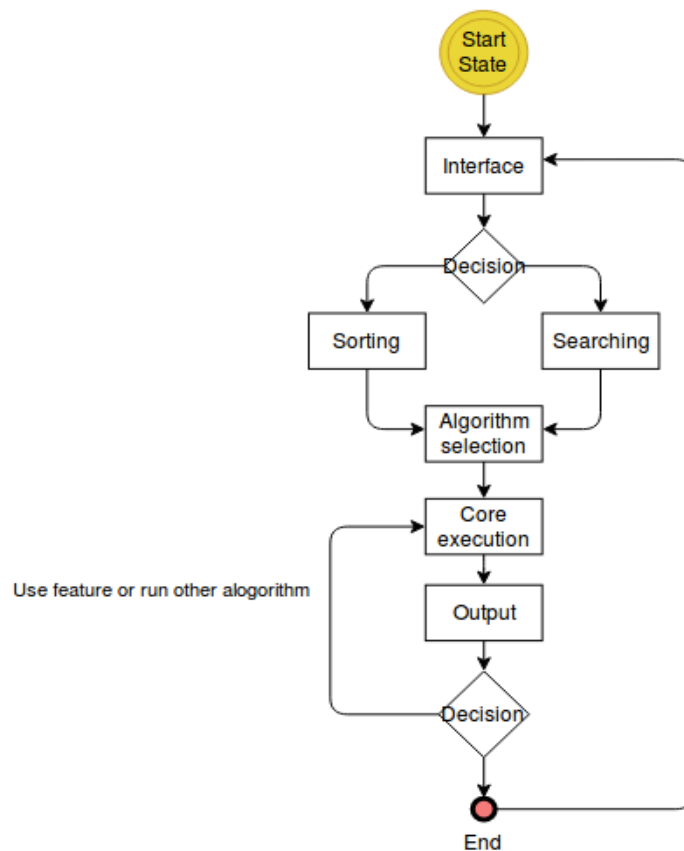
1. Site responsiveness - To bring responsiveness to the site, we have gone back to learn CSS styling. It is like going back to the time when we were learning the CS fundamentals and web technologies as a beginner.

2. Writing sort algorithms in JS - And coming to the second challenge we are going to face are writing sort algorithms in JS. When we want to write some code or learn algorithms for solving coding problems, we usually prefer Python/Java. Initially, we will take more time to implement the first sort algorithm i.e., Bubble sort to if it perfectly works. After that, for the remaining algorithms, we can start implementing them so quickly one after the other.

4. Future Scope

There are many sorting and searching algorithms and techniques we are using in day-to-day life. There are many applications where searching and sorting algorithms are used like phone directory, databases, any web engine searches, tv channel list but we usually don't know about how it works at the backend side. So this analyzer can show us how searching and sorting works in real time with the help of graphical user interface. It will help students to get better understanding about these algorithms.

5. Proposed System Architecture



6. Modules

1. Website - The main page where we can actually see the menu where you can select which ds you want to visualize.
2. Sorting and searching algorithms - Bubble sort, Merge sort, Quick sort, Heap sort, Binary and linear search and many more. where we will give different window to every function and give some more information about it on that page.
3. Features - We will give a feature where user to insert his element values and perform operations and other functions like array size, speed, reset array etc.

7. System Requirements

Hardware Requirements

Laptop/PC with minimum 2GB RAM

I3 processor 3.4 Ghz

Software Requirements

IDE

Browser

Operating system

Technologies

Html

Css

JavaScript

8. References

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