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ALGORITHM VISUALIZER

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ABSTRACT

Algorithms Visualizations contribute to improve computer science education. The method of teaching and learning algorithms is commonly complex to understand the problem. Visualization is a helpful technique for learning in any engineering course. In this report, an e-learning tool for Pathfinder, Prime Numbers, Sorting Algorithms, N Queen, Convex Hull, Binary Search Game visualization is described. For example, In sorting the animation tool would represent information as a bar and once choosing a data-ordering and algorithms, the user will run an automatic animation or step through it at their own pace.

In path finding making the starting and the end node be able to move around or the user to choose wherever he wants it to start or end. The developed e-learning tool permits visualizes the algorithm rule steps execution. It's mean to be used as a supplement to face-to-face instruction or as a complete application.

Keywords: Algorithm Visualization, Pathfinder, Prime Numbers, Sorting Algorithms, Convex Hull, Binary Search.

I. INTRODUCTION

Algorithm Visualizer (also referred as algorithmic animation) uses dynamic graphics to see computation of a given algorithmic program. First makes an attempt to robustness of algorithms date to mid 80's (Brown, 1988; Brown and Sedgewick, 1985), and also the golden age of algorithmic visualization was around the year 2000, when outstanding software tools for a dynamic algorithmic visualization (e.g., the language Java and its graphic libraries) and sufficiently powerful hardware were already available on the market. It had been expected that algorithmic visualization would replace the way algorithms are taught. Many algorithmic animations had appeared, largely for straight forward problems like basic tree data structures and sorting. There have been even attempts to automatize development of animated algorithmic program and algorithmic visualization. Another direction was to develop tools that might permit students to make their own animations simply. Rather than giving explicit references to algorithmic animation papers, the reader is directed to a super-reference (Algoviz) that brings a listing over 700 authors, a number of them even with twenty-nine references in algorithmic animation and visualization. There are also various web pages that supply algorithmic animation systems, e.g. Algoanim, Algomation, DD2, AlgoLiang, VisuAlgo.

We powerfully believe that the rationale is relative simple: An algorithmic program operates on some information (the input variables, and also the output data). Usually, in any explicit field of engineering, there is a customized way of visualization of data - graphs and trees are drawn as circles connected by line segments, number sequences could be visualized as collections of vertical bars, there are standard ways of drawing matrices, vectors, real functions, etc. An algorithmic animation is sometimes executed by running the algorithmic program slowly or in steps, and easily modifying the visual illustration of the information within the screen.

A person who understands the algorithm in question can see how the algorithmic program progress, but a beginner user simply see visual objects moving and bartering their shapes and colours, but finding out why the motion in picture show runs means sometimes too trouble for him or her .The solution that we provide is to see as what the algorithmic programme is doing, however why it's operating in the way it is running. In alternative words, our aim is to see an abstract algorithmic idea that is in back of a certain computing method.

The objective of this study is to style a system of algorithmic visualization, implement the system and visualize the run time for every implemented algorithmic programme aims to assist students acknowledge algorithms additional effectively.

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II. LITERATURE SURVEY

Motivation

The motivation behind this project is to study how the operations on data structure are performed. So that students can learn various algorithms through animation. To get a clear knowledge about various data structures and their operations on it. It will makes Data structures learning more interesting. The main goal of this project is to implement a system for various sorting algorithm , prime number , binary search game , - for investigation and visualization the best and worst case for every implemented algorithmic rule.

Relevance Of Work

Every software engineer should have a good understanding of DSA to develop efficient software. Visualizers have a good history of providing effective understanding to the users. Many algorithm visualizers have been developed over the years.

In 2008, paper "AlCoLab: Architecture of Algorithm Visualization System" concerns the style of script supported algorithm visualization systems for educational purposes, focusing on the support and the improvement that those systems provide in the process of teaching of an conceptual subject such as algorithms.

In 2019, paper "Towards Developing an Effective Algorithm Visualization Tool for Online Learning" reports a work-in-progress research project at Athabasca University on developing an effective algorithm visualization tool for online learning.

In 2019, paper "Open Interactive Algorithm Visualization " presents a work-in-progress project form developing an open interactive algorithm visualization website.

In 2021, paper "AlgoAssist: Algorithm Visualizer and Coding Platform for Remote Classroom Learning" focuses on "algorithm visualization", which allows a better understanding of its flow and operation. It supports the combination of the lab into a single application dedicated to pre-assessment, algorithm explanation, visualization, coding, and post-assessment.

In 2021, paper "Algorithm Visualizer " aims to simplify and deepen the understanding of algorithms operation. Within the paper we talk about the possibility of improving the standard methods of teaching algorithms, with the algorithm visualizations.

III. PROPOSED SYSTEM

A. System Architecture

The proposed system involves the simulation of the different type of algorithms codes. As you can see, there are no major components besides the three coding languages. Most websites have tools or scripts that require a server on the back-end (like PHP), but it is not necessary in this case since React JS runs right in the user's browser.

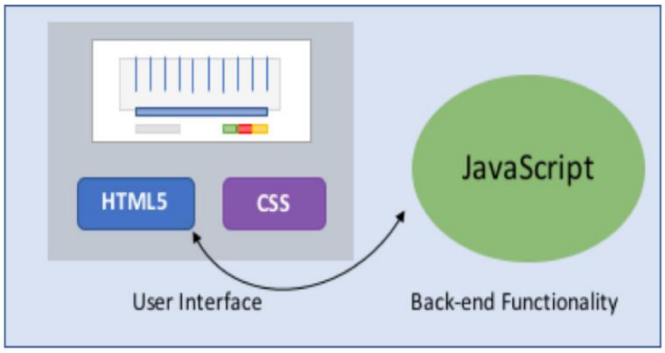

Figure 1: System Architecture 1.

HTML5 and CSS are used for the interface. The HTML5 communicates with the React JS code and vice versa to launch the appropriate algorithms and update the interface accordingly, as seen with a single, bidirectional arrow. As the React JS was modified from a functional programming focus to a more object-oriented one, the parts of the HTML5 that did change were the function calls for each button. All of the back-end interaction is abstracted to the various buttons for selecting algorithms and running the animation.

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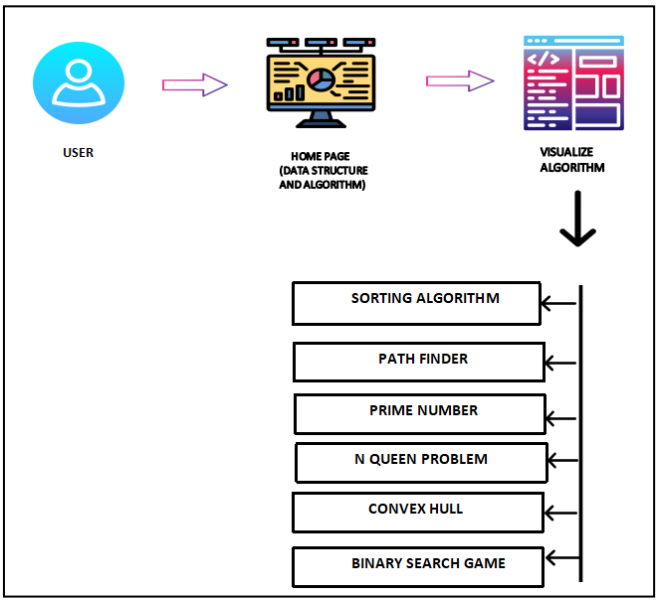
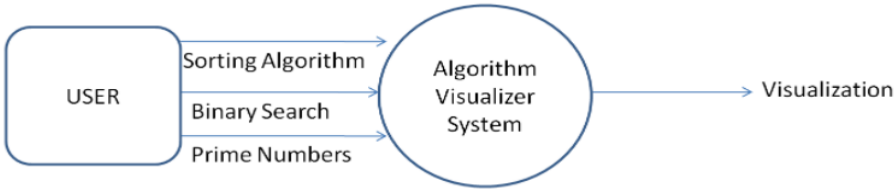


Figure 2: System Architecture 2.

B. Data Flow Diagrams

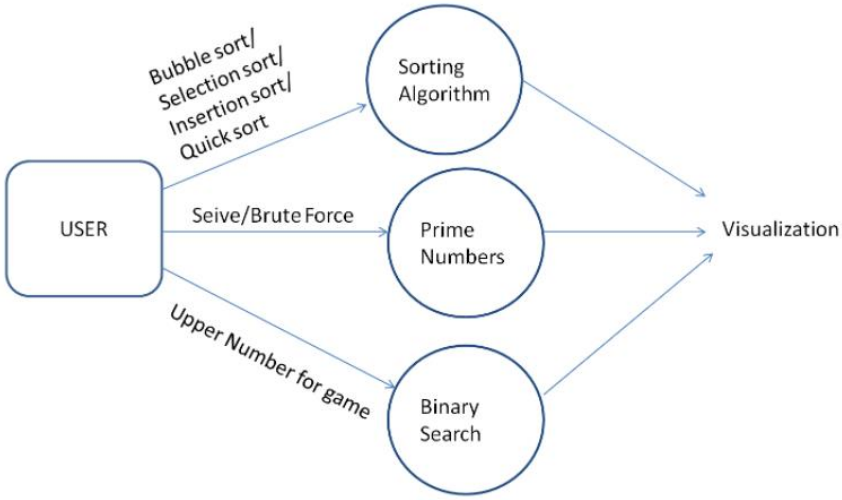
- DFD LEVEL-0



In Data Flow Diagram we Show the flow of data in our system, In DFD0 we show the base DFD in which rectangle present External entity (an outside system that sends or receives data)and circle show a Process(process that changes the data, producing an output).The arrows towards the process shows input while the arrows away from the process shows output.

- DFD LEVEL-1

DFD1 is the further bifurcation of DFD0.



IV. CONCLUSION

We started our project by studying a number of the well-known algorithm visualizations that are developed over a few years. According to our findings, algorithmic visualization are often seen as a valuable supporting tool, utilized in addition to straightforward ways of education within the field of computer science. With the

execution of this project, we have got with success attain our objective of our project is to engraft Graph Path Finding with Visualization and differentiate their performance. As is the case with most other teaching areas, there has been a major gap between the idea and practical understanding of algorithms realization. This is often true for shortest paths algorithms and in specially for Dijkstra algorithm. The main goal of the project is to use it from research educators and students for teaching and studying the existing known graph algorithms. The main plan of the system is to provide an associate educational environment for both instructors and students to facilitate the learning process in economical way.

V. FUTURE WORK

With the shift of remote and digital literacy, a combined platform serving the effective literacy requirements of students is required. Algorithm Visualizer is a combined platform that's a comprehensive result for educators and students to educate and learn online effectively. It substantially focuses on “algorithm visualization", which allows a better understanding of its inflow and operation.

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VI. REFERENCES

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