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A SURVEY PAPER ON DATA STRUCTURE AND ALGORITHM VISUALIZATION

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ABSTRACT

Data Structure and Algorithm Visualization is an important part of algorithm design. Traditionally, analysis of Data Structure and Algorithms is theoretical and mathematical. This makes it time-consuming, difficult in studying and lacks understanding of the real-life implementation of a problem. This limits the scope and scale of undertaking concepts. There has always been an ever-growing need to visualize the data structure and algorithm. With web development taking the center stage, we need to ensure that we build programs that visualize data structures and algorithms along with their real-life Implementation. We have developed and presented the idea, data structures and algorithm that can accomplish the goal and objective to help students and teachers visualize data structures and algorithms with their real-life implementation.

Keywords: Data Structures, Algorithms, Visualization, Real-Life Implementation.

I. INTRODUCTION

Data structures and algorithms play a major role in Computer Science and also help people to get hired. Data structure and Algorithms are the foundation. Belonging to software development one must have command over solving problems using programming languages and Data Structures and Algorithms are key to achieving the path. The newbies to computer science or more precisely Data Structure lack the knowledge of what is data structures and algorithms are, how they work behind the code and how these algorithms are used in real life. Knowingly or unknowingly, we use data structures and algorithms in our day-to-day life. For example, let's consider Google Maps, everyone at least once in their lifetime has used Google maps and belonging to a computer science background has also used and studied Dijkstra's algorithm, but were we aware when they studied Dijkstra's algorithm that Google Map is built using the Dijkstra's algorithm. Thus, by understanding the importance of Data Structures and Algorithms they have become an important part of computer science and technical recruitment. One can learn DSA from various books, presentations, online classes etc., which might generally strike as a boring subject but visualizing the Data Structures and Algorithms might help users to create interest in it. Visualizing the concepts with their real usage helps learners grasp concepts easily by stimulating imagination.

II. LITERATURE SURVEY

Existing System: Few websites present the visualization of Data Structure and Algorithms but real-life usage of them is missing. Real-life examples help users to better understand the concepts. Tao Chen [1] in his paper has provided visualization for the data structures such as an array, stack, queue, etc. It provides the animation of common operations associated with the data structures. It provides animation of simple user-defined algorithms. However, only the Data Structures have been visualized. Algorithms can also be visualized. The user interface does not seem to be user friendly. Users also need to understand the real-life implementation of these Data structures and Algorithms which seems to be one of the major drawbacks. Slavomır Simonak [2] in his paper intends to support teaching and learning activities in courses that include data structures. Their main intention for providing data structure visualizations is to strengthen the basics of object-oriented programming. However, lack of real-life implementation that will help users to understand concepts of Data Structure and Algorithms better. Slavomír ŠIMOŇÁK [3] This paper has a basic algorithm and data structures visualization, developed using the .NET framework. However, lack of real-life implementation. .NET Framework is the platform developed by Microsoft and supported only by Windows operating system; thus, the level of portability is significantly lower. Juan Lin, [4] The main aim of this paper is to develop a dynamic visualization tool to express the various data structures with their graphical presentation by applying run-time detection on the data structures, that can visualize the data elements and their corresponding structures to enhance

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students' learning experiences. However suboptimal user interface. Lack of real-life implementation which will help users to understand concepts of Data Structure and Algorithms better.

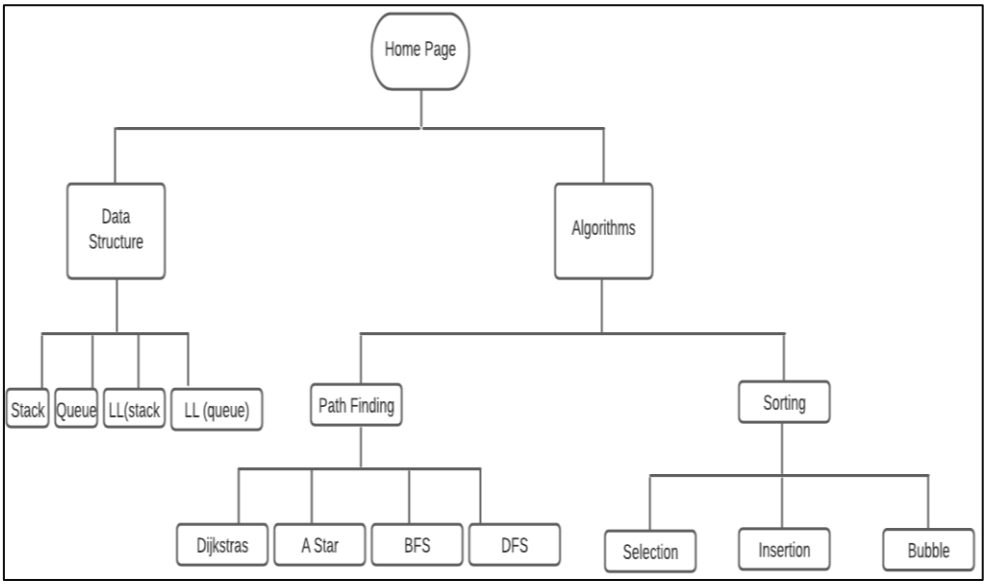
Need for New System: New system will consist of real-life implementation along with the visualization of Data Structure and Algorithms. Visual gives the user not only a better understanding but also the potential to connect to real-life use cases. Visualizing the concepts with their real usage helps learners grasp concepts easily by stimulating imagination.

III. PROBLEM DEFINITION

Data structure and Algorithms are the foundation.

One should have command over DSA as Software Developers need to have good knowledge of data structures that can help us to make algorithms more optimized, improve speed, and efficiency, and be easily maintainable. Difficulty in studying and lack of understanding of the real-life implementation of a problem. DSA requires an eye to see where we can use it in real life.

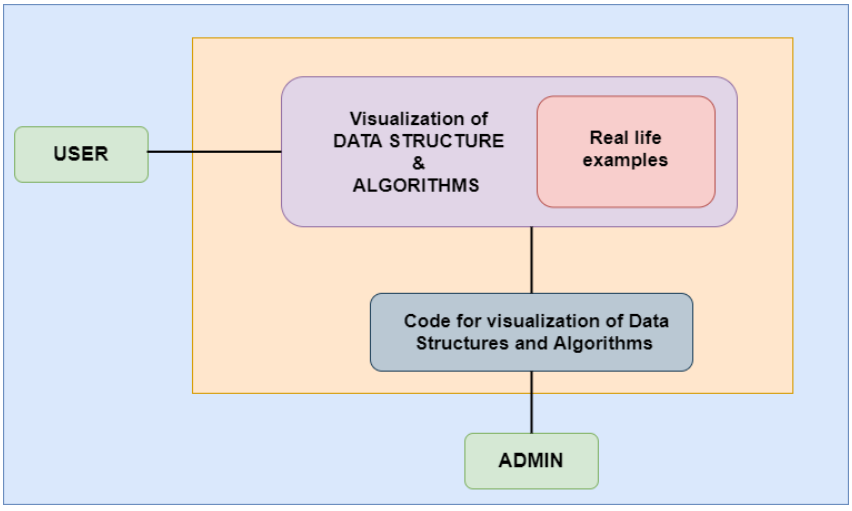
IV. IMPLEMENTATION



DESIGN:

Any kind of system in this world is used by different users. There could be various kinds of users such as business people, analysts, developers, testers, etc. Therefore, before designing any system, the architecture is made considering different perspectives. UML has an important role in defining different perspectives of a system.

Conceptual Diagram:



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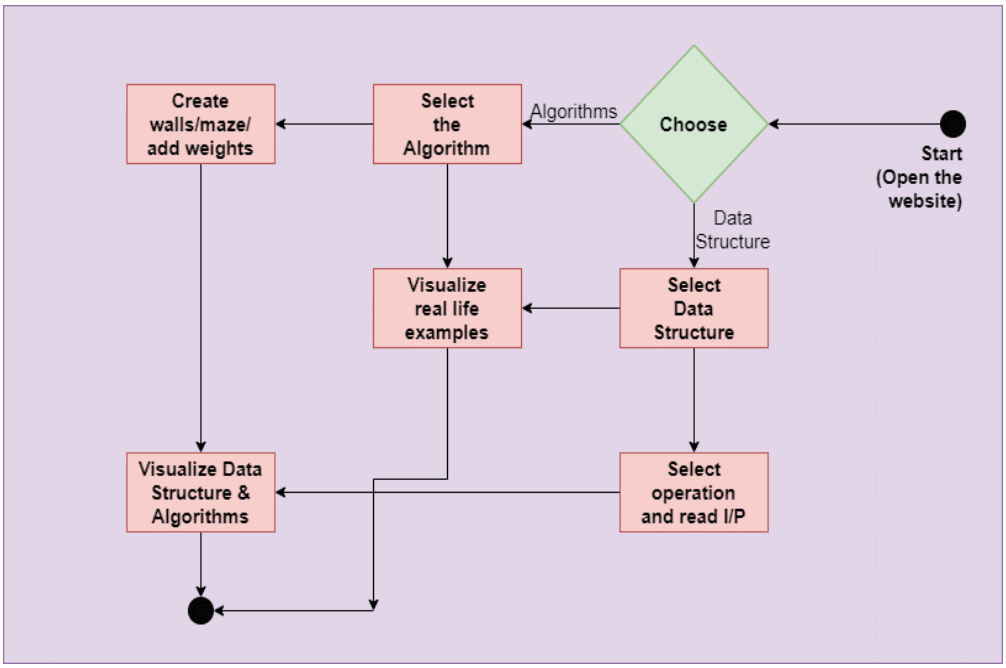
Activity Diagram:



V. RESULTS

With this website, we can visualize various Data Structures and Algorithms effectively and understand how they work. This is an interactive and colorful website (unlike other websites mentioned in this paper) that will help students and teachers visualize, learn and better understand various Data Structures and Algorithms.

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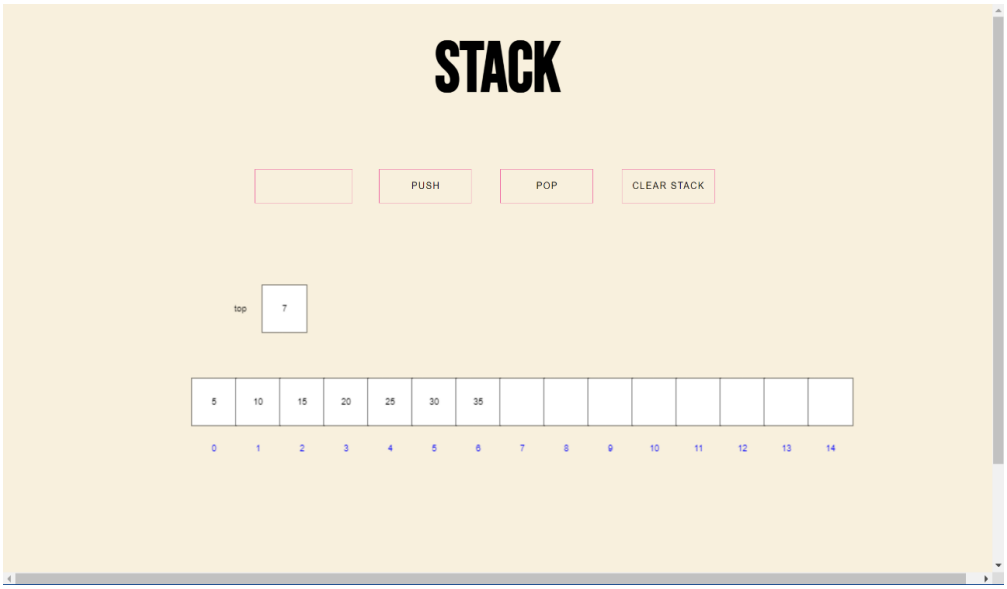

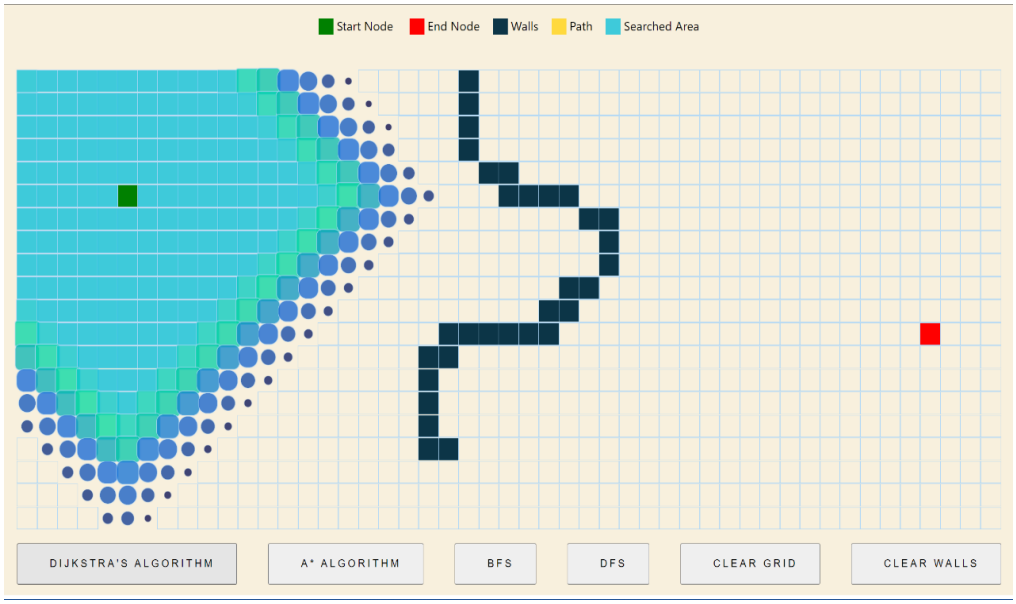

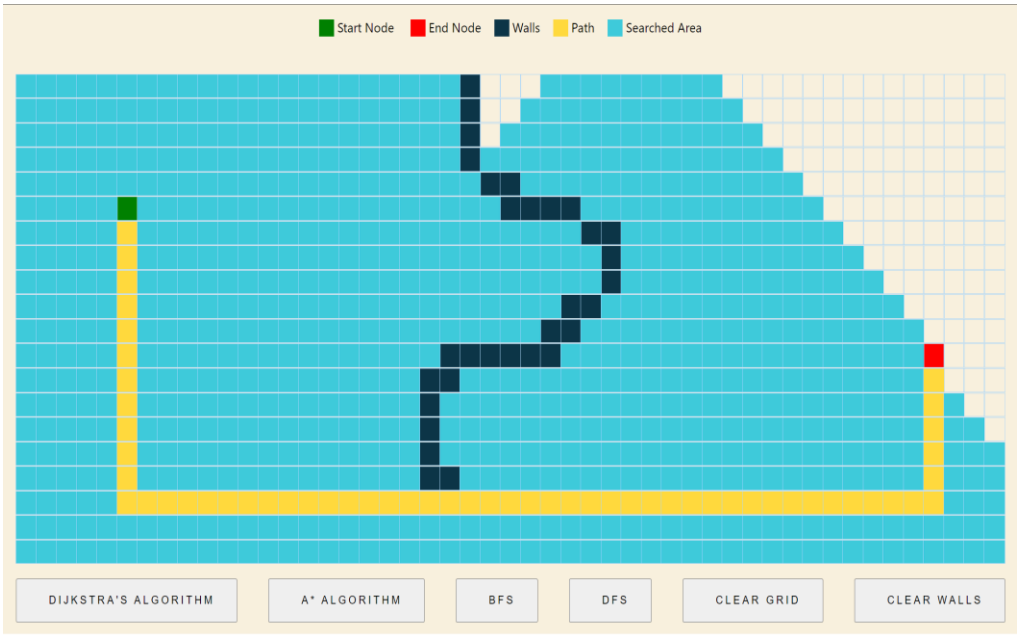

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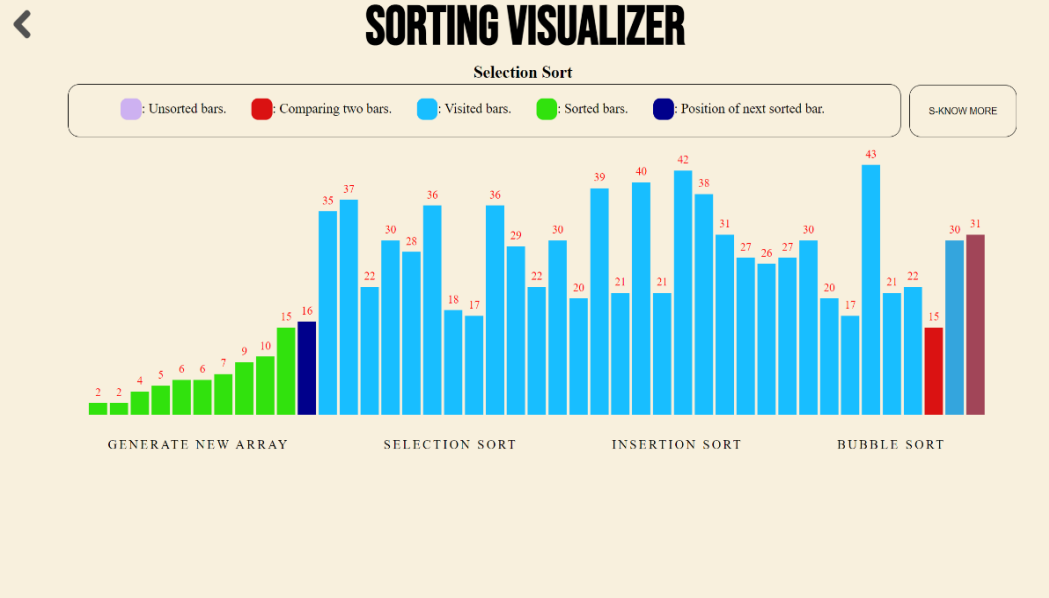

VI. CONCLUSION

Our paper, Data Structure and Algorithm visualization is built using data structures and algorithms and web development will provide a platform for students, teachers or anyone with a wish to visualize and understand Data Structure and algorithms, and also get to know the real-life examples of those DSA for their better understanding.

VII. FUTURE SCOPE

It can be made a full-fledged website by adding codes for respective DS/A and incorporating a code editor. Can be made into a 3D visualization website.

VIII. REFERENCE

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