International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 11 | November - 2023 SJIF Rating: 8.176 ISSN: 2582-3930

Survey Paper on Online Platform for Visualizing Algorithm

Under the guidance of Prof. Megharaj Patil.
Team – Mr. Dipak Ghodekar (Team Lead)
Mr. Pratik Das
Mr. Avishkar Shetkar, Mr. Saurabh Potdar

DEPARTMENT OF INFORMATION TECHNOLOGY

Genba Sopanrao Moze College of Engineering Balewadi
November 2023

Introduction:

As the distance and online learning is going on integrated platforms are required for students learning. Our website is a platform that aims on "Algorithm Visualization", which will ease the learning process and help to understand algorithms in better way. This website includes various other functionality that is play, pause, speed button in visualization. This website is very useful for computer science student and teachers for learning data structures and algorithms. The main of this project is to make better understanding of data structures and algorithm. This website also provides the knowledge about data structure array, stack, queue, and deque as well. Thus, our project provides better understanding of data structures and algorithms.

The project is an interactive web application designed to visualize various sorting algorithms, incorporating additional features like pathfinding. The user interface has a skeleton structure created using HTML, CSS, and Bootstrap for a visually appealing and responsive design. The inclusion of sorting algorithms and pathfinding algorithms adds versatility to the application, making it a comprehensive tool for understanding algorithmic processes. A new feature, the speed control for visualization, has been introduced to allow users to adjust the pace of algorithm execution, enhancing the learning experience. The project aims to be an effective learning aid, capturing user attention through interactive elements while providing educators with a powerful tool for teaching complex algorithms.

.

Abstract:

With the increasing demand of remote and digital learning, an integrated platform is required for the effective learning needs of students. Our Algorithm Visualizer is a website that mainly focuses on "algorithm visualization", which allows a better understanding of how algorithms work. It supports the various functionality which includes pre-assessment, algorithm explanation, visualization, coding, and post-assessment. The Code of Algorithm is provided in various languages like C, C++, Python, Java. It also provides information on user's performance, which will be calculated based on the result of pre-assessments and post-assessment. This Algorithm Visualizer supports the learning systems in areas of computer engineering, especially in the data structures and algorithms. Aim of this project is to make clear understanding of various data structure and algorithms. Using a website this will simulates the data structure array, stack, queue, and linked list and algorithms as well. Thus, our project provides effective and efficient knowledge of data structures. This also provides some theoretical knowledge regarding the data structure.

As the distance and online learning is going on integrated platforms are required for students learning. Our website is a platform that aims on "Algorithm Visualization", which will ease the learning process and help to understand algorithms in better way. This website includes various other functionality that are pre-assessment, algorithm explanation, visualization, coding, post-assessment, and Codes of Algorithm is provided in different languages like C, C++, Python, and Java. It also checks the knowledge of the learner, based on the result of assessment tests. This website is very useful for computer science student and teachers for learning data structures and algorithms. The main of this project is to make better understanding of data structures and algorithm. This website also provides the knowledge about data structure array, stack, queue, and linked list as well. Thus, our project provides better understanding of data structures and algorithms.

Implementation:

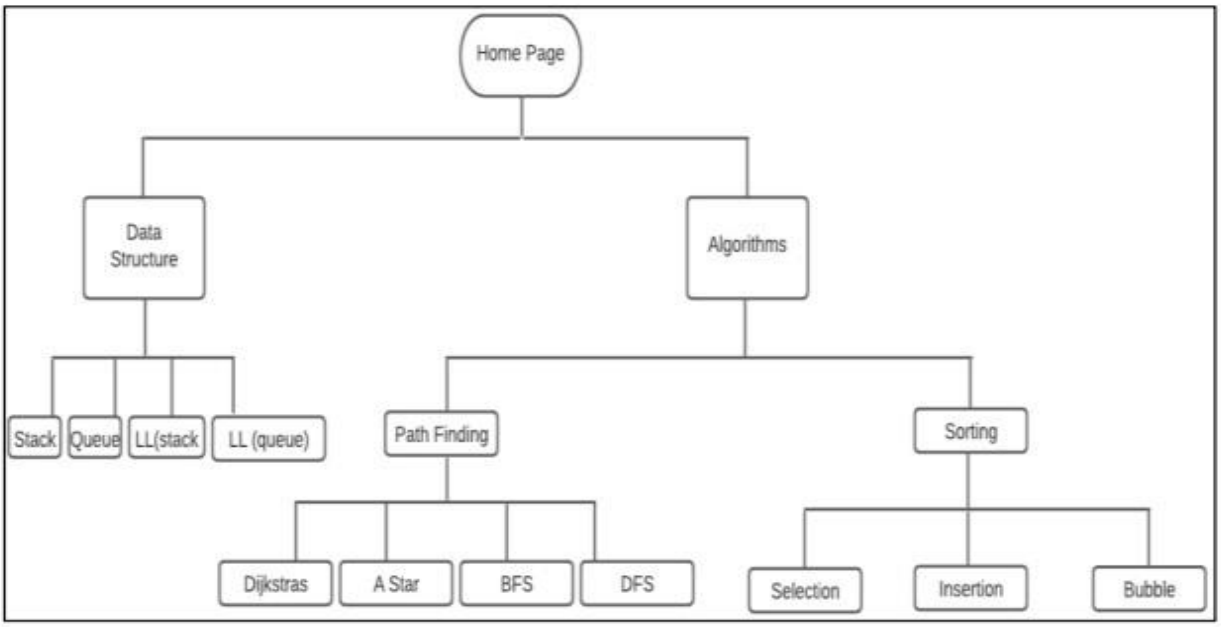

Figure 1.

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 below -

Conceptual Architecture

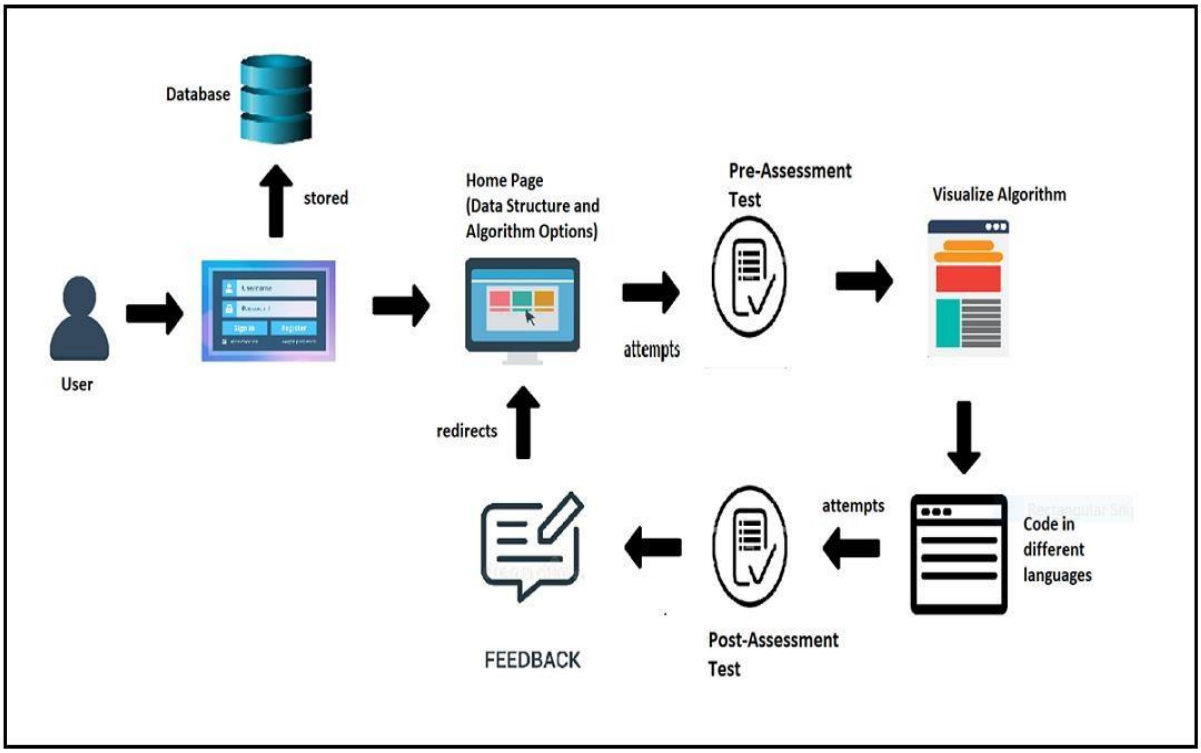

Figure 2. Conceptual Architecture

a) User will sign in/register in our website, and then user data will be stored in the MYSQL database.

b) User will be directed to the homepage. In our homepage we have given various data structure & algorithm options that user can choose algorithm whichever user wants to learn.

c) If user choose algorithm, then he will be forwarded to attempt pre-assessment test on that algorithm.

d) Next user will move to the visualization page where user can see the visualization of the particular algorithm. Then user will visit the next page where we have given code of the different algorithm in different languages, where user can study the algorithm in different languages. Then user will be forwarded to attempt post assessment test here scores will also display from that user can understand how he/she understood about that algorithm. After that user will give his feedback & will be directed to homepage.

Algorithms:

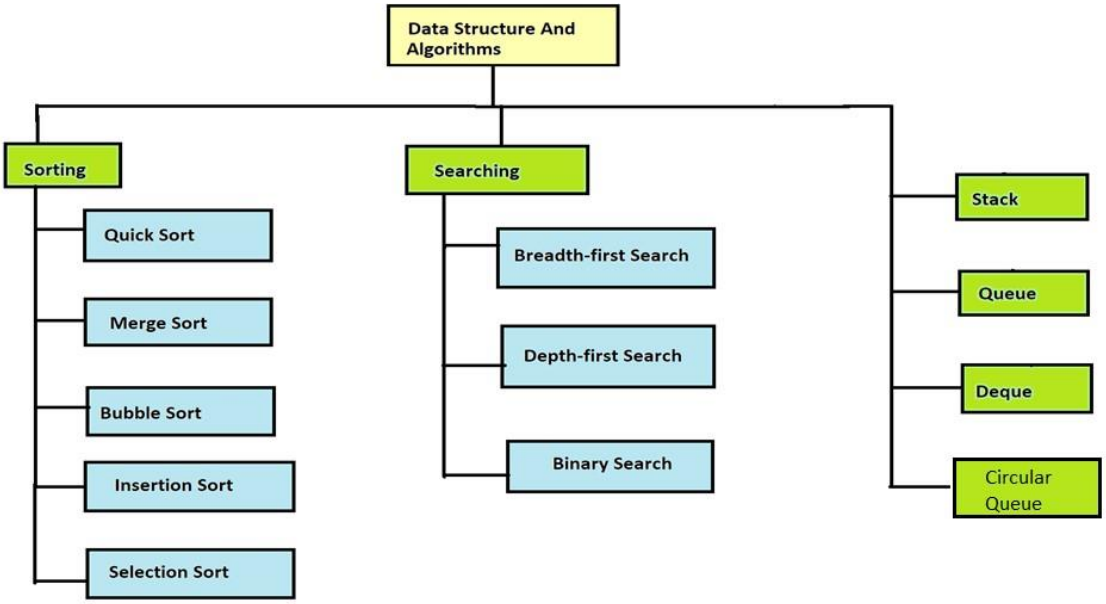

Figure 3.

Future Scope:

1. Enhanced educational tools for algorithm and data structure learning.
2. Integration into online learning platforms.
3. Real-world applications for process optimization.
4. Collaboration, sharing, and community building.
5. Supporting research and algorithm optimization.

Conclusion:

Algorithm visualizer can be seen as a valuable supporting tool, used in various ways of education in the field of computer science. Our website helps to improve the quality of education in various field.And it alsocontributes to the solution for some of the problems in higher education. Our intentions here is to provide better understanding of various algorithms like sorting algorithms and more complex data structures via their visualization. We will be providing some pre-assessment and post-assessment tests for more interaction of the learners. Thus, user can learn in much effective manner and also get their progress.

Acknowledgment:

This is a great pleasure & immense satisfaction to express our deepest sense of Gratitude & thanks to everyone who has directly or indirectly helped us in partial completion of Project work successfully. It gives us great pleasure in presenting project report on:

"Interactive online platform for Visualizing an Algorithm"

We would like to take this opportunity to thank our guide Prof. Megharaj Patil for giving us the guidance & all the help that we needed. We are really grateful to her for her kind support. We would also like to express our gratitude towards our parents for their kind cooperation and encouragement which helped us in completion of this project.

We are grateful to our HOD Prof. Sana Shaikh for her kind support & guidance. We express our sincere thanks to our beloved Principal, Dr. Ratnaraja Kumar Jambi & the management for providing us the resources required in successful completion of the project.

Last but not the least, many thanks go to the coordinator of the project, Prof. Kaveri Kari who has invested her full effort in guiding the team for achieving the goal. We are also grateful to her dispensable support and suggestions. We express our gratitude to all the teaching, non-teaching & our dear friends for their support.

References:

[1] Supporting algorithm visualization-IEEE JHAVE: https://ieeexplore.ieee.org/document/1510539

[2] JHAVEPOP: visualizing linked-list operations in C++ and Java: https://www.researchgate.net/publication/262177625_JHAVEPOP_visualizing_linkedlist_operations_in_C_and_Java

[3] Developing an effective algorithm visualization tool for online learning: https://www.researchgate.net/publication/329481179_Towards_Developing_an_Effective_Algorithm_Visualization_Tool_for_Online_Learning

[4] Developing an effective algorithm visualization tool for online learning (IEEE 2018): https://www.cs.utep.edu/makbar/papers/TOCE.pdf

[5] Course referred for development of the project: https://www.udemy.com/course/thecomplete-web-developmentbootcamp/learn/lecture/12299730?start=120#content

[6] Research paper study Algorithm Visualization: https://www.cs.utep.edu/makbar/papers/TOCE.pdf

[7] Exploring the role of visualization and engagement in computer science education: https://www.academia.edu/75893135/Exploring_the_role_of_visualization_and_engagement_in_computer_science_educationn

[8] A Survey of Successful Evaluations of Program Visualization and Algorithm Animation Systems: https://www.academia.edu/76408518/A_Survey_of_Successful_Evaluations_of_Program_Visualization_and_Algorithm_Animation_Systems

[9] Learning Bootstrap5 for project front-end : https://getbootstrap.com/docs/5.0/gettingstarted/introduction/