

## Algorithm Visualizer A Web Based Tool

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### ABSTRACT

Algorithm visualizer is a web-based tool that was created with the concerns in mind when learning about data structures and algorithms in mind. Students can learn sophisticated algorithms like merge sort that are tough to visualize in their heads thanks to the platform's vivid visuals. We also intend to provide information regarding the algorithm's time and space complexities, making our platform a one-stop shop for algorithm research. Selection Sort, Bubble Sort, Insertion Sort, and Merge Sort are four basic sorting algorithms that were visualized using a web-based animation application. After selecting a data-ordering and method, the user may either run an automatic animation or step through it at their own pace using the animation tool.

**Keywords:** Algorithms, Data Structures, Visualization, searching, sorting, pathfinder.

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## I. INTRODUCTION

As computer engineering students, we are familiar with the difficulties one might face while learning the subject of data structures and algorithms. For us it was very tough to visualize algorithms like merge sort. Keeping that in mind we decided to solve this problem through our final year project and thus we came up with the topic 'Algorithm visualizer'.

Algorithms are difficult to understand even with the traditional methods such as paper pencil. Visualization technique has been proven more effective in understanding complex things, also due to the pandemic situation, education is shifted to online learning which makes the difficult subject of algorithms more difficult for students. To solve this

problem to some extent we propose the platform 'algorithm visualizer' to help students learn algorithms. This might help student even after the pandemic is over as it uses colorful and eye-catching animations.

## II. METHODS AND MATERIAL

As of now we have implemented four algorithms (Prime numbers, Sorting Algorithms, Pathfinding Algorithms and Binary search). We have studied about each and every algorithm in detail. There is always more than one way to solve a problem, we have explained below which method we have implemented for algorithms.

**A] Prime Number:**

Sieve of Eratosthenes is efficient algorithm to find prime number from 1 to N where n is a given number.

**B] Sorting Algorithms:**

We have implemented bubble sort, insertion sort, selection sort and quick sort algorithm. Out of these algorithms first three are simple algorithm but not as efficient as quick sort. Bubble sort compare adjacent element and arrange its position and continue this at most n times where n is a size of the array. Insertion sort keep moving elements

From left to right until left element is bigger. Selection sort select smallest number from the elements and append it to the sorted part of the array. Quick sort uses recursion to sort array.

**C] Pathfinder Algorithms:**

Pathfinder Algorithms are the backbone of application like google maps .We,In this project have included popular pathfinder algorithms named DjKstra’s algorithm, Depth first search and breadth first search.

**D] Binary Search:**

It’s one of the most used and efficient algorithm. It is used in many ways. It follows Divide and Conquer approach.

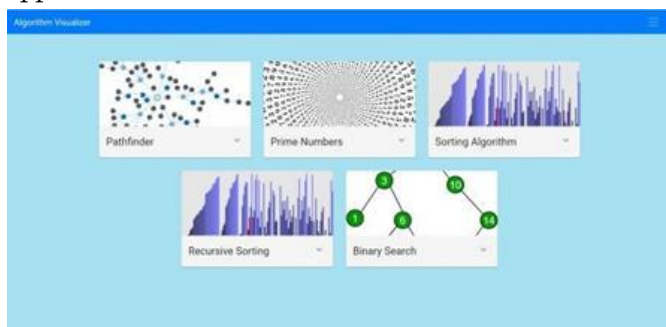


Fig. Home screen of the tool.

Now, let’s take an overview on how the tool actually works. Basically, the working has four steps. Namely, Environment setup, taking inputs, perform necessary calculations in the background and reflecting the changes on the screen.

Let’s understand it better using the example of sorting algorithms.

Firstly, the environment is setup, i.e. The original array to be sorted is represented in the form of vertical bars.



Now the user has an option to choose the range of values, numbers ,speed of animations and the algorithms they want to visualize. They may choose the duo option to compare two different algorithms.



After taking the inputs the necessary calculations depending on the user inputs are done and the animations are displayed.



**III. RESULTS AND DISCUSSION**

In studies it is found that visualization makes Complex things easy to study and understand they also took reviews from beginners as they can tell how equalization effect understanding of complex topics and how we can improve project. After enough

reviews we found that visualization is a way interesting than the traditional methods to understand topics easily.

#### IV. CONCLUSION AND FUTURE SCOPE

According to our findings, algorithm visualization might be viewed as a beneficial complement to traditional computer science teaching. We feel (and the findings of the survey back up this belief) that it aids in improving the quality of education in the field and contributes to the resolution of some of the issues in higher education.

We came to the conclusion from our research and experience that learning from a book or reading is not always the most effective way to absorb things. You may grasp anything better when you study it from films or animations, therefore We believe this is one of the attempts to improve the learning process that requires more time and thinking

As of now, we plan to include complex algorithms like convex hull, n-queens and A\* algorithm as a future scope to help learners who are at intermediate or advanced levels.

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