DSA VISUALIZER

DSA Visualizer is an interactive web application designed to help students and developers understand the internal workings of **Data Structures and Algorithms (DSA)** through animated and real-time visualizations. The platform serves as an educational tool that bridges the gap between theoretical understanding and practical implementation by illustrating the step-by-step execution of algorithms.

Key Features:

❖ Sorting Algorithm Visualizations:

- ➢ Visualize classic sorting algorithms like:
  - Bubble Sort
  - Selection Sort
  - Insertion Sort
  - Merge Sort
  - Quick Sort
- ➢ Real-time animations show how elements are compared and swapped.
- ➢ Speed control and pause/play functionality for better understanding.

❖ Searching Algorithm Visualizations:

- ➢ Understand how different searching techniques work:
  - Linear Search
  - Binary Search
- ➢ Visual highlight of each search step.
- ➢ Dynamic indication of comparisons and decision points.
- ➢ Shows whether the target element is found or not.
- ➢ Works on both sorted and unsorted arrays (depending on algorithm).

❖ Binary Tree Visualization and Binary Search Tree

- ➢ Build and explore trees dynamically
- ➢ **Binary Search Tree (BST)** insertion and deletion

- Animated node placement and movement.
- Highlights visited nodes during traversals.
- Clean tree diagram with parent-child relationships.

Educational Enhancements:

- Pseudocode and real-time algorithm logic shown alongside visuals
- Line-by-line code highlighting as animation progresses
- Helpful hints and terminology explanations via tooltips

Future Scope:

- **Add data structures like Stack, Queue, Linked List, Heap, Graph**
- **Add pathfinding algorithms (Dijkstra, BFS, DFS)**
- **Enable user-submitted code for custom visualizations**

Live Demo / GitHub Repository:

- 🌐 **Live: [Live site link will add soon]**
- 💻 **Code: [GitHub repo link will add soon]**