Sorting Algorithm Visualizer - Documentation

1. Introduction

The Sorting Algorithm Visualizer is a Python-based tool that provides a graphical representation of how different sorting algorithms work. It allows users to input a list of numbers and select a sorting algorithm to visualize the sorting process step-by-step.

2. Algorithms

2.1 Bubble Sort

Bubble Sort is a simple sorting algorithm that repeatedly compares adjacent elements and swaps them if they are in the wrong order. This process is repeated until[1] the entire list is sorted.

Description:

- Compares adjacent elements and swaps them if they are in the wrong order.
- Repeatedly iterates through the list until no swaps are needed.
- Simple to implement but can be inefficient for large datasets.

2.2 Selection Sort

Selection Sort is an algorithm that divides the list into two parts: the sorted part and the unsorted part. It repeatedly finds the minimum element from the unsorted part and places it at the end of the sorted part.

Description:

- Repeatedly finds the minimum element from the unsorted part and places it at the end of the sorted part.
- Simple to implement but can be inefficient for large datasets.

2.3 Insertion Sort

Insertion Sort is an algorithm that builds the final sorted list one item at a time. It iterates through the input list and for each element, it removes it and finds the right position where it belongs in the sorted list and inserts it there.

Description:

- Builds the final sorted list one item at a time.
- Efficient for small lists or nearly sorted lists.

3. How to Use

1. Input Numbers: Enter a sequence of numbers separated by commas in the input field.
2. Select Algorithm: Choose a sorting algorithm from the dropdown menu.
3. Start Sorting: Click the "Start Sorting" button to begin the visualization.

4. Visualization

The visualization window displays a bar graph of the input numbers. The sorting process is animated, with bars changing color to indicate comparisons and swaps.

5. Example

Input: 5, 2, 8, 1, 9

Algorithm: Bubble Sort

The visualization will show the steps taken by the Bubble Sort algorithm to sort the numbers in ascending order.

6. Notes

- The visualization speed can be adjusted using the delay slider.
- The "Reset" button clears the visualization and allows for new input.