Data Structures & Algorithms Visualizer

Submitted by: R. Shrenik, Niranjan Bhaskar K, Vidhisha Shankar
Under the guidance of Prof. Kusuma K V
Department of Computer Science & Engineering, PES University

Problem Statement

- To create an interactive online platform to visualize the creation and working of data structures and algorithms using animations on the web.
- The platform should allow the user to enter their own data, visualize the animated structures and algorithms and perform associated operations on those accordingly.

Background & Project Brief

- Visual learning tools are very valuable from a practical learning standpoint. The tools built in the literature covered are aimed at solving exactly this problem via an intuitive user-operable interface.
- Visualizing user-defined algorithms are extremely hard to implement since it usually involves converting existing HLL code to a workable implementation requiring custom parsers and grammar.
- Interactivity is important. To understand how data structures and algorithms work it is important to understand the iterative process behind their creation and working using data structure-specific methods. Well-tested animation controls are therefore important.

Design Approach / Methods

- Traditional web application built using HTML, CSS, and Vanilla JS. Several constituents such as variable declarations, mouse events, buttons and menus, functions for each of the algorithms that need to be visualized and ones responsible for visualizations are modularised into its counterparts.
- Design constraints, assumptions and dependencies: Addition of other graph algorithms would require multiple changes across functions, No external JS libraries used and ES6 code.

Team Members & Guide

Prof. Kusuma K V
Guide

R. Shrenik
Team Member

Niranjan Bhaskar K
Team Member

Vidhisha S
Team Member

Project Summary

Data Structures and Algorithms Visualizers for Linear Data Structures, Trees, DFS, BFS, Dijkstra, Prim, Kruskal, Floyd algorithms for graphs, Comparison Sort algorithms, and others, basic string operation algorithms were implemented within the system as initially proposed.

Conclusions & Future Work

- The idea of a platform to visualize DSA, see them in action and the ability for the user to perform operations on them is vital to learning how they work for both teachers and students alike.
- In the future, we plan on integrating live code tracing to all of our visualizers effectively by providing common interfaces we can use for every algorithm.

References

- *Cyber Security Risks For Modern Web Applications by Devanshu Bhatt.*
- *Analysis of Web Application Performance Enhancement Techniques by Igor Jugo.*