Summer Internship Project Report

Visualization of data structures in ELM

Submitted by

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Contents

Introduction

This report outlines my work as part of my summer internship at the Software Engineering Research Center, IIIT Hyderabad from 15th May-30th June 2022. I have worked with the Algo dynamics team initially to build a data structure visualization package in ELM. I worked on building a replica of Bubble sort Algorithm using ELM language along with Pyscript.

Objective

1. Understand Algodynamics Experiments.
2. Learn ELM language.
3. Learn Python Script Runner

Work Done:

1. Implemented Bubble Sort replica using ELM

I have learnt elm by starting with implementation of bubble sort experiment Replica. This helped me learn to model a problem in ELM and understand language constructs, architecture of ELM. My implementation has the following features:

1. Displays and Updates state variables namely index(i) and boundary(b) of bubble sort Experiment.
2. Highlights elements with green color if they are in the correct position when compared with sorted Array.
3. Reset button to reset the machine to initial state.
4. Undo button to undo the previous operation.
5. Status string which displays array status i.e sorted or not sorted
6. Swap button to swap consecutive elements.
7. Index highlighter which highlights indices of two elements which are going to be swapped.

Live Link : Main (geetika-2001.github.io)
Repository Link: Link to Repository

2. Elm Calculator

I have implemented a fully functional calculator in ELM. This helped me learn how to write logic/algorithm for a particular task in ELM and how to divide it into sub-problems and use function composition in ELM. This resource helped me in understanding function composition better.

Learnt Function Composition through the following Reference:

function composition

This Calculator has some drawbacks like:

1. It does not have BODMAS Functionality for calculations.
2. It is not configurable and layout has been designed by hard coding the coordinate values and sizes.

Live Link : Link
Repository Link: Repo Link

3. Running Python Script in Browser

How can we run a Python Code when working on a HTML page /existing Web Page and use it to run the code in real-time?

Research References: Links Included here

1. **Conclusion of Research:** Using Pyscript can help run Python code directly

2. **Summary:** It is able to run the python code exactly like one would run in an IDE. It is also capable of adding certain lines of code as default to help the user get started.

   Example of default code shown in Work Demo.

   Live link : https://geetika-2001.github.io/Pyscript-Task3/
   Code Link: Repo

3. **Progress of Running Pyscript in Browser:**
   The python code implemented write now is well capable of running python commands. The execution is complete. On adding the code in any existing html code , the python code can be executed successfully

Future Work

As the name of the package(elm-data structure) suggests, our plan was to implement a package which supports drawing of all possible data structures. But, we were only able to implement array-view in the current version due to the time constraints. The further plans include:

1. Add more data structures to the package like Stacks, Queues, Lists.
2. Write tests to the current package using elm-test.
3. Make changes to the package to add responsiveness, so that it could also be rendered on mobiles.

Additional Links

Internship work demo presentation:

PPT link

Work Logs:

Worklogs link

Acknowledgment

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References

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