ECpE 492 – Bi-weekly Report #3

Sept 27 – Oct 11

Project Title	Interactive evaluation of shortest path methods
Client & Advisor	Goce Trajcevski
Team	`sddec23-14`
Team Members	Alex Blomquist, Samuel Caldwell, Selma Saric, Yadiel Johnson

1 Report

1.1 Abstract

The team has progressed heavily over the last period, with major milestones regarding the algorithm execution logic, the web server deployments, the user-facing web application, and the backend-to-frontend communication.

1.2 Work Breakdown

Over the last two weeks, we've been improving the various sections of this project that each member has chosen to work on.

The requested ETG server has seen changes, primarily centered around automating builds and deployments. We have also implemented the basic UI and functionality for the home page on the frontend.

For the Algorithm Execution Driver, the main logic for our application, a full implementation of both Dijkstra's and Thorup's algorithms has been completed, featuring:

- Algorithm execution and comparison
    - o Runtime calculations
    - o Per-algorithm setup
- Graph importing (9th DIMACS Challenge Format)
- Extensible structure and interfaces

The last point is important, as the following time period will see focus shifted towards the web server and application quality as a whole, but once that is done, further development should be much more streamlined. More details can be found in the associated GitLab issue. Two algorithm implementations for All-Pairs Shortest Path have also been tested, but require significant work to adapt and will be implemented later on.

Finally, the graphical aspect of the web application has had significant progress, as well. For the UI itself, we have implemented the basic layout for the home page, including a "Select an algorithm" section where the user can select one or two algorithms to run on a dataset, and a "Select a dataset"

section, where the user can upload a file containing the dataset they would like to run their algorithm(s) on. The uploaded dataset file is parsed and converted into a graph structure, using Graphology API. From there, the Graph can be visually represented and manipulated using Sigma.js to show the paths produced by the AED.

1.2.1 Major accomplishments
- o Created the basic layout of the UI for the homepage and implemented file selection so that users can eventually upload their datasets
- o Implemented input selection for user's datasets via formatted text files.
- o Began rendering graph data structures using Sigma.js

1.2.2 Pending issues
- User account implementation is still somewhat tricky to implement. Spring Boot has various forms of doing so, and because this is not part of the core functionality of this project, it has not been researched as heavily as other aspects.
- Algorithm implementations are hard to source with credible backgrounds. For the APSP algorithms that were found, they *look* solid, but they don't have as solid of a credential backing them as the Dijkstra and Thorup implementations. Additional work must be done to find possible better implementations.

1.2.3 Individual contributions

Name	Individual Contributions	Worked Hours	
		This Period	Cumulative
Alex Blomquist	- Continued development of server on the backend server - Began work implementing on the CI/CD pipeline and its respective tests - Began work on SQL database storage on the backend	7	58
Samuel Caldwell	- Research on MapBox API implementations - Formatting user dataset inputs for integration into Graphology. - Began implementation of the visualization renderer using Sigma.js	8	60
Selma Saric	- Completed work on UI for the home page of the web application - Lead discussion and helped team members get tasks assigned to them for the next couple of weeks - Filled out meeting minutes document and Gitlab for project management	6	64

Yadiel Johnson	- Completed AED implementation for two SSSP algorithms. - Testing for APSP implementations. - Major progress on writing AED JavaDocs. - Merge request for completed changes on GitLab (issue). - Portions of Section 1: Report and overall development for this weekly report.	10	82

2 Comments and extended discussion

2.1 Work Planned for Next Week

2.1.1 Collective

The next major step for our project is to continue working on the UI of the home page by adding a source and destination point entry field in the "Select a dataset" section and begin working on the UI for the other pages on the website. We will also continue to work on our visualization renderer, as well as setting up more of our web server for communication betweent the frontend and the backend.

2.1.2 Individual

- Alex Blomquist
    - Continue and finalize work on the CI/CD pipeline and its respective tests
    - Similarly, continue work on the SQL database for backend storage
    - Generate tests to ensure the proper functionality of sed database
- Samuel Caldwell
    - Finish researching MapBox API implementations.
    - Translate Graphology datasets into applicable datasets for MapBox visualization rendering.
    - Begin implementing endpoints for frontend/backend communication.
    - Continue to develop visualization renderer using sigma.js.
- Selma Saric
    - Continue updating the meeting minutes document when we meet with our client
    - Update the Gitlab issue board as new tasks come up
    - Continue working on the UI home page layout
    - Start work on the UI for the other web app pages
- Yadiel Johnson
    - Implement new methods/endpoints for the RESTful API server.
    - Adapt Floyd-Warshall's and Johnson's algorithms for APSP functionality on the AED.
    - Set up logging on the application.
    - Set up database storage for the application using the ETG server.

2.2 Summary of weekly advisor meeting

Within the past couple of weeks, we have met with our client twice. During the first meeting, we discussed our progress on the frontend and backend and asked some outstanding questions that we had, and received advice on what we should be working on next. During the second meeting, we showed our progress on the home page layout and received feedback to allow the user to add a source and destination point so the visualization will display correctly. We also discussed some of our technical challenges with the algorithm implementations in the backend and received advice on how to proceed with that as well.