

ECpE 492 – Bi-weekly Report #5

Oct 25 – Nov 08

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

This period, three new algorithms were fully implemented in the backend; additionally, logging and code structure improvements, including decoupling and refactoring early code to align closer to the ideal vision. For the frontend, several improvements have been made to the sigma visualizer in order to improve the graphs readability as well as its accessibility.

1.2 Work Breakdown

Throughout the last period, the team advanced in several key areas.

First, the web server and algorithm execution sections of the code got major overhauls to facilitate logging, improve testing, and take advantage of language features. This allows for a more streamlined codebase. Namely, the separation of logic away from controllers allows for more fine-grained testing on the business logic rather than bundling it with the RESTful aspects and allows for a condensed definition for both APSP and SSSP endpoints.

Implementations for Johnson’s, Floyd-Warshall’s, and Bellman-Ford’s algorithms have been added. Minor, yet documented modifications have been made to allow for critical information to be returned/generated, such as predecessor matrices for APSP algorithms. With these, the count for algorithms ends up at 3 SSSP and 2 APSP, with a relatively short turnover time to implement them.

Then, for the visualizer on the frontend, node and edge sizes now correspond to the number of outgoing edges and their weights, respectively. Users may now drag and drop nodes to change the layout of the graph. Finally, the sigma visualizer is now capable of representing paths through colored nodes and edges.

1.2.1 Major accomplishments

- Implementation
 - Implemented:
 - Johnson’s Algorithm

- Floyd-Warshall's Algorithm
 - Bellman-Ford's Algorithm
- Sigma.js improvements (a visualization library).
- Graph parsing from text files.
- Began connecting elements in the backend to the frontend.
- Fixed Backend docker CI/CD pipeline issues.
- Finished implementation of MySQL database and began integration of Spring Boot data storage.
- Additions
 - Distinct code for both single-source and single-source-single-destination calculations.
 - Logging for critical sections of code in the backend.
 - Improvements to both SSSP and APSP HTTP endpoints.

1.2.2 Pending issues

- Due to the lack of a real-time language, operating system, or supporting hardware, it becomes inevitable that run-to-run variance affects the execution results for the Algorithm Execution Driver due to preemption, context switching, and interrupts. There seem to be no "simple" solutions to this problem, but it can be mitigated by performing an average over X number of runs. However, this implementation can prove to have other problems associated with it.

1.2.3 Individual contributions

Name	Individual Contributions	Worked Hours	
		This Period	Cumulative
Alex Blomquist	<ul style="list-style-type: none"> ● Finished integration and deployment of the GitLab CI/CD pipeline and its respective testing ● Fixed bugs regarding Docker Daemon connecting to the Gitlab Runner for deployment ● Finished setup of the MySQL Database and began setup of springboot server storage/connection 	12	88

Samuel Caldwell	<ul style="list-style-type: none"> • Implemented new sigma.js features <ul style="list-style-type: none"> ○ Graphs can now be manipulated via drag and drop features ○ Nodes and edges now correspond to their number of edges and weights, respectively ○ Graphs can now display paths between source and destination nodes. • Uploaded graphs will now automatically detect negative edge weights • Continue implementation of the page for displaying results of algorithm execution on the uploaded graph 	13	88
Selma Saric	<ul style="list-style-type: none"> • Began to connect the backend to the frontend • Continued work on home page UI • 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 	12	86
Yadiel Johnson	<ul style="list-style-type: none"> • Added support for three new algorithms, • Major refactoring, decoupling, and reorganization for backend. • Added logging for critical areas such as controller services and the AED. • Merge request for completed changes on GitLab (issue, issue). • Portions of Section 1: Report and overall development for this weekly report. 	15	109

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 connection between the backend and frontend elements, primarily on the home page. We will also begin work on the MapBox visualization. On the backend side of things, we will be working on completing the integration of the SQL database and running tests on the AED.

2.1.2 Individual

- Alex Blomquist
 - Finish integration SQL database storage in the Springboot server

- Develop associated tests involved in the integration of the SQL database storage
- Samuel Caldwell
 - Implement graph builder and visualizer using Mapbox.
 - Integrate Mapbox implementation with the graph storage structure on the frontend
- 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 connecting the backend components to the home page within the frontend so the user can select different inputs for their algorithm runs
- Yadiel Johnson
 - Devise a solution for run-to-run variance using queues for the AED.
 - Finish adding tests for the algorithm endpoints and the AED.
 - Set up database storage for the application using the ETG server.

2.2 Summary of weekly advisor meeting

In the past two weeks we have met with our client once and discussed our individual progress on the project. There were some blockers we had regarding the visualization aspect of our project and our client was able to provide some clarity for us so that we could move forward.