TESTING AND EVALUATION DOCUMENT

for

Elevation-based Navigation System (EleNa)

COMPSCI 520 Final Project

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Contents

1 Introduction

1.1 Purpose

This document specifies the testing and evaluation of results for Elevation-based Navigation System (EleNa). This project corresponds to the CS520 Final Project.

1.2 Intended Audience and Reading Suggestions

This document is intended for developers, testers, documentation writers, and the grading staff for the project. This document does not specify the technical details, evaluation results, and user manual. The reader should read the system design document evaluation result, and user-manual document separately.

1.3 Project Scope

EleNa on higher level has the following objectives:

- Allow user to get directions between origin address and destination address.
- The provided directions should minimize the elevation gain.

Such a system will provide the following benefit(s):

- Improve user's walking and biking commute by minimizing the elevation gain.

2 Unit Testing

We perform unit testing of the view functions and worker functions. For the test oracle, we use manually curated set of paths. The steps to perform testing are provided in README.md.

The unit-test results are shown below:

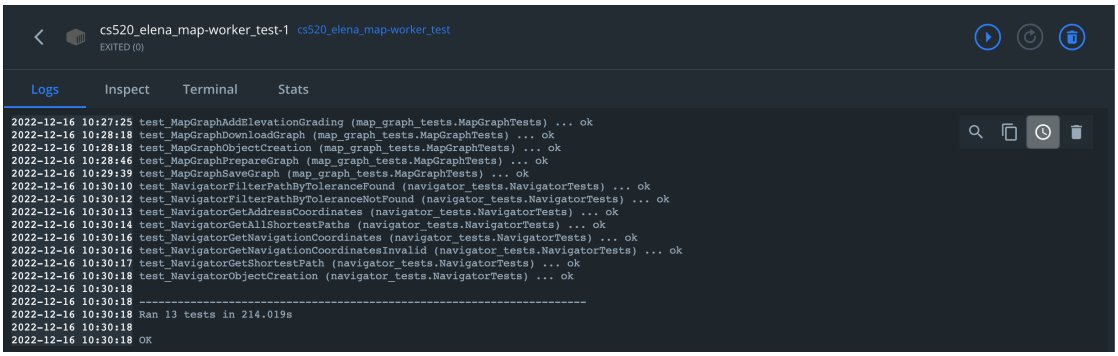

Figure 2.1: Worker unit tests

Figure 2.2: View unit tests

3 Stress Testing

We perform internal worker API stress testing using JMeter. Due to computational resource limitation, we perform stress testing by scaling to 2 workers. One of our third-party API dependency's (Nominatim) free API limits us to 1 request per second. The steps for stress testing setup are provided in README.md.

We stress test using the following configuration in Apache JMeter – 50 threads with 50 seconds ramp-up. We randomly sample and send a HTTP request from a collection of 5 pre-defined HTTP requests. We observe a 0.0% error rate and a throughput of 58.6 requests/min.

We present the results of stress testing below:

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
HTTP Request 5	11	1920	1616	2379	264.12	0.00%	16.9/min	0.33	0.10	1198.0
HTTP Request 4	9	1793	1585	2310	214.84	0.00%	13.9/min	0.19	0.08	853.0
HTTP Request 3	15	1846	1575	2174	183.17	0.00%	17.6/min	0.27	0.10	932.0
HTTP Request 2	9	1800	1617	2014	121.39	0.00%	13.5/min	0.13	0.08	607.0
HTTP Request 1	6	1912	1644	2501	277.54	0.00%	9.1/min	0.10	0.05	656.0
TOTAL	50	1852	1575	2501	219.50	0.00%	58.6/min	0.84	0.35	884.7

Figure 3.1: Stress testing with 50 threads with 50 seconds ramp-up