Mappa

Team Mappa (#20)

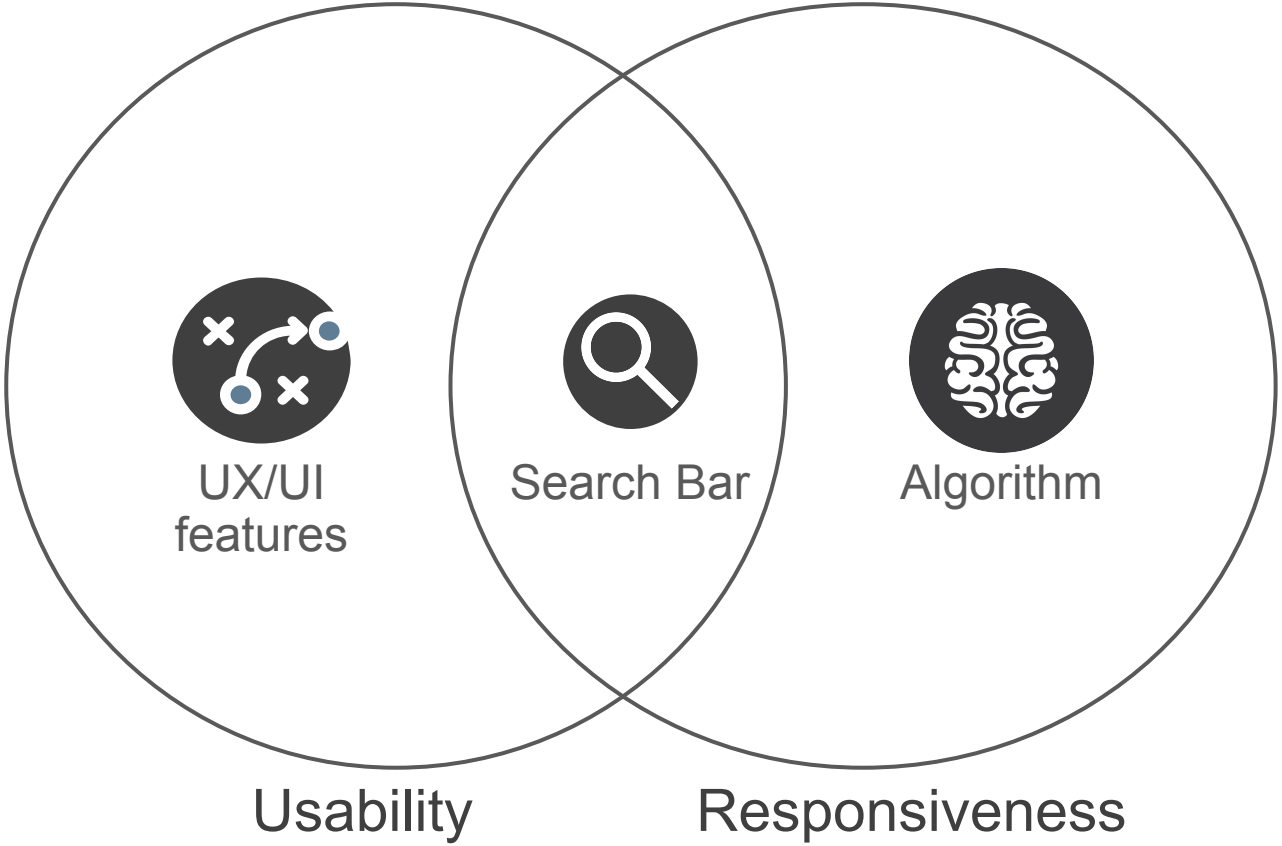
Alexandre Gouveia

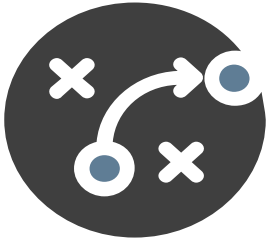
Pratish Dalal

Marcos Madrigal

Mappa: Features of Interest

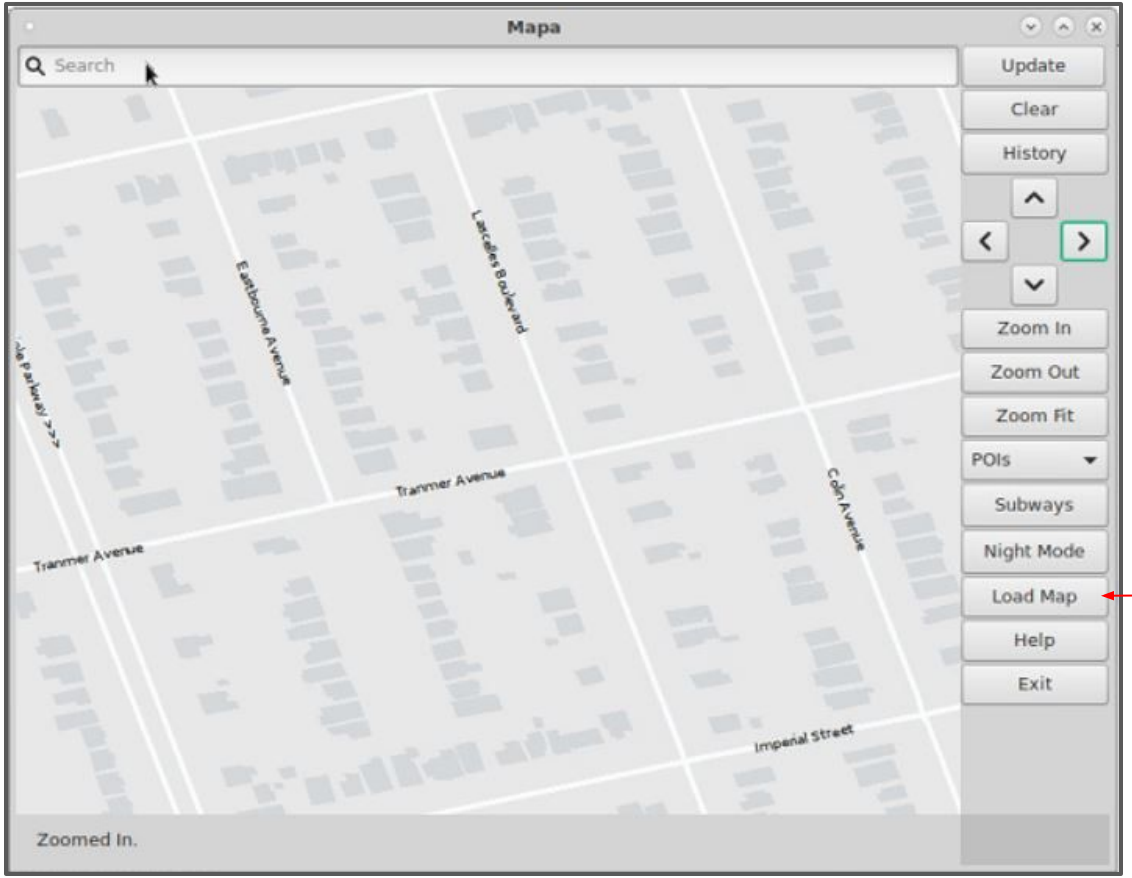
Achieving Usability & Responsiveness





UX/UI features

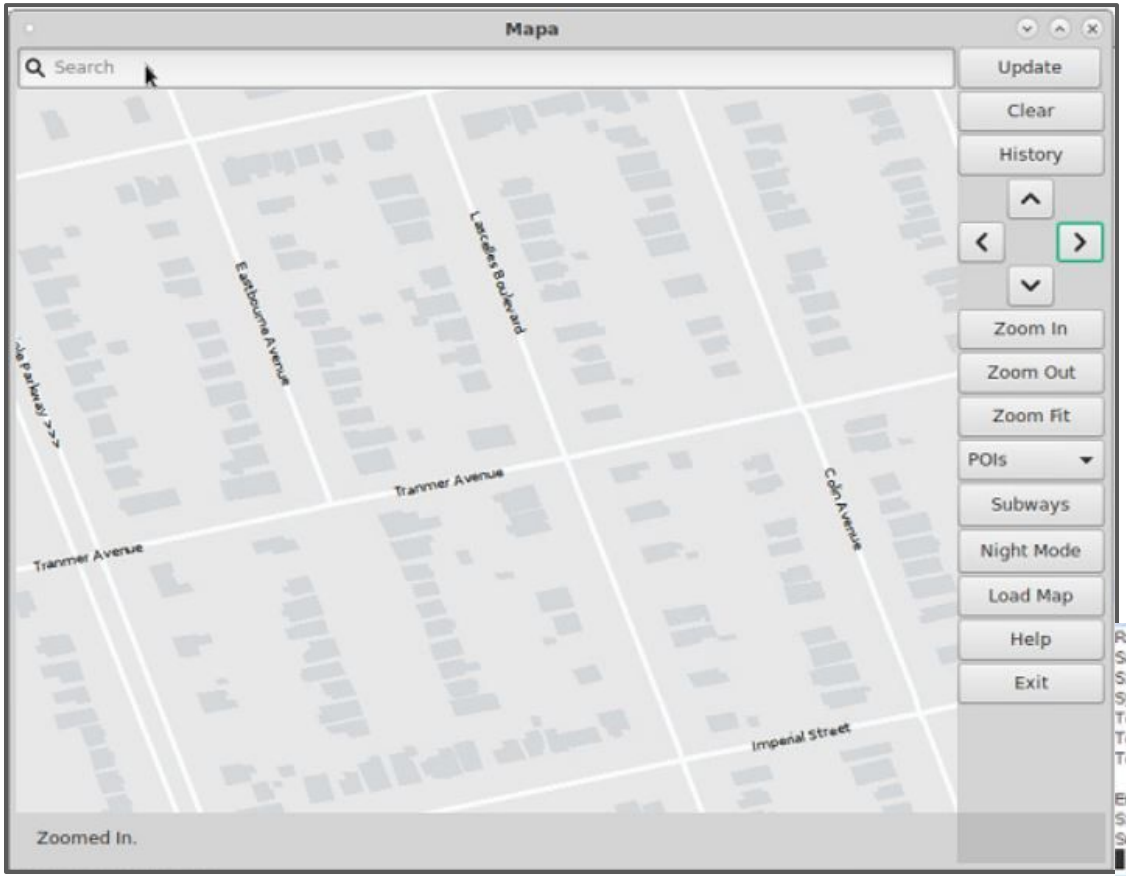
Usability: Load Map



Step 1:

Click the Load Map button

Usability: Load Map



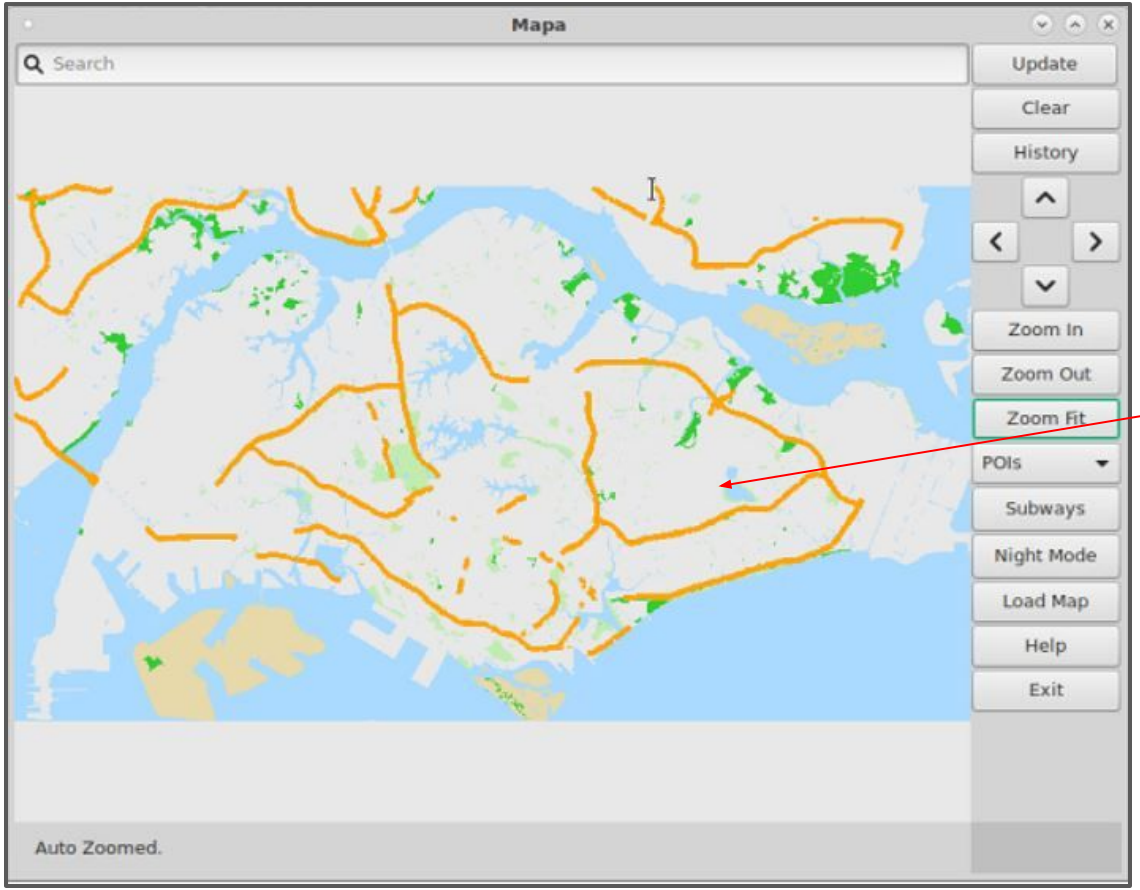
Step 2:

Interact with the terminal to choose new map to be loaded

```
Rio-de-Janeiro
Saint-Helena
Singapore
Sydney
Tehran
Tokyo
Toronto

Enter map of the city to be loaded:
Singapore
Successfully loaded map '/cad2/ece297s/public/maps/singapore.streets.bin'
```

Usability: Load Map



New map gets loaded without recompilation

[1]

Usability: Why Subway Systems?

Subway systems are one of the highest used modes of transportation globally. [2]

Subway systems are a means to:

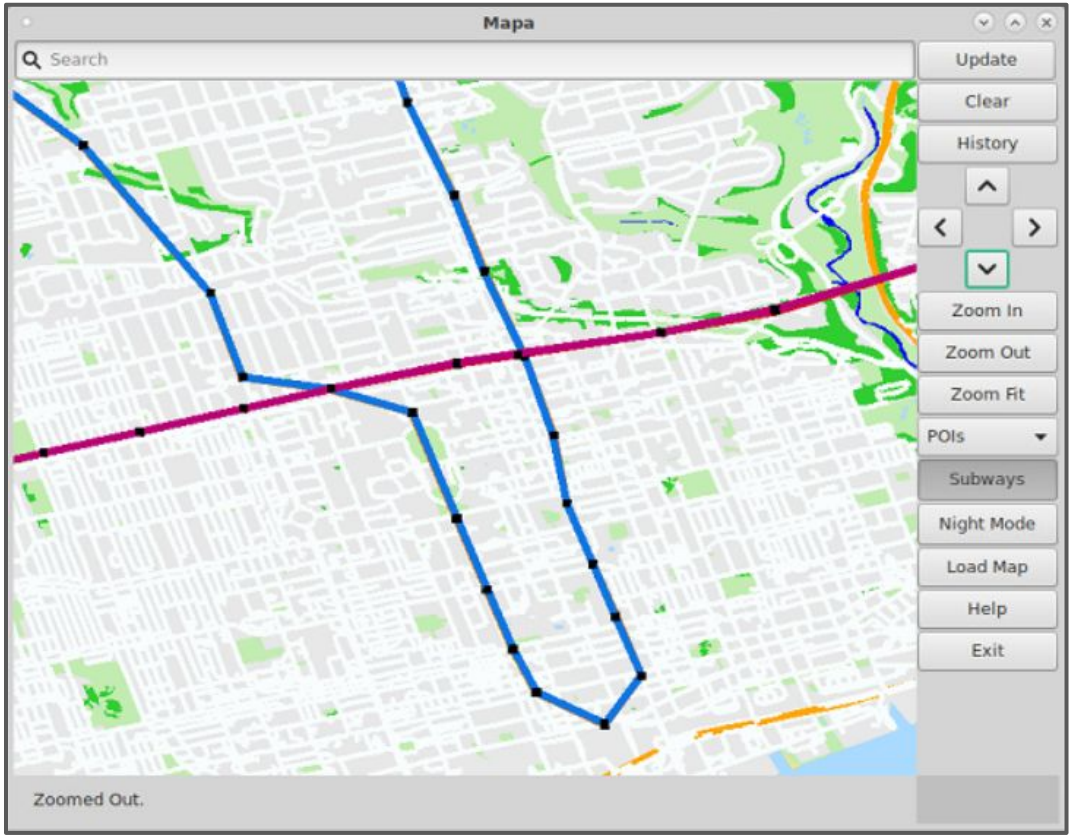
- Foster density
- Reduce reliance on cars
- Provide residents with affordable transportation

Usability: Annual Subway Systems Users

CITY	ANNUAL USERS
Tokyo, Japan Metro	3.16 billion
Moscow, Russia Metro	2.4 billion
Seoul, South Korea Metro	2.04 billion
Shanghai, China Metro	2 billion annual
Beijing, China Metro	1.84 billion
New York City Subway	1.6 billion
Paris, France Metro	1.5 billion
Mexico City, Mexico Metro	1.4 billion
Hong Kong, China Metro	1.32 billion
Guangzhou, China Metro	1.18 billion
London, England Underground	1.065 billion

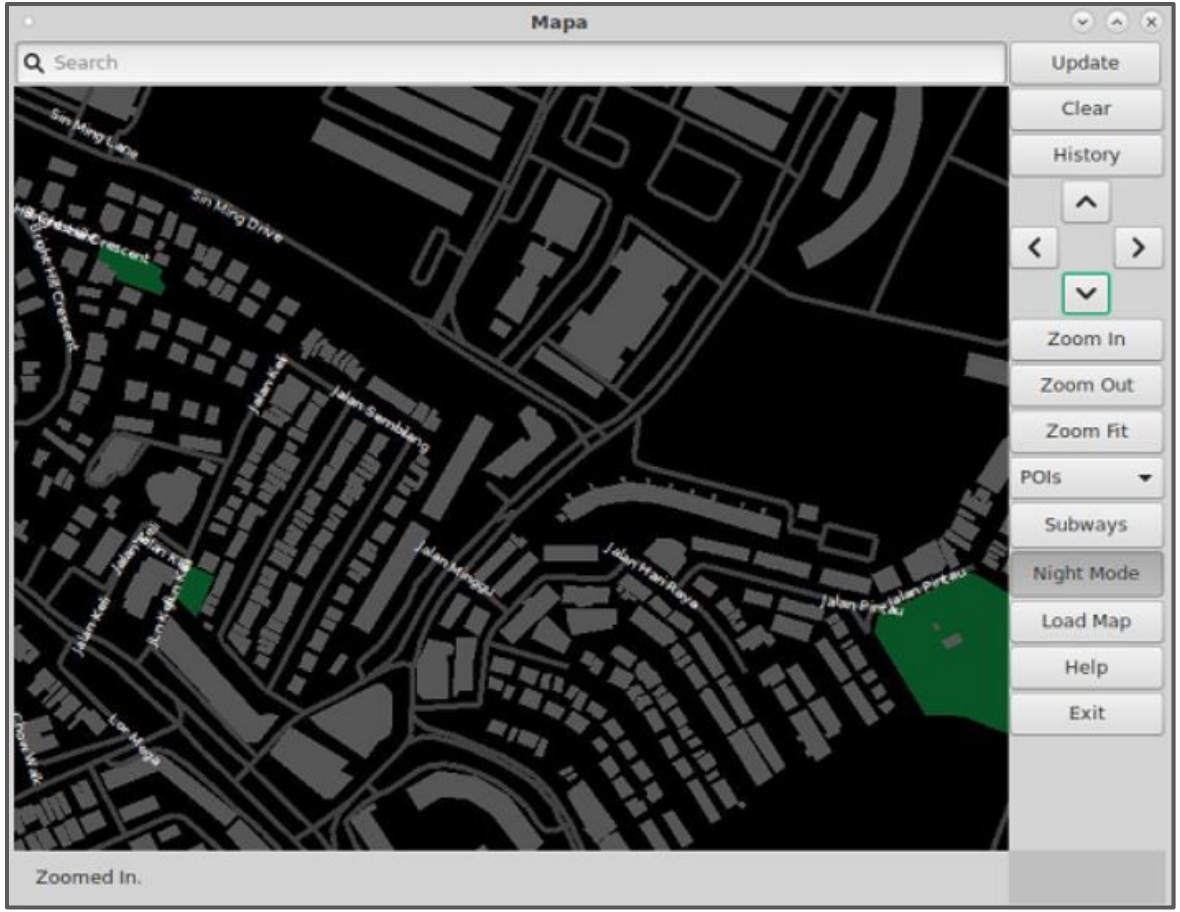
[3]

Usability: Subway Systems implementation



Press button to view subways

Usability: Night Mode implementation



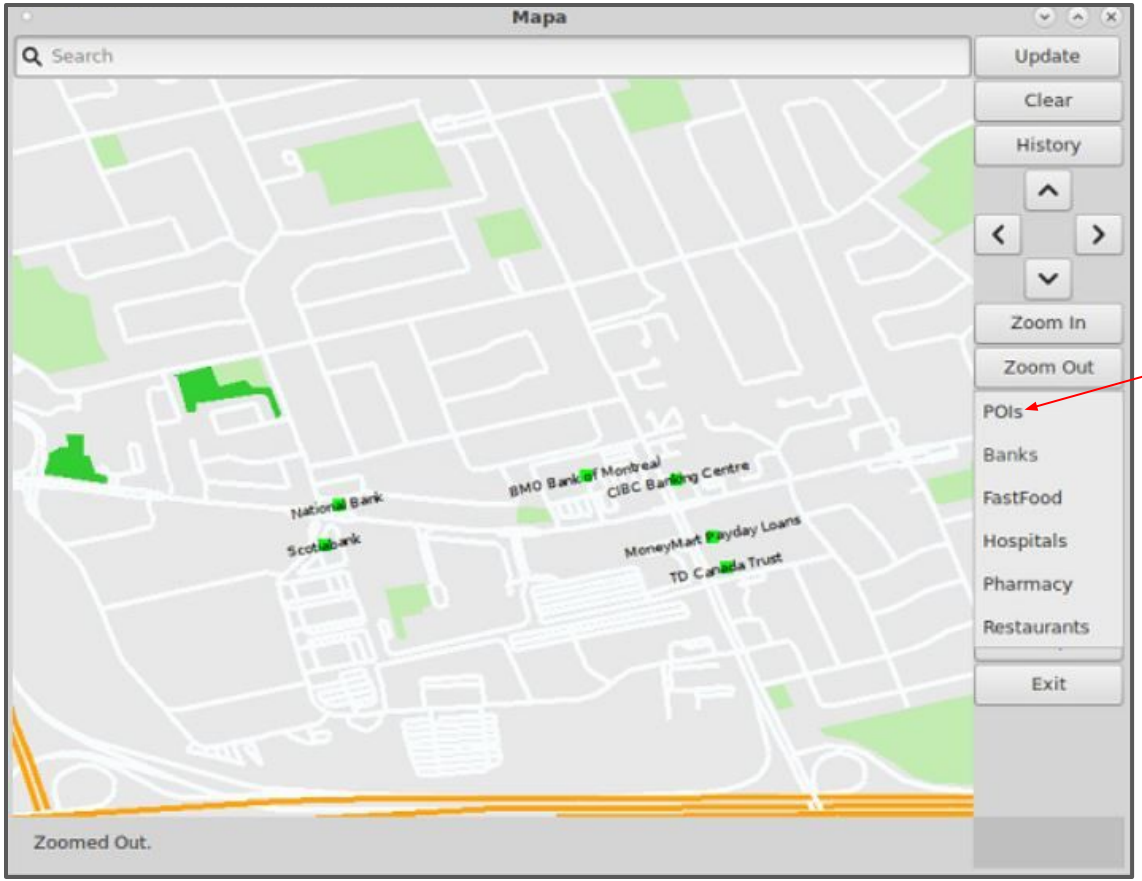
Press button to change mode

Usability: Why Night Mode?

		Background								
		Red	Orange	Yellow	Green	Blue	Violet	Black	White	Gray
Foreground	Red		Poor	Good	Poor	Poor	Poor	Good	Good	Poor
	Orange	Poor		Poor	Poor	Poor	Poor	Good	Poor	Poor
	Yellow	Good	Good		Poor	Good	Poor	Good	Poor	Good
	Green	Poor	Poor	Poor		Good	Poor	Good	Poor	Good
	Blue	Poor	Poor	Good	Good		Poor	Poor	Good	Poor
	Violet	Poor	Poor	Good	Poor	Poor		Good	Good	Poor
	Black	Poor	Good	Good	Good	Poor	Good		Good	Poor
	White	Good	Good	Poor	Poor	Good	Good	Good		Good
	Gray	Poor	Poor	Good	Good	Poor	Poor	Poor	Good	

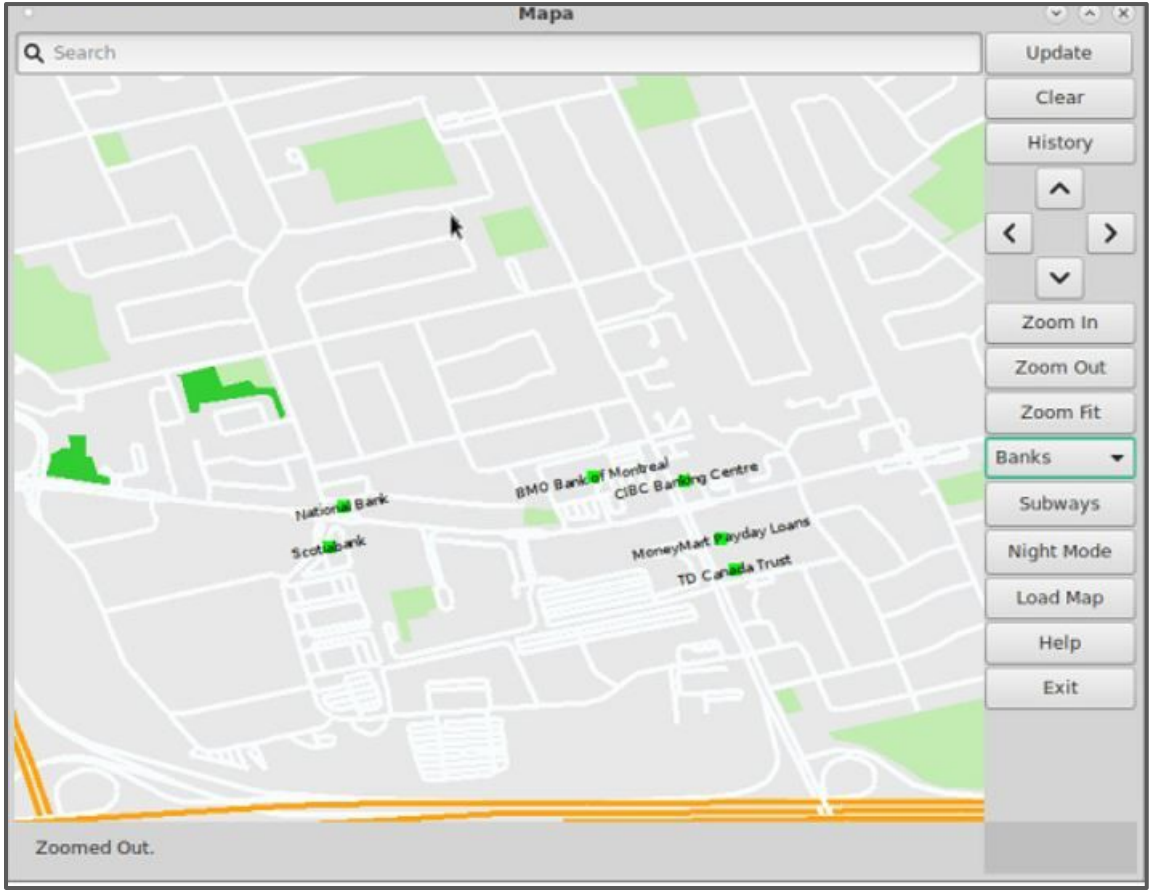
- Research shows that there is a direct relation between retention of users and the color of the screen [4]
- Eyes get less tired at night. [4]
- Longer consumption of content.
- Dark background provides for better contrast for a majority of the colors. [5]
- Looks Amazing !

Usability: Points of Interest Implementation



Drop-down menu for selection

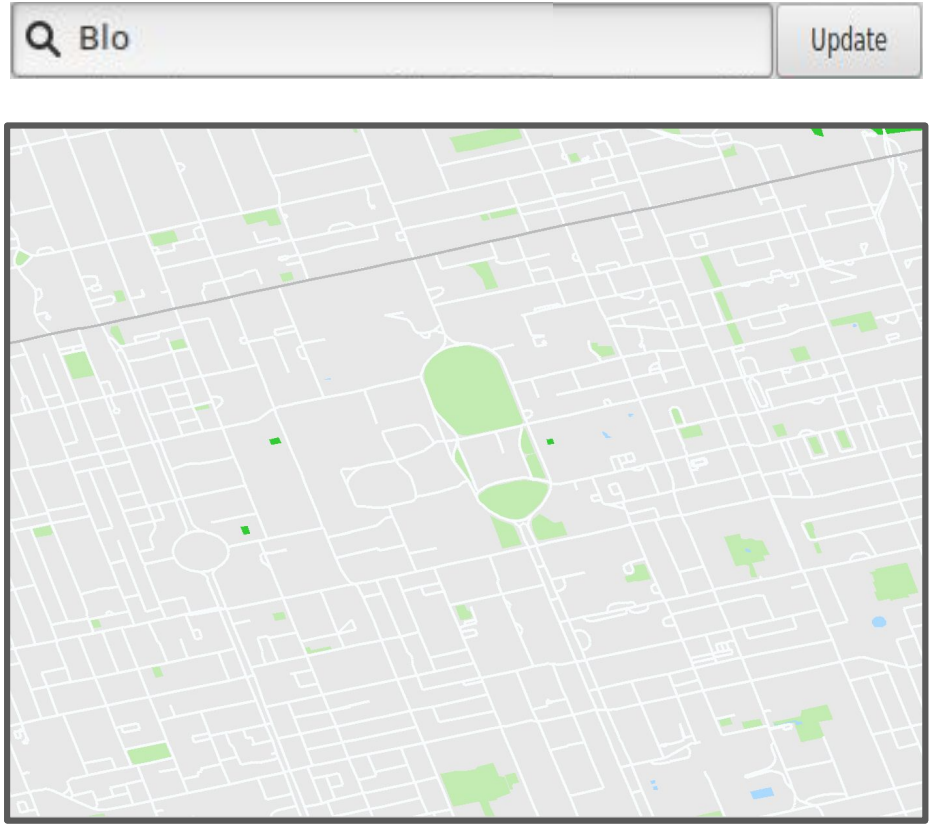
Usability: Points of Interest Implementation



Search Bar

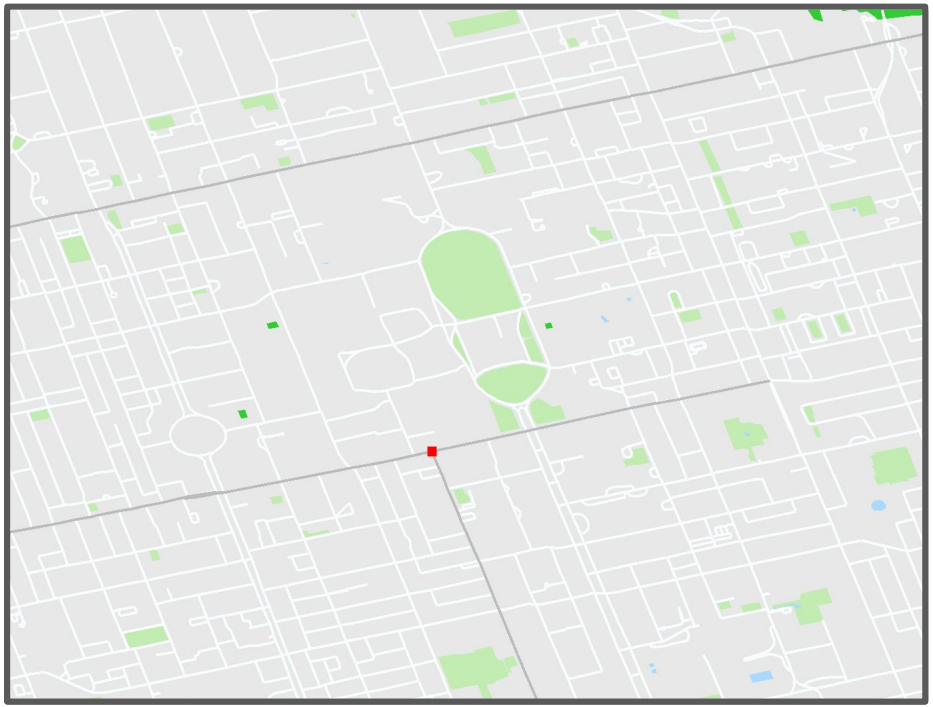
Usability: Search Bar - Required Functions

- Search by partial street names (M1)



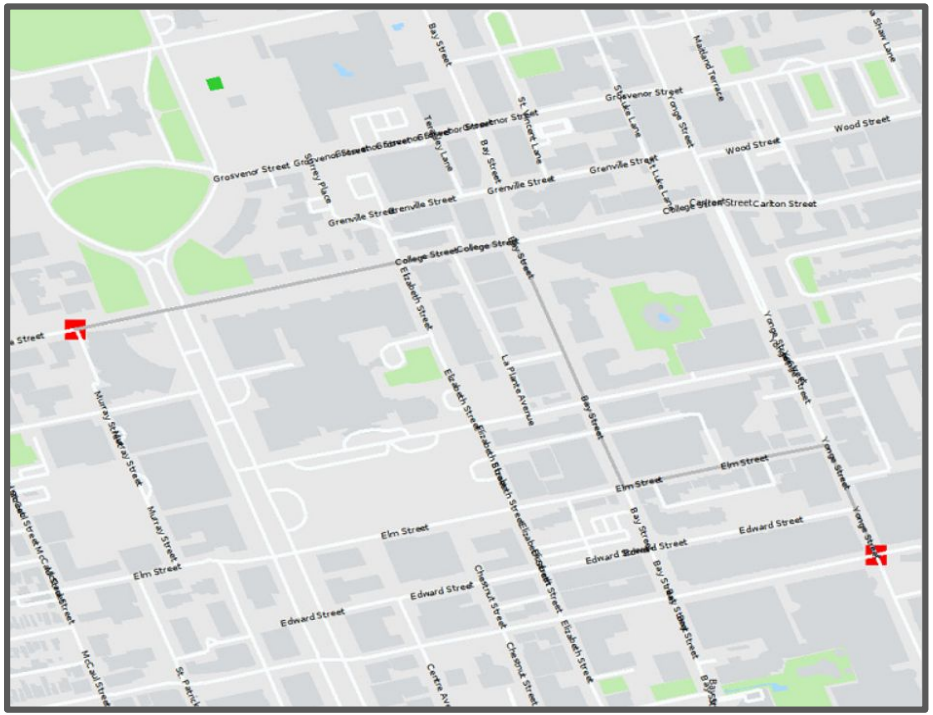
Usability: Search Bar - Required Functions

- Search by partial street names (M1)
- Find intersection between streets (M2)



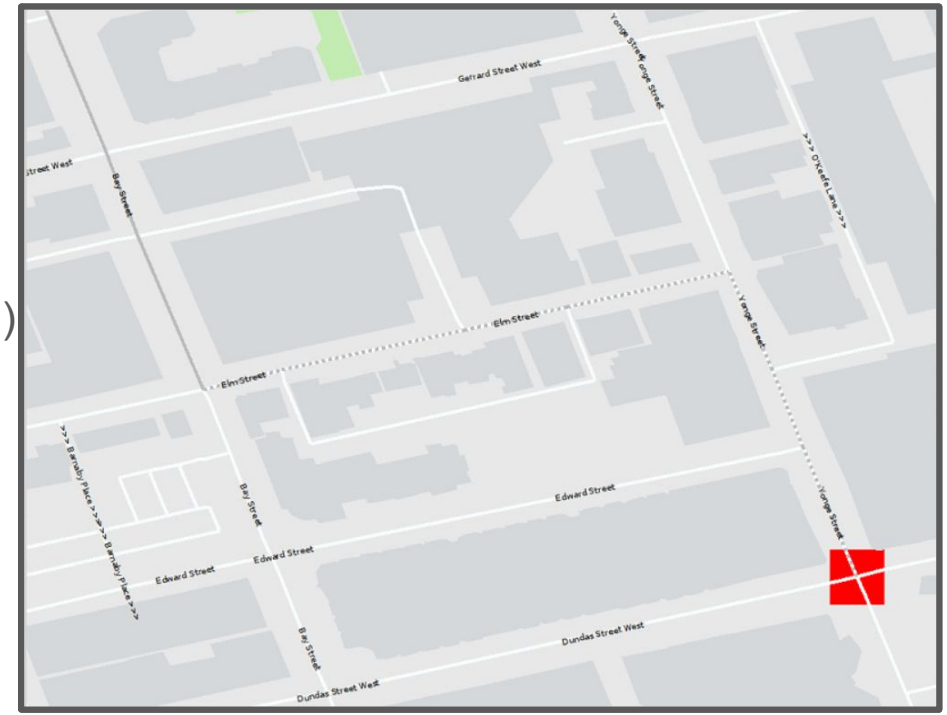
Usability: Search Bar - Required Functions

- Search by partial street names (M1)
- Find intersection between streets (M2)
- Find shortest driving path (M3)

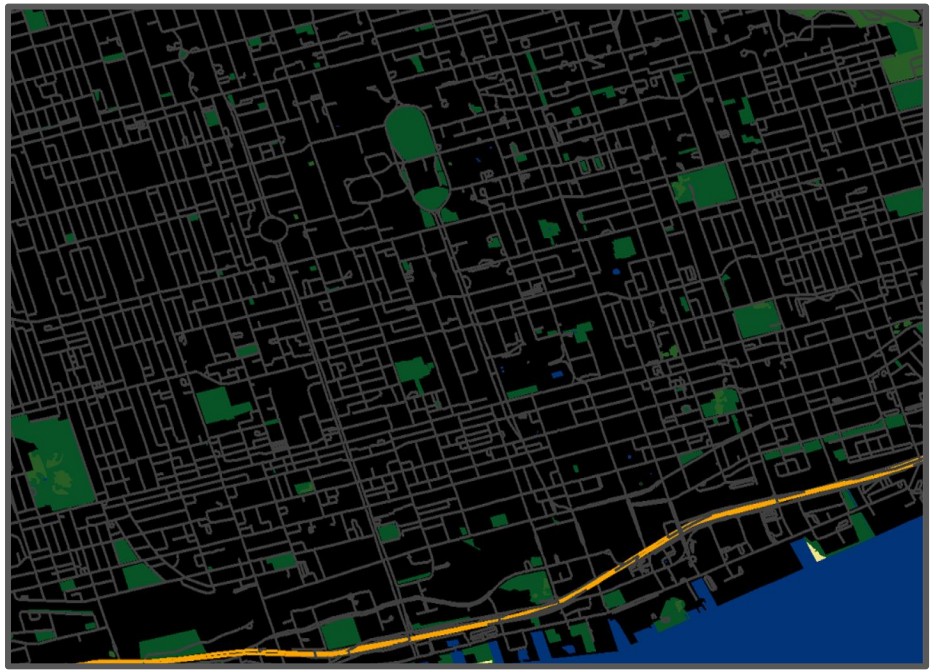


Usability: Search Bar - Required Functions

- Search by partial street names (M1)
- Find intersection between streets (M2)
- Find shortest driving path (M3)
- Find shortest driving + walking path (M4)

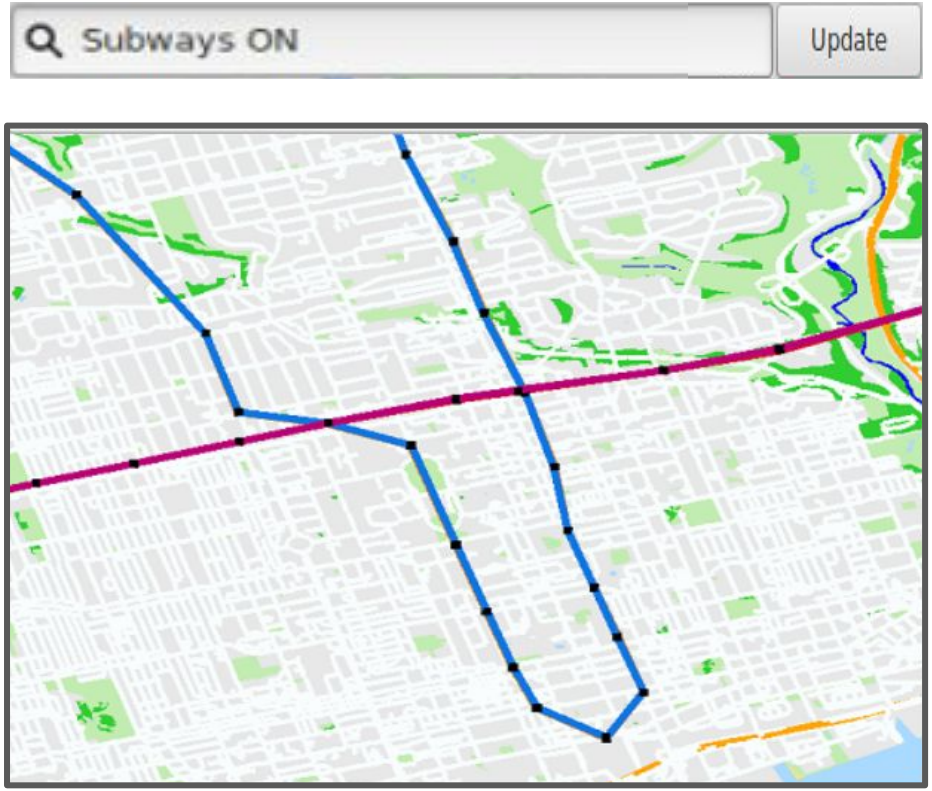


Usability: Search Bar - Extra Features



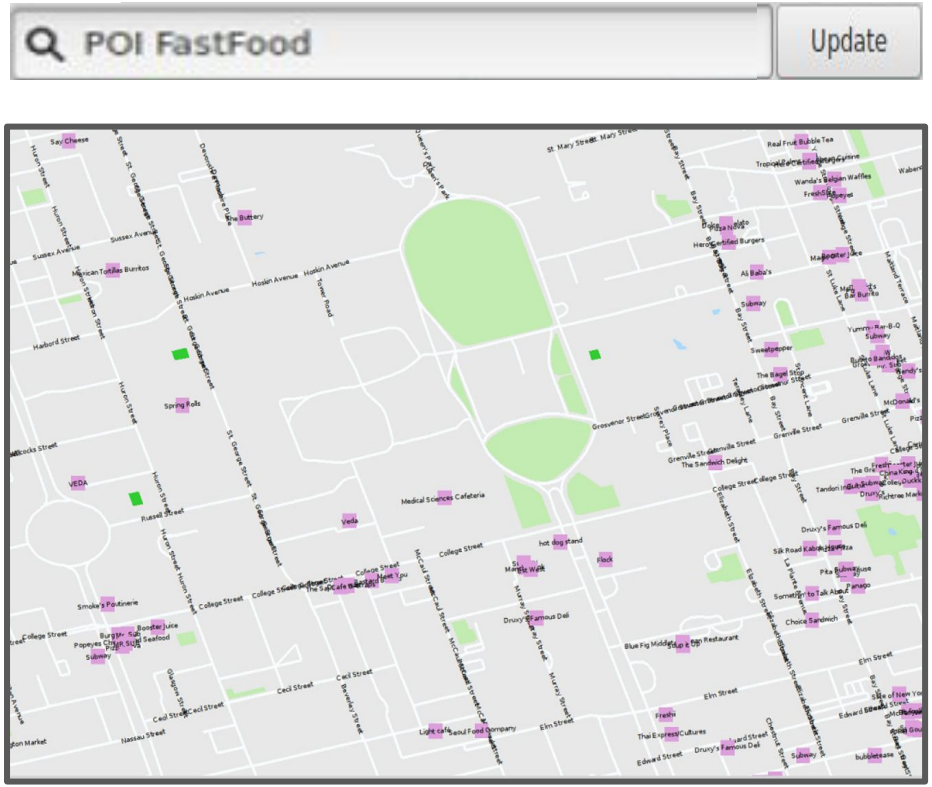
- Night Mode

Usability: Search Bar - Extra Features



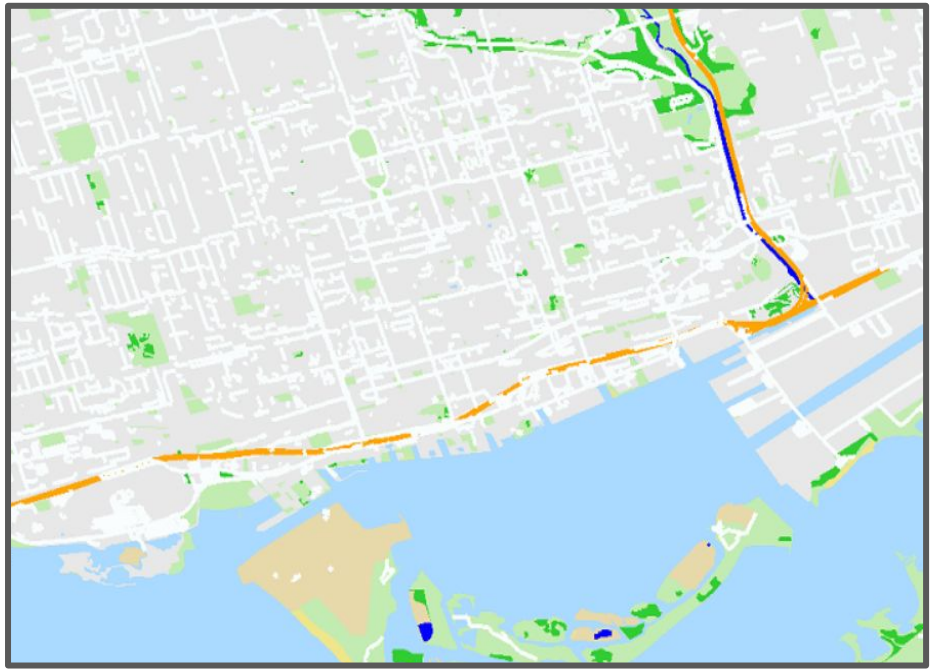
- Night Mode
- Subways

Usability: Search Bar - Extra Features



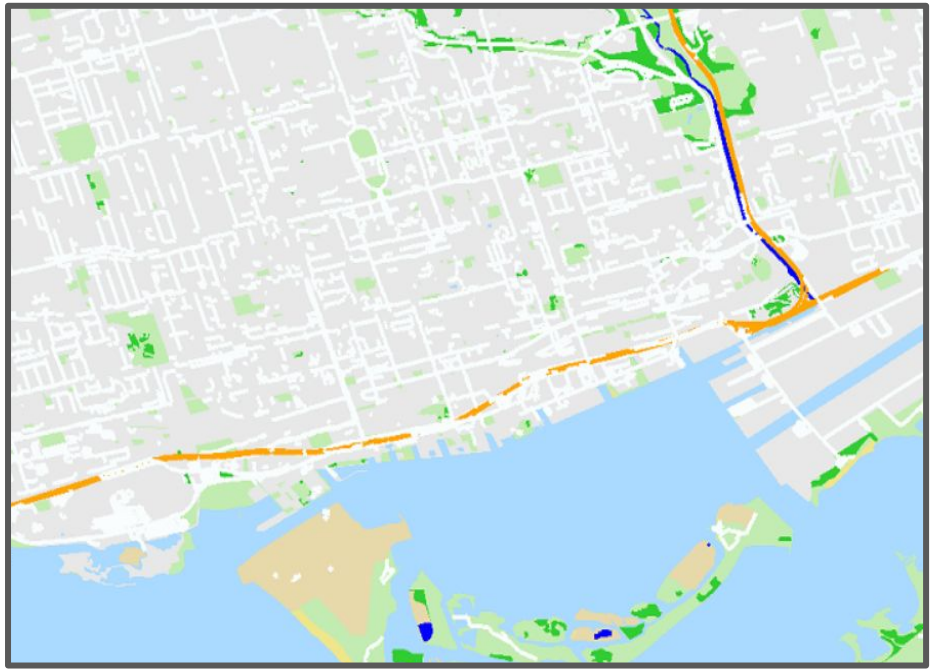
- Night Mode
- Subways
- POIs

Usability: Search Bar - Extra Features



- Night Mode
- Subways
- POIs
- Customizable Features:

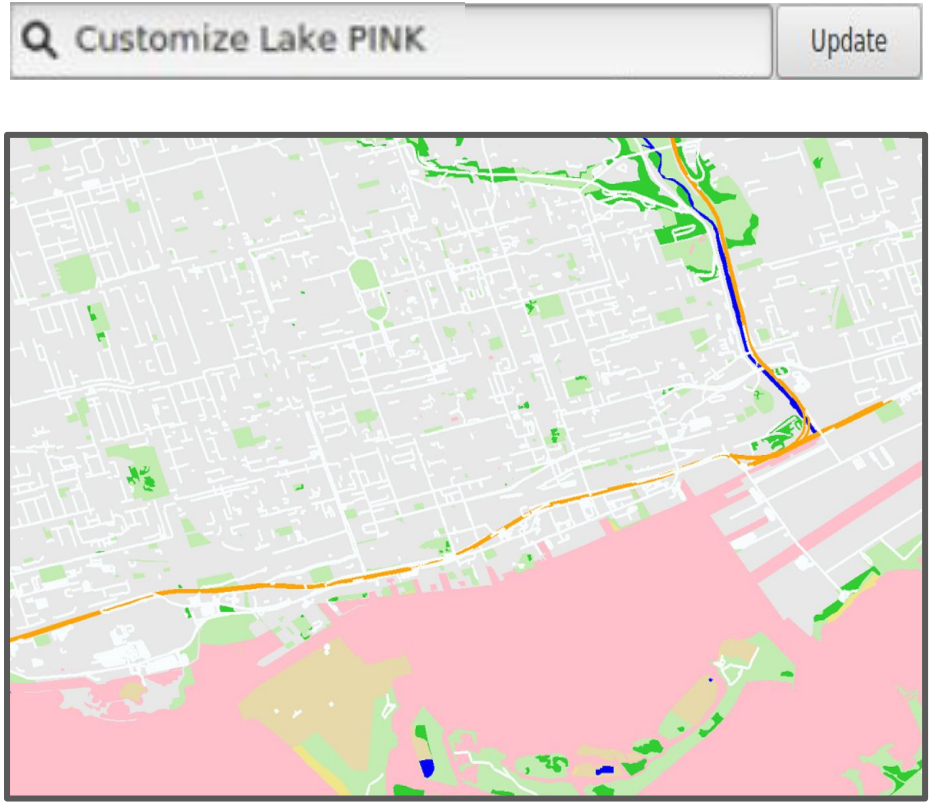
Usability: Search Bar - Extra Features



- Night Mode
- Subways
- POIs
- Customizable Features:

- Parks	- Beaches	- Greenspace
- Rivers	- Buildings	- Streams
- Islands	- Highways	- Lakes

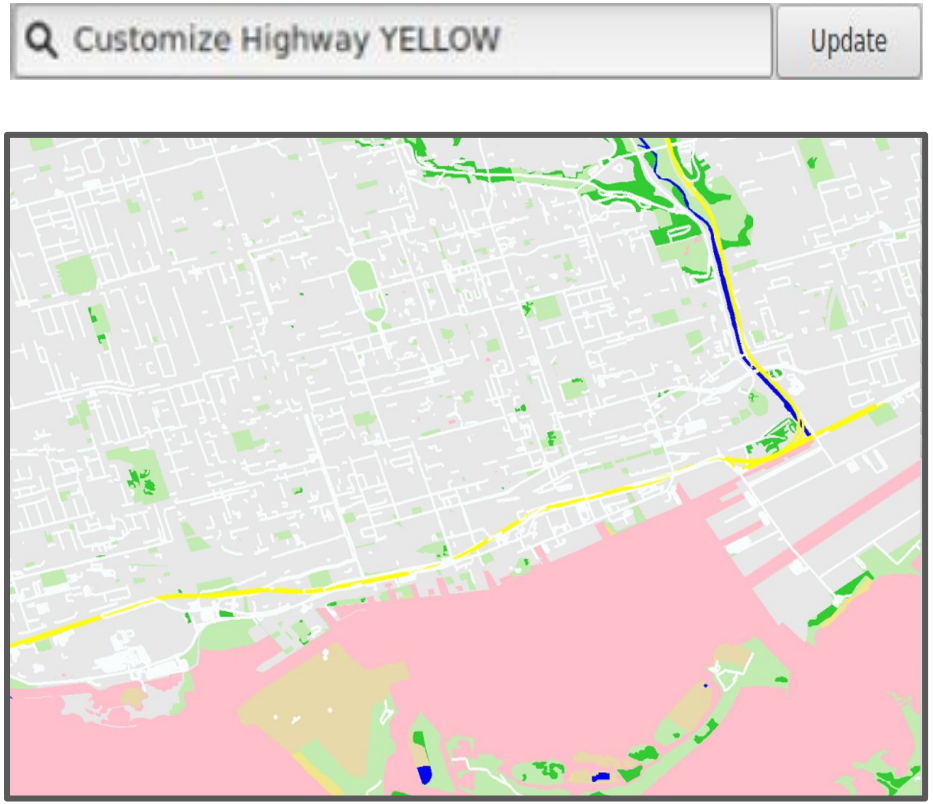
Usability: Search Bar - Extra Features



- Night Mode
- Subways
- POIs
- Customizable Features:

- Parks	- Beaches	- Greenspace
- Rivers	- Buildings	- Streams
- Islands	- Highways	- Lakes

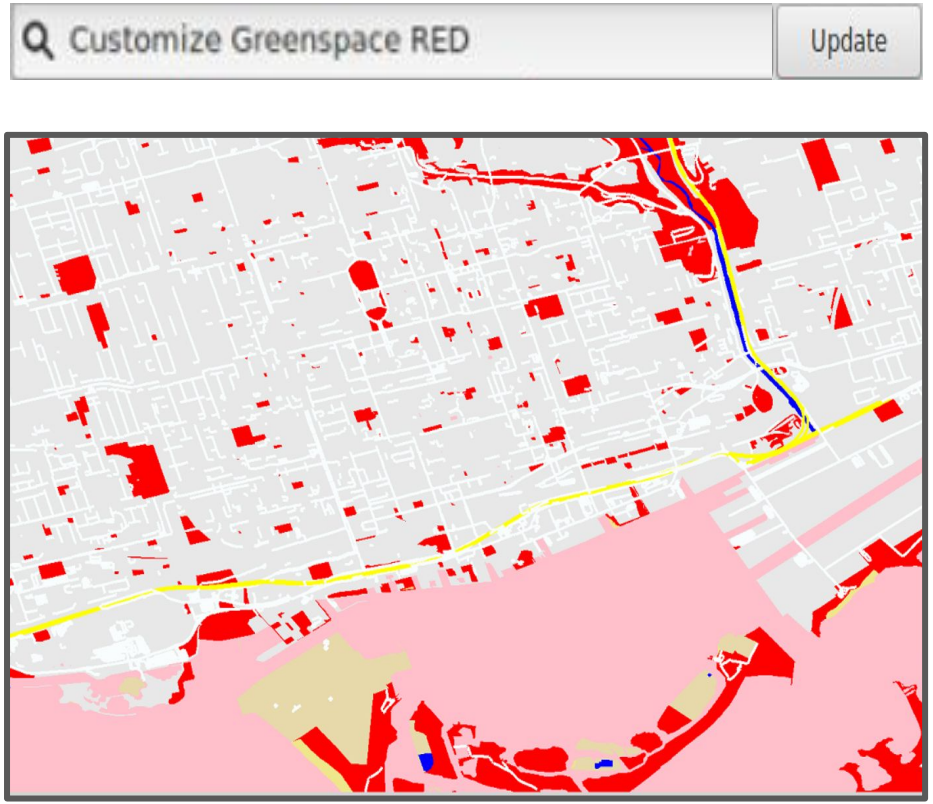
Usability: Search Bar - Extra Features



- Night Mode
- Subways
- POIs
- Customizable Features:

- Parks	- Beaches	- Greenspace
- Rivers	- Buildings	- Streams
- Islands	- Highways	- Lakes

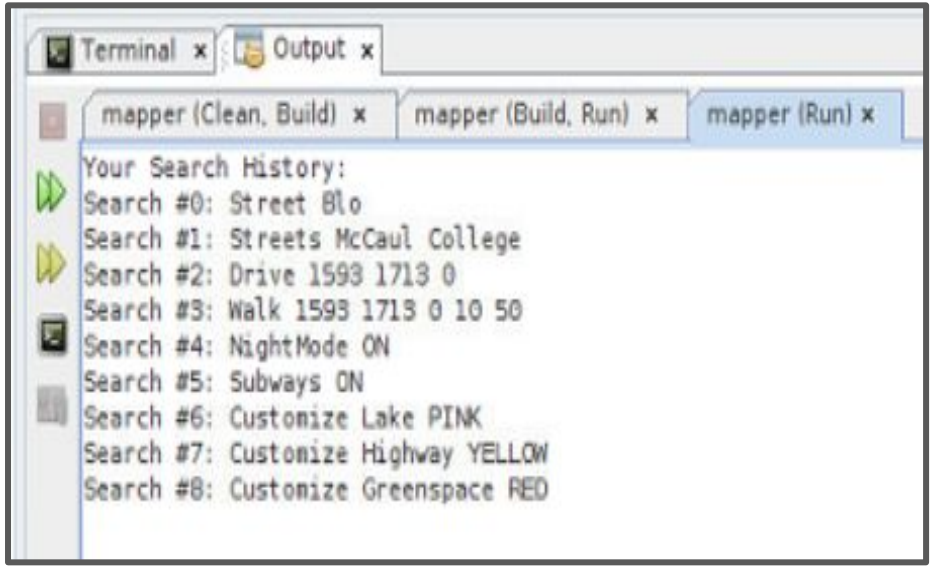
Usability: Search Bar - Extra Features



- Night Mode
- Subways
- POIs
- Customizable Features:

- Parks	- Beaches	- Greenspace
- Rivers	- Buildings	- Streams
- Islands	- Highways	- Lakes

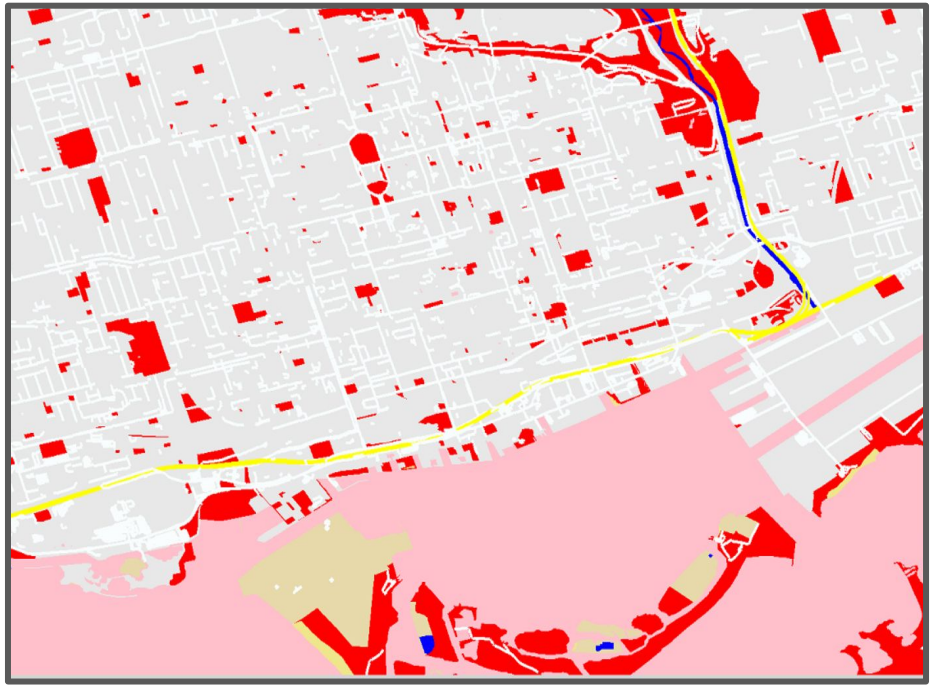
Usability: Search Bar - Extra Features



- Night Mode
- Subways
- POIs
- Customizable Features
- Search History

Responsiveness: Search Bar - Clear

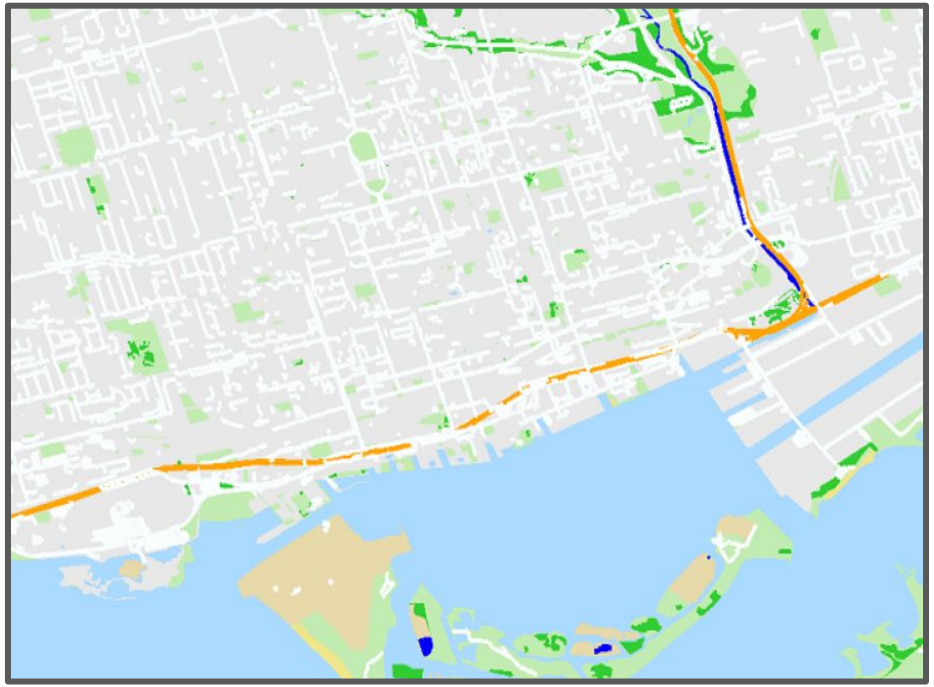
- Street Drawing
- Intersection Marking Spots
- Path-Finding Algorithms
- Points of Interests



- Subway Data
- User-Defined Colour Scheme
- Search History
- Other related data structures

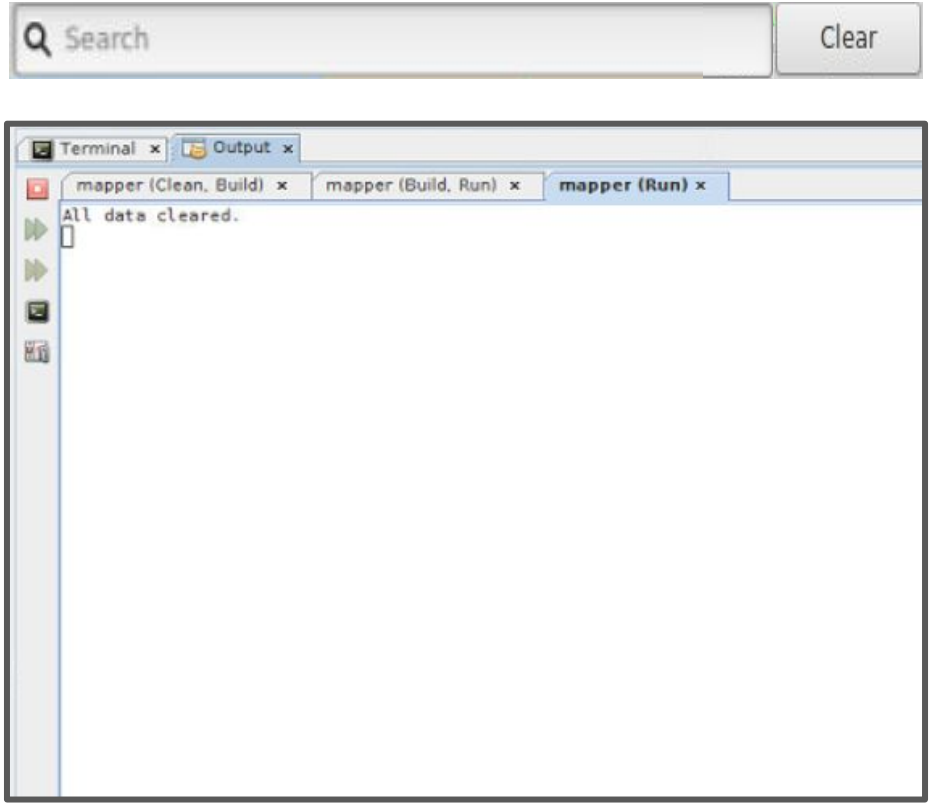
Responsiveness: Search Bar - Clear

- Street Drawing
- Intersection Marking Spots
- Path-Finding Algorithms
- Points of Interests



- Subway Data
- User-Defined Colour Scheme
- Search History
- Other related data structures

Responsiveness: Search Bar - Clear



Algorithm

Drawing and how it is done

- Selective current-screen only drawing
- Graphics loaded once
- Zoom based rendering
- Improved drawing library:
  - Flag setting
  - Data Structures used in selective drawing

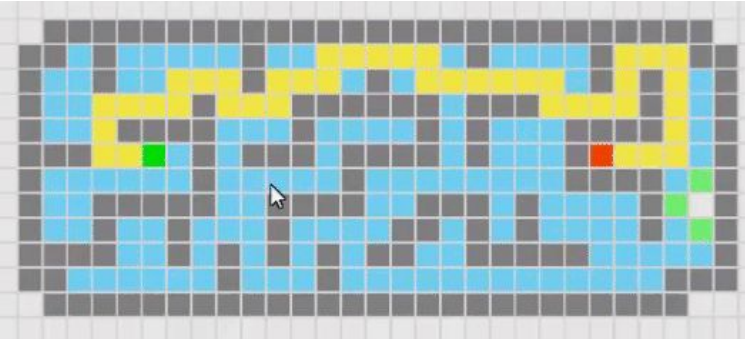
Drawing and how it is done

- Selective current-screen only drawing
- Graphics loaded once
- Zoom based rendering
- Improved drawing library:
  - Flag setting
  - Data Structures used in selective drawing

Drawing and how it is done

- Selective current-screen only drawing
- Graphics loaded once
- Zoom based rendering
- Improved drawing library:
  - Flag setting
  - Data Structures used in selective drawing

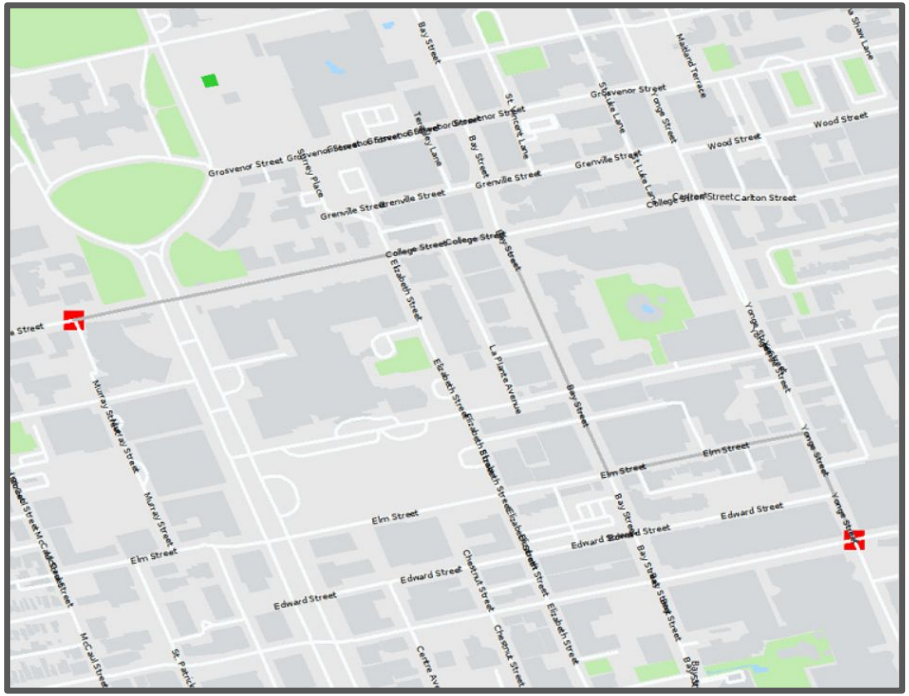
How we find paths



- Dijkstra in a simple way
- Backtracking made simple
  - Ancestor list
- Made into a helper function
  - Returns travel time
  - Returns path in a stack

Presence on the map

- Path display in the map, and instructions to reach the destination given through command line
- Clearing capabilities to delete the user's map history

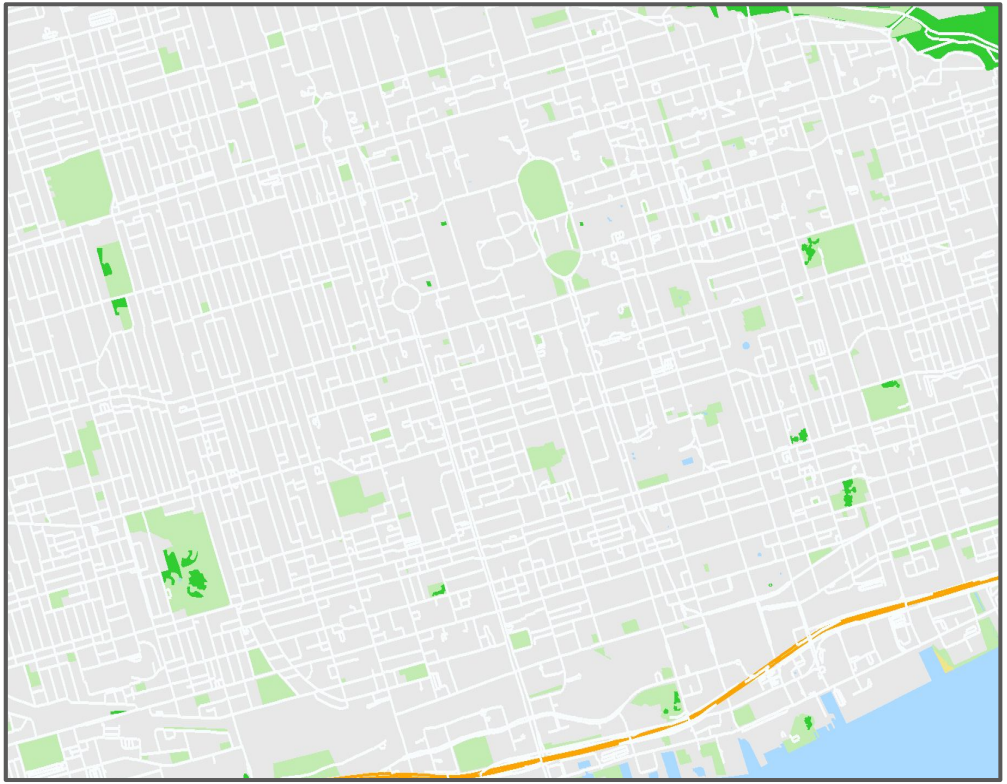


The Travelling Salesman Problem

- Implemented with Dijkstra as a core
- Visits nodes sequentially at first
  - Improved after

Future Goals

- Improvements:
  - Implement A* + heuristics.
  - Implement API
  - User Interface
  - COVID-19 Map

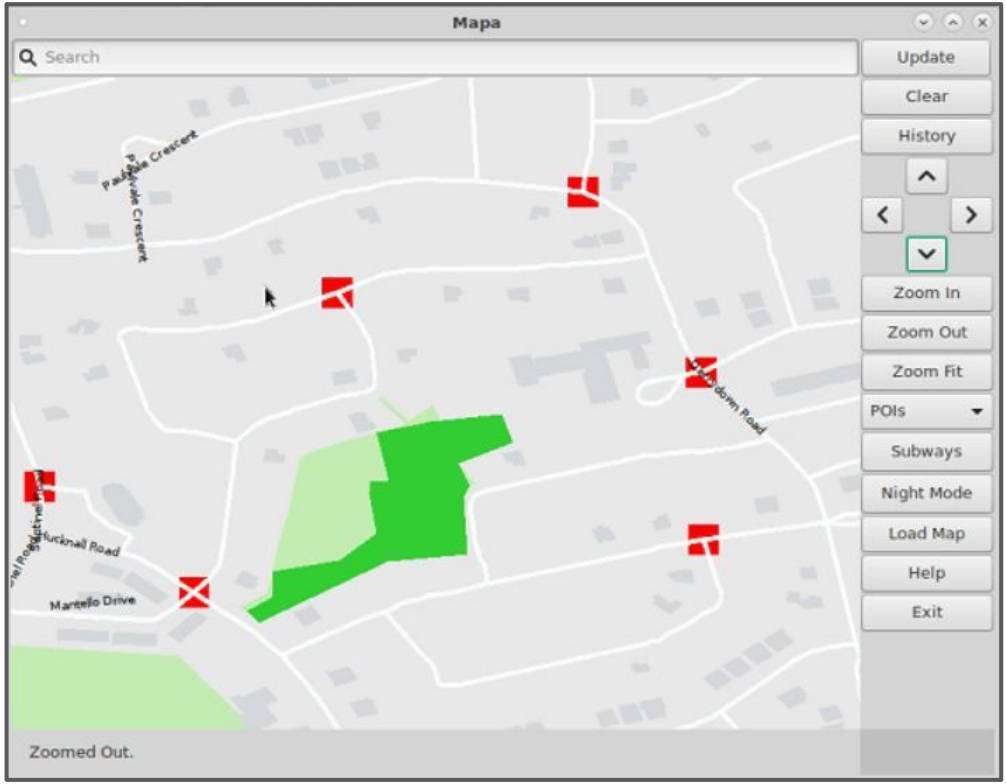


COVID-19 Map

- With the rise of the pandemic across the globe, we see a gap for a COVID-19 specific map.

- Features would include:
  - Identification of hotspots.
  - Essential businesses.
  - Nearby check-up centers.

- Tracking user data.



Plan for COVID-19 Map

- Use the WHO API.[6]
- A button on the current user interface, for accessing COVID-19 information.
- Using the current POI implementation.
- Using user location to track distant activity.

Mappa

Usability

Responsiveness

Search Bar

Algorithms

User Interface

Night Mode

Subways

POIs

Q & A

References

[1] “subway_car_interior_black_and_white,” *https://upload.wikimedia.org/wikipedia/commons/c/cc/R62_subway_car_interior_black_and_white.jpg*. .

[2] CityLab and University of Toronto’s School of Cities and Rotman School of Management, “The Relationship Between Subways and Urban Growth,” *CityLab*, 02-Jun-2016. [Online]. Available: https://www.citylab.com/transportation/2016/06/the-relationship-between-subways-and-urban-growth/485006/. [Accessed: 12-Mar-2020].

[3] K. S. Richard, “Can You Name the World's Busiest Subway Systems?,” *ThoughtCo*, 10-Apr-2019. [Online]. Available: https://www.thoughtco.com/busiest-subways-1435753. [Accessed: 12-Mar-2020].

[4] R. Hall and P. Hanna, "The Impact of Web Page Text-Background Color Combinations on Readability, Retention, Aesthetics, and Behavioral Intention", 2003. [Accessed 13 April 2020].

[5] R. Koemets, “The Benefits of Dark Mode: Why should you turn off the lights?,” *Weekdone*, 04-Oct-2019. [Online]. Available: https://blog.weekdone.com/why-you-should-switch-on-dark-mode/. [Accessed: 13-Apr-2020].

[6] *Information APIs - World Health Organization (WHO)*. [Online]. Available: https://documenter.getpostman.com/view/8854915/SzS7NkAS?version=latest. [Accessed: 13-Apr-2020].

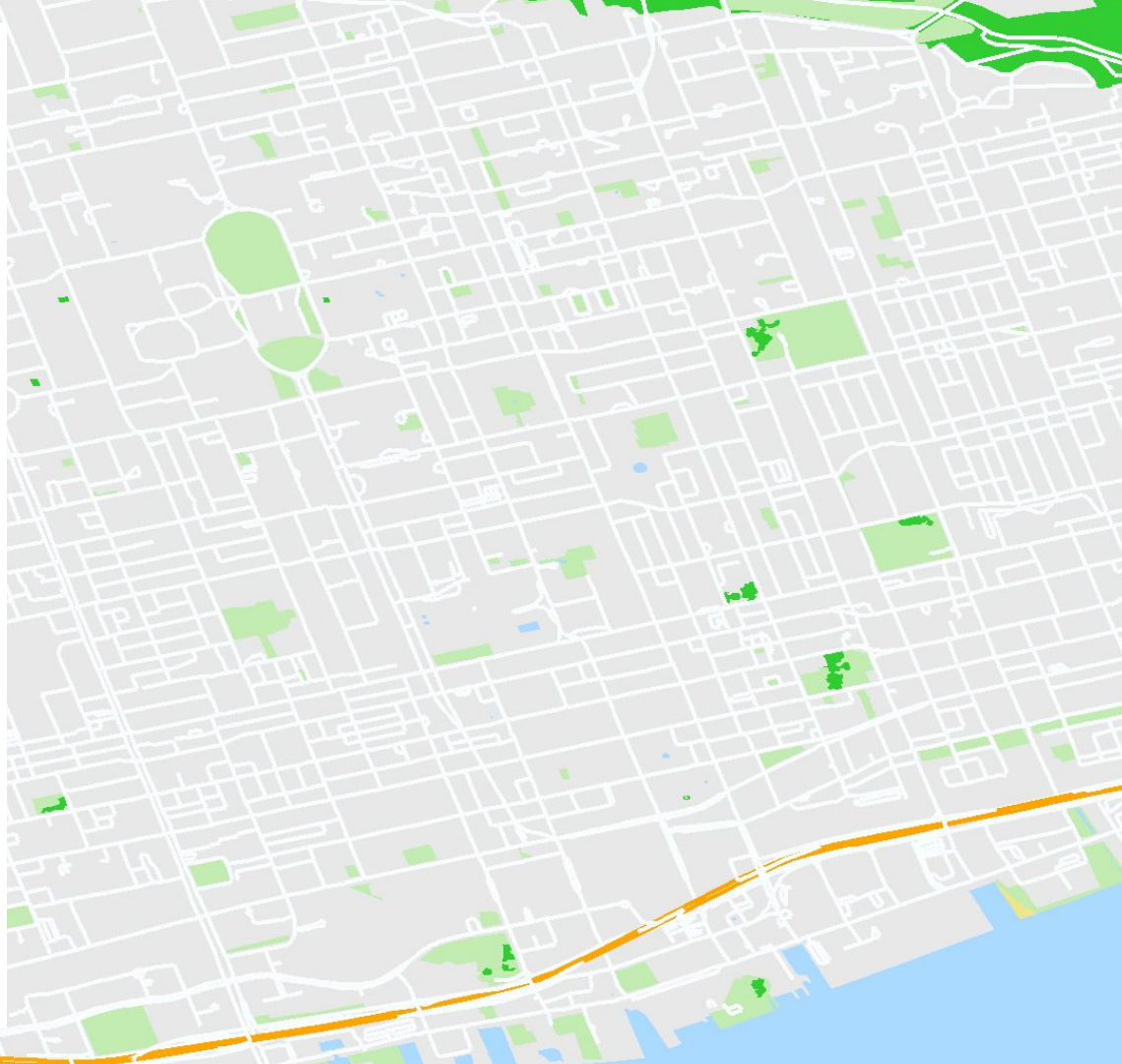
Thank You

Alexandre Gouveia

alexandre.gouveiarodrigues@mail.utoronto.ca

Pratish Dalal

pratish.dalal@mail.utoronto.ca

Marcos Madrigal

marcos.madrigalalbores@mail.utoronto.ca