Incorporating Public Transit into Measures of Accessibility

UBCO 2021 Capstone Project

Overall progress

Week 6

Week 6

Overall Progress and Completed Tasks

Last Week’s Tasks

Week 5

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- Dashboard functions with pre-rendered HTML maps (performance boost)

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Week 5

- Dashboard functions with pre-rendered HTML maps (performance boost)
- Investigated models for network efficiency
- Daily/hourly accessibility scores for Kepler
- Preliminary report writing
- Dashboard deployment
- Other (code merge, cleaned files, new wrangling functions)

Summary of team and individual tasks

	Luka	Graham	Yuxuan	Rain	All
Dashboard html functionality	●	●			
Isochrone visualizations			●		
NA filler functions for missing values	●				
Fixed amenity weights wrangling			●	●	
Network efficiency exploration			●		
Daily/hourly accessibility - Isochrone				●	
Dashboard deployment		●			
Report writing / general formatting					●
Code merge and project cleanup	●				

Preliminary Results

- Developed interpretable isochrone visualizations
- Developed Kepler visualizations which use custom different departure times and days
- Developed a basic efficiency model:
  - Efficiency = deviation between **block population** and **block accessibility score**
  - Disadvantages:
    - Does not consider unpopulated/high traffic areas (amenity dense /low population areas are given bad efficiency values)
    - Transit efficiency depends on a lot more than only cultural amenities

Created isochrone map

- **What is isochrone map?**

Created isochrone map

- **What is isochrone map?**

An **isochrone map** in geography and urban planning is a map that depicts the area accessible from a point within **a certain time threshold**[1]

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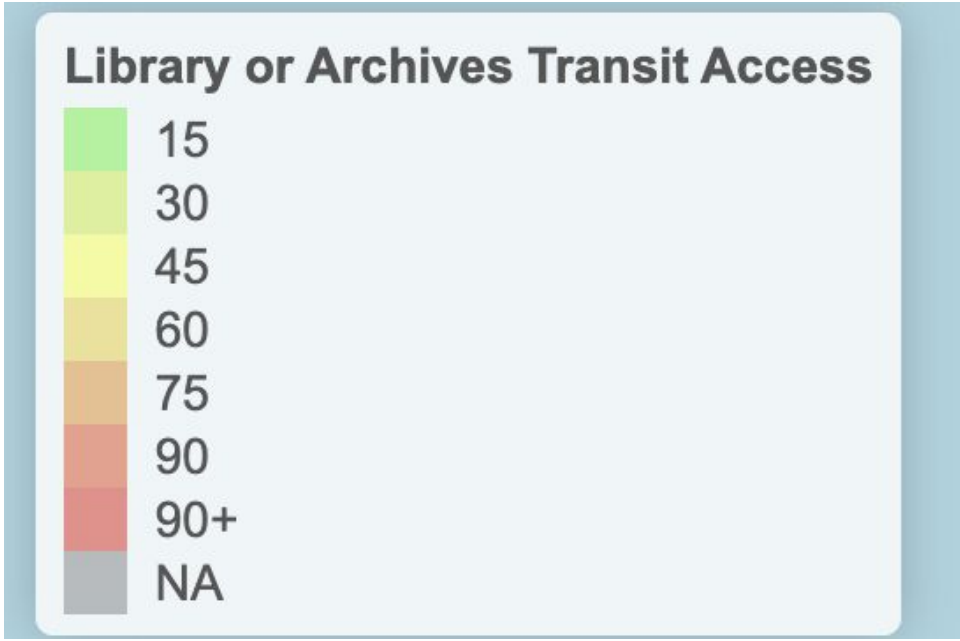
[1]Allen, Jeff (2018-12-01). "Using Network Segments in the Visualization of Urban Isochrones".

Created isochrone map

- The minimum time from ***block i*** to ***amenity j***.
  By default, the minimum time points to the nearest amenity



7 Levels + NA:
From 15 mins up to 90+ mins

Created isochrone map

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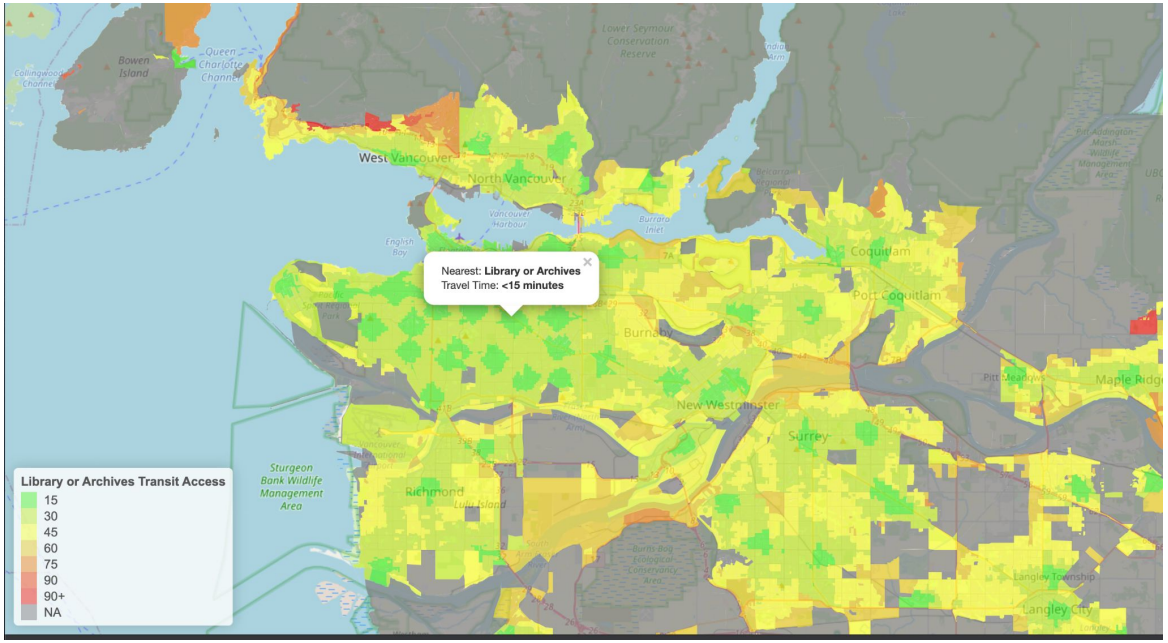
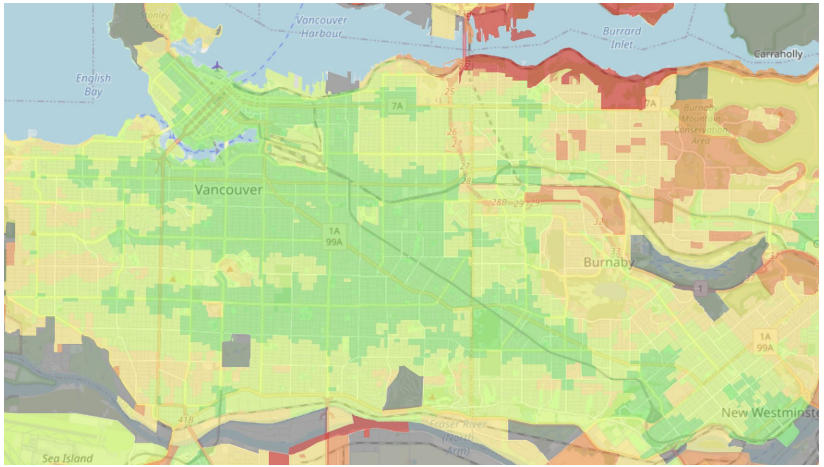
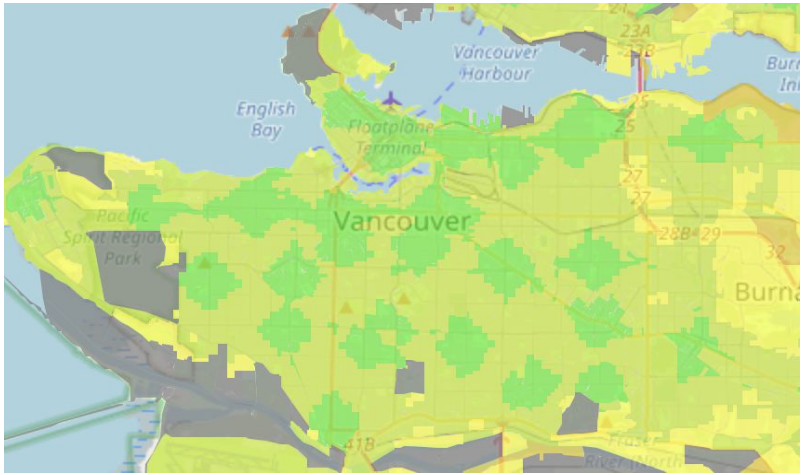


Created isochrone map

- Advantage:
  - **Clear visualizations**



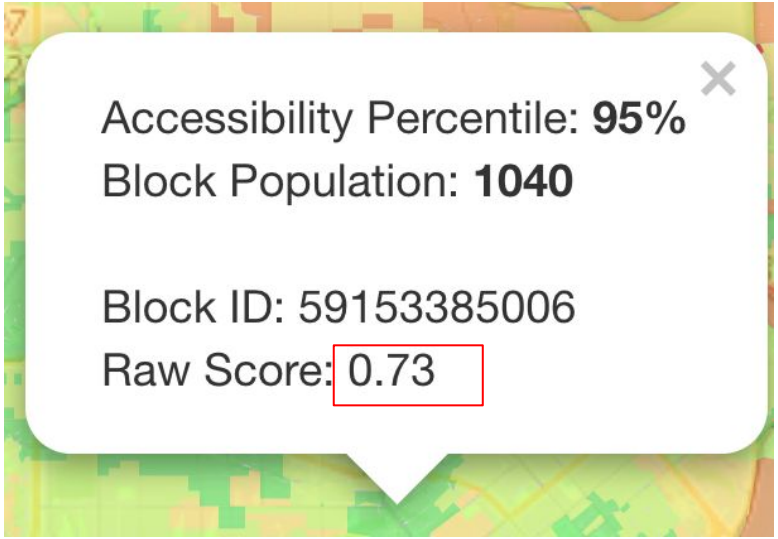
Nearest all amenity Library

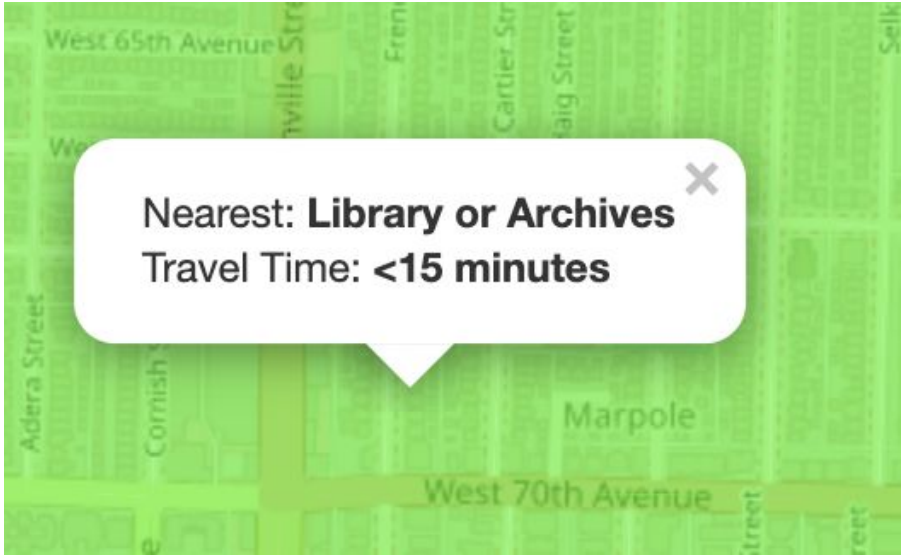


Isochrone map nearest one amenity Library

Created isochrone map

- Advantage:
  - **Easy to Interapte**



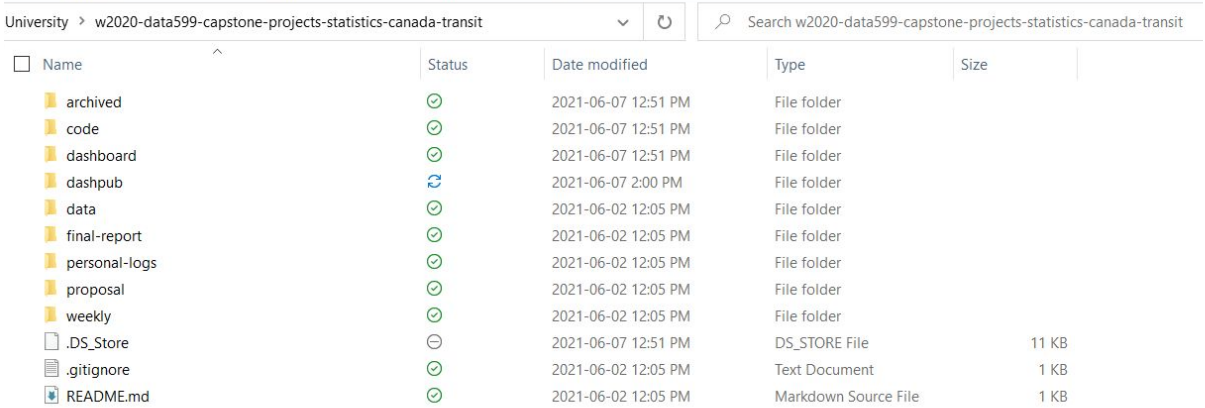


Updated Scores

$$s_{o_i,d_j} = \frac{1}{\mu_{o_i,d_j} + 2\sigma_{o_i,d_j}}$$

A lot of cleaning....

Welcome, the archive folder



Name	Status	Date modified	Type	Size
archived	✓	2021-06-07 12:51 PM	File folder	
code	✓	2021-06-07 12:51 PM	File folder	
dashboard	✓	2021-06-07 12:51 PM	File folder	
dashpub	↻	2021-06-07 2:00 PM	File folder	
data	✓	2021-06-02 12:05 PM	File folder	
final-report	✓	2021-06-02 12:05 PM	File folder	
personal-logs	✓	2021-06-02 12:05 PM	File folder	
proposal	✓	2021-06-02 12:05 PM	File folder	
weekly	✓	2021-06-02 12:05 PM	File folder	
.DS_Store	⊖	2021-06-07 12:51 PM	DS_STORE File	11 KB
.gitignore	✓	2021-06-02 12:05 PM	Text Document	1 KB
README.md	✓	2021-06-02 12:05 PM	Markdown Source File	1 KB

Accomplishments

- **Shiny Dashboard**
    - Updated to use HTMLs

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        - Added NAs to HTML files

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    - Added NAs to HTML files
    - Added Isochrone HTML maps

Accomplishments

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    - Peak time v.s. Non-peak time (hourly)

Accomplishments

- **Isochrones in Kepler.gl** - average travel time to nearest
    - Created time window for each hour based on r5r
    - Weekdays v.s. Weekends (Sat/Sun)
    - Peak time v.s. Non-peak time (hourly)
    - By type of amenities

Accomplishments

A Quick Demo

Isochrones for Saturday transit

Roadblocks

- Kepler.gl file size limit
  - Data set size cannot exceed 250Mb

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    - Use cloud storage and mapbox token

Roadblocks

- Kepler.gl file size limit
  - Data set size cannot exceed 250Mb
    - Use cloud storage and mapbox token
  - Slow map loading
    - Hard to include weekdays, and weekends together
    - Busy map for including amenity locations

Roadblocks

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  - Requires html for efficient image display times

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Roadblocks

- Visualization of Dashboard
  - Requires html for efficient image display times
    - Difficulty publishing the dashboard
      - File size limit using r.cloud
      - Number of html files
    - Converting dashboard to use html files

Week 6 Plan

- Writing of the report
  - Introduction
  - Background
  - Methods
    - Weights
    - Dashboard
- Deploy dashboard with Kepler.gl maps
- Transit efficiency modeling and visualization

Week 5 - Timeline

Weekly Tasks *This week's theme:* **Code Cleanup and Dashboard Performance**	Mon. 5/31/2021	Tue. 6/1/2021	Wed. 6/2/2021	Thu. 6/3/2021	Fri. 6/4/2021	Sat. 6/5/2021
Embed HTML Kepler visualization in R		Rain, Graham ☑	Rain, Graham ☑			
Create weekly presentation	All ☑					
Create kepler.gl map with time windows			Rain ☑	Rain ☑	Rain ☑	
Create isochrone maps in leaflet		Yuxuan ☑	Yuxuan ☑	Yuxuan ☑		
Update main score scripts / clean project files		Luka ☑	Luka ☑			
Implement html map calling in R shiny		Graham, Luka ☑	Graham, Luka ☑	Graham ☑	Graham ☑	
Merge code for travel time matrix to map rendering		Luka ☑	Luka ☑			
Created functions for filling NA values for missing blocks and corresponding scores or isochrones	Luka ☑	Luka ☑				

Week 6 - Timeline

Weekly Tasks *This week's theme:* **Dashboards and Scoring Models**	Mon. 6/7/2021	Tue. 6/8/2021	Wed. 6/9/2021	Thu. 6/10/2021	Fri. 6/11/2021	Sat. 6/12/2021
Publish dashboard	All ☐					
Create weekly presentation	All ☑					
Report writing - Intro	Luka ☐	Luka ☐	Luka ☐	Luka ☐	Luka ☐	
Report writing - Background	Rain ☐	Rain ☐	Rain ☐	Rain ☐	Rain ☐	
Report writing - Methodologies - Weight Index	Yuxuan ☐	Yuxuan ☐	Yuxuan ☐	Yuxuan ☐	Yuxuan ☐	
Report writing - Methodologies - Dashboard	Graham ☐	Graham ☐	Graham ☐	Graham ☐	Graham ☐	
Report writing - Methodologies - Scores Sets & Computation	Luka ☐	Luka ☐	Luka ☐	Luka ☐	Luka ☐	
Dashboard astectics	Graham ☐					
Incorporate weekday and weekend maps into one Kepler.gl map		Rain ☐	Rain ☐			

Closing Remarks

Questions?