Modeling and Visualization of the COVID-19 Outbreak in Ontario

Statistics Canada

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Team

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Statistics Canada Statistique Canada

Introduction

- Client
  - Statistics Canada
    - Bruno St-Aubin, Team Lead and GIS Developer
    - Marian Radulescu, Unit Head and Analyst
- Requirements
  - Assess the quality and possibly improve upon StatCan open data sources
  - Build a product that shows that StatCan open source data are useable in complex analytical cases

Purpose

- Analyze the COVID-19 Outbreak in Ontario
  - Spread in long term care (LTC) homes
    - In the media
  - Association between disease activity in different (Public Health Unit) PHU regions and StatCan proximity measures

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THE STAR

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FEDERAL POLITICS

82% of Canada's COVID-19 deaths have been in long-term care, new data reveals

HEALTH

Coronavirus: Canadian military arrives at 5 Ontario long-term care homes struggling with COVID-19

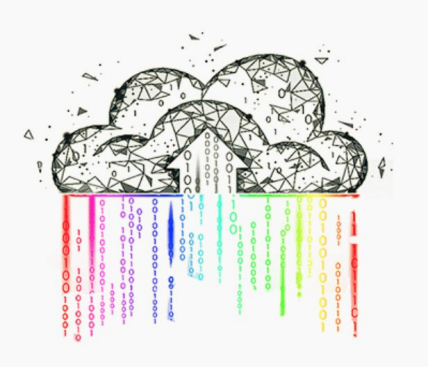
BY JESSICA PATTON - GLOBAL NEWS

Posted April 24, 2020 9:15 am
Updated April 24, 2020 4:51 pm

Objectives

1. Produce an inferential statistical model of factors that may be associated with the COVID-19 outbreak in LTC homes in Ontario
2. Produce an inferential statistical model of proximity factors that may be associated with COVID-19 outbreaks at the level of PHU regions in Ontario

Data

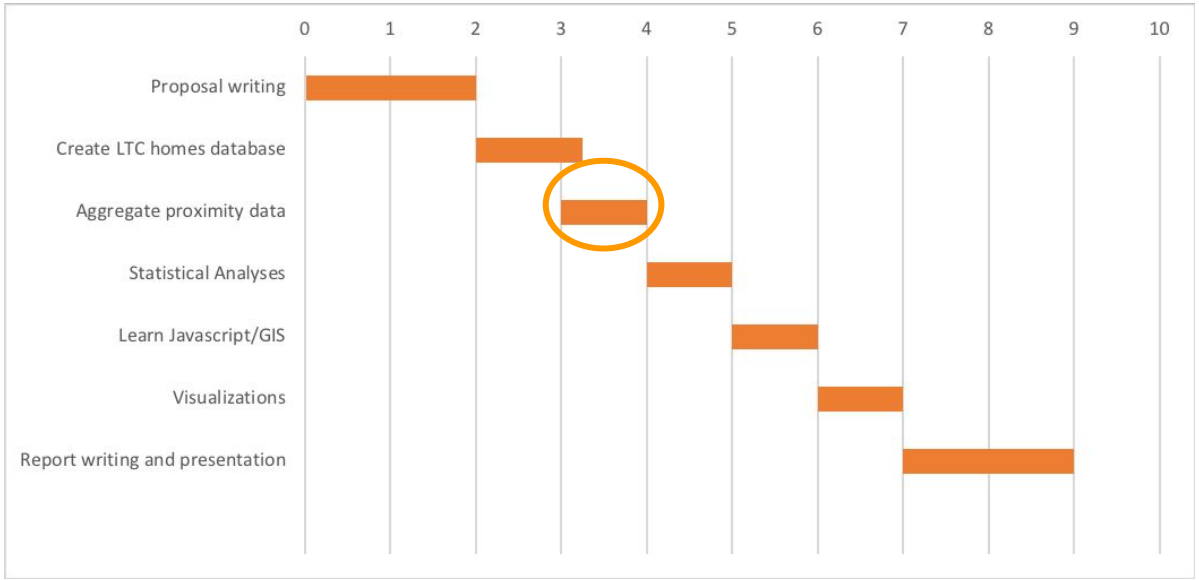


- StatCan Sources
  - Open Database for Health Facilities
    - Linkable Open Data Environment (LODE)
      - Data Exploration and Integration Lab (DEIL)
  - Proximity data for transit, health care, and pharmacies
- Other Sources
  - COVID-19 Data by Health Regions
    - Natural Resources Canada
    - Government of Ontario
  - Data about LTC homes in Ontario will be scraped from government websites

Tasks

1. **Data Preparation**
    a. **Create a database of LTC homes in Ontario**
        i. **Data cleaning (Python)**
        ii. **Webscraping (Python)**
    b. **Aggregate proximity data to level of PHU regions**
2. Statistical Analysis (R)
    a. Principal component regression
    b. Factor analysis
3. Visualization
    a. Javascript, GIS and D3

Schedule



https://trello.com/b/BOM8D6zv

Deliverables

- A database of LTC homes in Ontario
  - Update StatCan ODHF
- A method to aggregate proximity data to the PHU region level
- Two inferential statistical models
  - Association between LTC home characteristics factors and COVID-19 outbreaks
  - Association between proximity factors and COVID-19 outbreaks among different Ontario PHU regions.
- Visualizations
- Report
  - Explore connections between the LTC homes data, the proximity data, and the COVID-19 data

Summary of Individual and Team Work Logs For Week 4

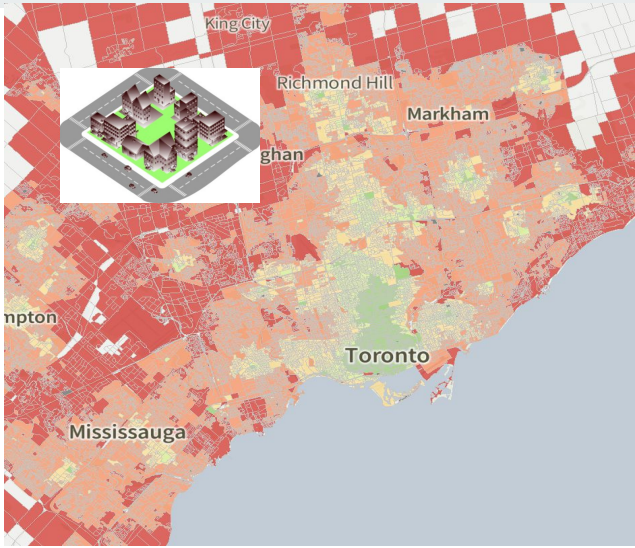
- Proposal
  - Reviewed with Prof and TA.
  - Reviewed with Bruno and Marian on Wednesday
- Began working in pairs on two data cleaning and web-scraping tasks
  - Finalize the dataset
  - Begin QGIS implementation to explore the DB and PHU overlapping using Layering
  - Making decision about the DB which on border of PHU
  - Getting started with Statistical analysis.

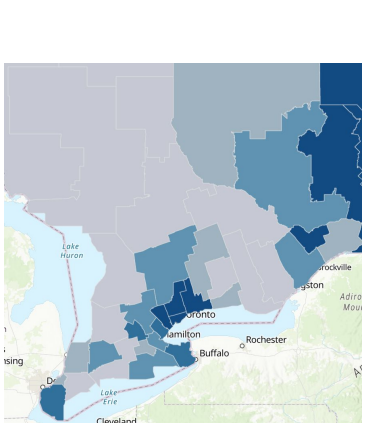
Agenda for Week 4

- Using QGIS to see how DB and PHU overlap.
- Going through different methods previously discussed to decide where the DB belongs.
- Making all required data QGIS compatible.
- Develop a method to aggregate proximity data

Potential Limitations

1. Aggregating/averaging proximity data from the dissemination block level to the PHU regions level
2. QGIS implementation with layering
3. Validation of statistical analysis to move on to next step.





Thanks!