Modeling Hospital Network Coverage Expansion

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1. Introduction

1.1 Background

Toronto was the second fastest growing metropolitan area in the United States and Canada in 2018 (Ryerson University Research). Such growth requires infrastructure expansion prediction and according planning.

1.2 Problem

This project aims to predict optimal placement of hospital facilities based on emergency incident statistics.

1.3 Interest

Toronto city Council would be interested in the results of this research since it can be used in The Official Plan of city development.

2. Data sources and pre-processing

2.1 Data Sources

Dataset for research will be obtained from three sources:

- Wikipedia: List of postal codes of Canada: M
- Toronto Open Data Portal: Paramedic Service Incident Data
- Nominatim service, for geo data: Python geopy library
- Foursquare API for hospitals location data, site

2.2 Data Pre-processing

Service Incident data (2010-2019) will be cleaned and used for incident prediction for the next decade. Hospital location data obtained from Foursquare will be used to analyze current coverage and prediction of new facilities placement.

2.3 Data Linkage

Service Incident data structure:

ID	Dispatch_Time	Incident_Type	Priority_Number	Units_Arrived_At_Scene	Forward_Sortation_Area

Data clustered in 10 clusters for every year in 2010-2019. We are interested in ‘Forward_Sortation_Area’ which is Post Code and ‘Units_Arrived_At_Scene’ to get aggregated values for each Borough annually.

Using ‘Forward_Sortation_Area’ this data will be linked to Borough data for analysis. Foursquare API will be used for retrieving current hospital facilities which also will be assigned to Boroughs.