**Mission Statement**

Community Open-Data Engage (CODE) is an application that connects cities and citizens through open data. The CODE platform empowers citizens to make sense of often scattered and unprocessed open-data through an interactive mapping interface. By putting information in the hands of concerned citizens and community leaders, CODE is a proof-of-concept for data-driven approaches in *building a strong sense of community* across cities. CODE also connects people and governments by allowing them to create forums for conversation in specific geographic locations across a city or search social media sites to find other people in their area. In other words, our application shapes open data to fit all people regardless of technical background and across a variety of possible interests. Through our holistic information sharing and knowledge discovery platform several well-studied techniques developed in geography and spatial analysis are implemented to provide social and economic indicators back to the people that live in these areas. *This tool is available for the citizens of Edmonton and Vancouver in the first phase of development.*

**Intended Use**

CODE provides a platform to communicate open-data from local governments to citizens through a user-friendly web interface. Citizens are able to explore community data, ideas, comments, and infrastructure by using filter based search criteria to overlay relevant spatial information in an ESRI powered leaflet map interface. The user can explore their community by clicking individual features to bring up descriptive text and graphical balloons describing the individual feature. We also provide a comprehensive neighbourhood profile based on important community indicators, including: access to healthcare, neighbourhood crime rate, walkability, recreational facilities, access to public transport, education availability and quality, and civic services available to citizens.

**Novelty**

For the most part, local governments have been leaders in open data with all major cities hosting the open-data catalogues. The Canadian government, most provinces, and several inter-organizational groups also provide internal data within the growing drive for open-data and open government. Applications for open-data include: community activism, planning, civil discourse, and research (Turner, 2015).

We firmly believe in the spirit of open-data and openly advocate for continued engagement throughout Canada. However, the Digital Divide continues to pose a barrier to Canadian benefiting from open-data. We believe that a big part in the value of open-data is the ability for it to be used by citizens. Furthermore, even for those with the technical means for access, open-data is often seen as scattered, confusing, and not useful for the average citizen. With this in mind, we propose an application to help bridge this divide by packaging open-data in a purposeful and interesting way for citizens to better understand the communities they live in. CODE implements the concept of XaaS (Everything as a service) as a service to connect data to people.

**Methods**

***Data***

For our application, we have accessed the open-data portals of Edmonton and Vancouver. These two cities were selected because of their strong commitment to open-data and civic engagement. Each city hosts a comprehensive portal with extensive spatial and non-spatial datasets of interest to citizens. We also access Canadian census data through the federal government's open-data portal. This demographic data complements the city-provided datasets by aggregating population trends and statistics at the neighbourhood/dissemination area level.

The specific data files that we access in our app are:

* school locations (including name and distance from neighbourhoods)
* health facility locations (including name and distance from neighbourhoods)
* grocery store locations (including name and distance from neighbourhoods)
* gas station locations (including name and distance from neighbourhoods)
* greenspace (including percent of greenspace within a neighbourhood)
* cultural facilities (including number of facilities within a neighbourhood)
* emergency services (including proximity to neighbourhoods)
* census dissemination areas (including demographic and socio-economic indicators)

***Back-end***

We use python scripts to both download and perform spatial analysis with the open data. The first script accesses the url of the file from the data portal and downloads it to the server. The second set of scripts run a spatial analysis on each shapefile. For school, health facility, and grocery store locations, emergency services, and green spaces, a shortest-path network analysis was run, according to Park and Corson (1997) to find the nearest feature from each of those groups to the centroid of the dissemination area using the street network. Additionally, a count of each type of facility per dissemination area was done using a spatial join python script. The resulting shape files: shortest paths, individual features, and census dissemination areas with facility counts were then converted to JSON using a python script and pushed into the server for visualization.

***Front-end***

Our visualization is powered through the ESRI leaflet mapping JavaScript library, which simplifies the integration of geospatial data and visualization tool. ESRI leaflet also brings multi-source data management, which allows us to dynamically add and remove feature layers. The ESRI JavaScript plays a pivotal role in linking open data, people, and maps.

We use D3 and Google Charts API for pop-up balloon dynamic statistics of each feature layer, which is provided by the ESRI leaflet layer group control. Legends which change as different layers are selected, are implemented as additional control layers. Therefore, the front end of CODE is the implemented as multiple dynamic ESRI leaflet layers.

**Component Descriptions**

***Visualization***

The visualization component of this application is primarily designed to allow the user to navigate through useful community spatial information that has been made available through open-data initiatives. The interactive mapping interface is powered through Leaflet commands. The primary objective for the visualization is to provide brief, yet comprehensive, The visualization allows the user to toggle between relevant spatial data layers showing the location of different community features

***User-input***

In theory, this component will allow users to upload their own content into the mapping interface. There will be an option to share this data with other users or just visualize it.

***Community discussion***

This component allows users to see who else in their neighbourhood is interested in open-data.

**Discussion**

As is the nature of open-data, it was difficult to find standardized data across different cities. Although there are some initial standards and open-data “best-practice” methods for releasing data, it is evident that each city deployed their open data differently. This meant that, for our application, we had to cater our individual scripts to each city’s data sets. This also meant that our descriptive text and statistics do not necessarily reflect the attributes of each individual feature.

**Assumptions**

This proof-of-concept applications provides evidence that citizen and cities can be better connected. It is possible to link citizen relevant open-data in an easy-to-use interface where extensive technical skills are not required.

**References**

Kitchin, R. (2014). The real-time city? Big data and smart urbanism.*GeoJournal*, *79*(1), 1-14.

Park, V. D., & Corson, M. S. (1997, April). A highly adaptive distributed routing algorithm for mobile wireless networks. In *INFOCOM'97. Sixteenth Annual Joint Conference of the IEEE Computer and Communications Societies. Driving the Information Revolution., Proceedings IEEE* (Vol. 3, pp. 1405-1413). IEEE.

Turner, A. J. (2006). Introduction to neography.