CLIMATE CHANGE AI HACKATHON

Generate a National Building Inventory

Challenge Proponent: Natural Resources Canada and Statistics Canada

Computer-generated building footprints are now available for all of Canada. Given this immense dataset — roughly 12 million buildings — your task is to leverage other data sources and develop machine learning methods for assigning building attributes. Desired building attributes include, but are not limited to floor area, number of stories, height, building type (e.g. single family dwelling, duplex, row house, low rise multi-unit residential building, high rise multi unit residential building, school, office, hospital, extended care facility, etc.), construction date, facade type (e.g. brick veneer, pre-cast panels, glass curtain wall, concrete block, or metal clad), and window-to-wall ratio. To build machine learning models for assigning these attributes, you may use street-view imagery, satellite imagery, or any other data source (suggestions are provided on page 2).

The methods you develop may inform the development of a centralized, up-to-date, and complete National Building Layer. This National Building Layer will be used in a variety of important initiatives relating to climate change mitigation and adaptation. For instance, within Natural Resources Canada, a National Building Layer is needed for *ER2* (*Évaluateur rapide des risques*), a web application for conducting climate-related risk assessments (floods and wildfires), and for the *Canadian Energy End-use Mapping* (*CEE Map*) project, which aims to map housing energy end-use and identify efficiency opportunities. Your innovation in this area will greatly advance these and other climate change mitigation and adaptation initiatives. Good luck!

Data sources

Below are suggested data sources. This list is not exhaustive — you are encouraged to use any other data-sets that you find useful.

Building footprints

- Building footprints are available from Microsoft (as a result of a collaboration between Statistics Canada and Microsoft), as well as the Canadian Centre for Mapping and Earth Observation.
- Statistics Canada Open Database of Buildings (ODB). This database is part of a larger initiative called Linkable Open Data Environment (LODE) (Github repository).
- It is advisable to link the Open Database of Buildings and supplement with the Microsoft data for areas not covered by the ODB.

Street-level imagery

- Google Street View API. A credit card is required for the Google Maps Platform, but the 200 USD in free monthly usage should be sufficient to support your work. Developer documentation.

Satellite imagery

- Satellite imagery is available from NRCan, Google Maps API, and other sources.

Web mapping services

- Web mapping services are made accessible through APIs (e.g. Google Map API, Openstreetmap API).

Real-estate listings

- Current and archived real estate listings can provide building valuation, construction date, and construction materials. Your mileage may vary.

Census data

- Statistics Canada provides census data (e.g. population, income) aggregated at different spatial scales.

Municipal data sources

- Most Canadian municipalities provide data sets, often through convenient APIs. List compiled by StatsCan: https://github.com/CSBP-CPSE/LODE-ECDO/blob/master/MasterList_OpenDataPortals.csv