Generate a National
Building Inventory

1. Motivation
2. Our Work
3. Creativity  & Contribution
4. Future Work

# 1. Motivation

- Important!
  - Emergency Management
  - Mitigation Planning
  - City Planning

Emergency Management

- Limited Resources
  - attributes, spatial coverage, aggregated data

https://spvm.qc.ca/en/Fiches/Details/911

# 2. Our Work  (pipeline)

Web Scrap
from websites

Data Cleaning &
Merging

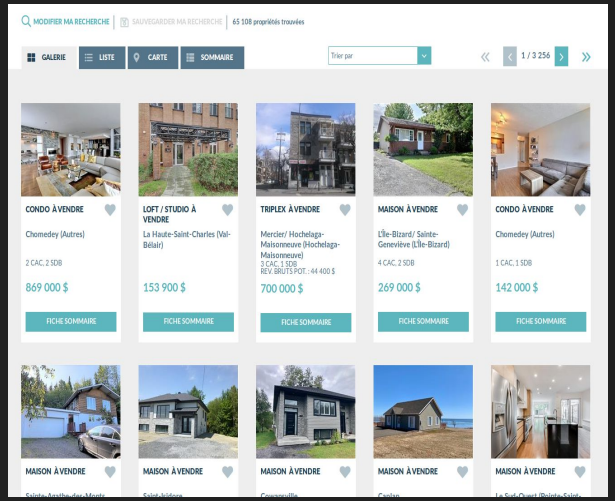
Missing Value
Prediction with
ML & AI tools

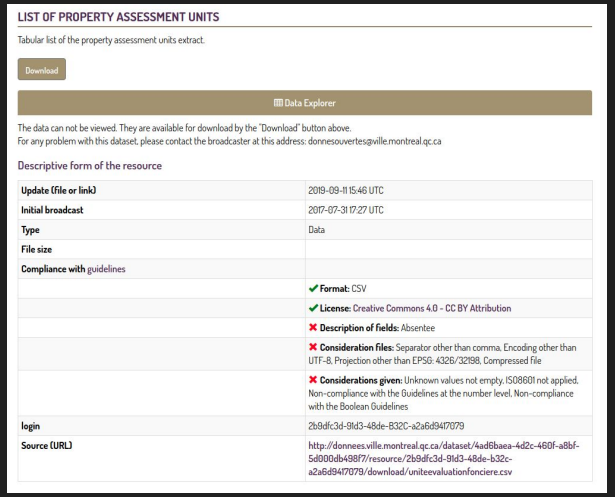
User Friendly
Interface

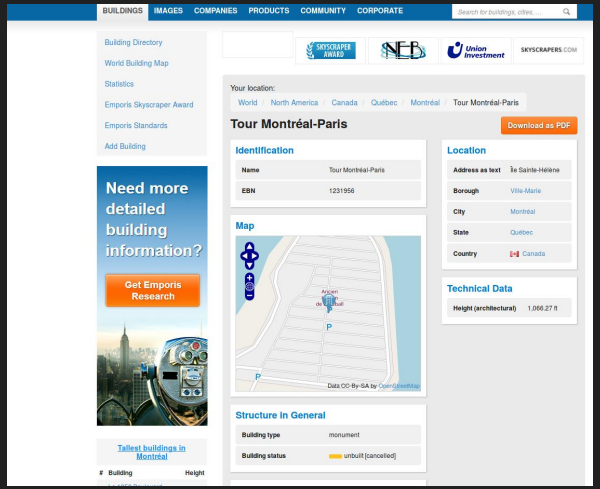
https://www.fiverr.com/junaidkhankakar/create-a-web-scraper-or-crawler-for-you

# 2. Our Work (web scrap)

## Web Examples:



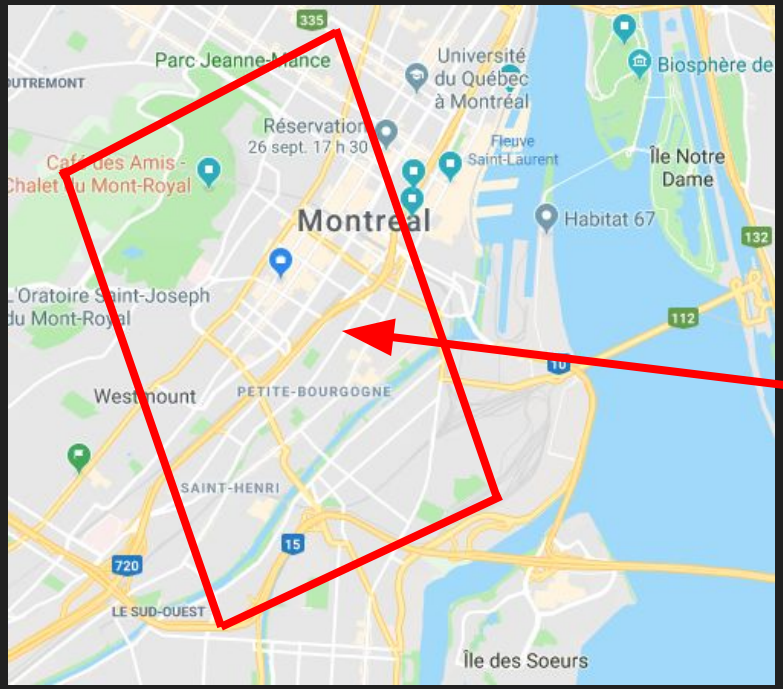




https://www.centris.ca/

List of Property Assessment Units

https://www.emporis.com/

# 2. Our Work (data cleaning)




## Region Selection

(45.508268, -73.571234)
(45.491339, -73.587941)
(45.488000, -73.582976)
(45.505211, -73.564860)

# 2. Our Work (data evaluation (1/2)

| | Area | Construction Year | Floors | Type | Units | formatted_address | latitude | longitude | postcode | Height |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 598.0 | 1880.0 | 4.0 | Residential | 8.0 | 215 Rue de la Commune O, Montréal, QC H2Y 3W8,... | 45.501999 | -73.553966 | H2Y 3W8 | 30 |
| 1 | 2041.0 | 1861.0 | 11.0 | Office | NaN | 1015 Rue St-Alexandre, Montréal, QC H2Z 1N9, C... | 45.503052 | -73.562862 | H2Z 1N9 | 110 |
| 2 | 378.0 | 1967.0 | 5.0 | Residential | 8.0 | 221 Rue de la Commune O, Montréal, QC H2Y 2C9,... | 45.501829 | -73.553948 | H2Y 2C9 | 37.5 |
| 3 | 681.0 | 1885.0 | 3.0 | Office | NaN | 321 Rue de la Commune O, Montréal, QC H2Y 2E1,... | 45.500698 | -73.553653 | H2Y 2E1 | 30 |
| 4 | 344.0 | 1925.0 | 5.0 | Residential | 8.0 | 1101 Rue St-Alexandre, Montréal, QC H2Z 1P8, C... | 45.504124 | -73.564819 | H2Z 1P8 | 37.5 |

# 2. Our Work (data evaluation (2/2)

| | latitude | longitude | Units | Construction Year | Area | Floors | Height | year |
|---|---|---|---|---|---|---|---|---|
| count | 1828.000000 | 1828.000000 | 1828.000000 | 1828.000000 | 1828.000000 | 1828.000000 | 1828.000000 | 1828.000000 |
| mean | 45.510088 | -73.578899 | 5.774617 | 1920.292670 | 298.315098 | 2.481400 | 18.762309 | 1.781182 |
| std | 0.012526 | 0.011593 | 35.810554 | 37.147736 | 2510.795005 | 1.783026 | 13.467225 | 1.714817 |
| min | 45.481468 | -73.596046 | 1.000000 | 1830.000000 | 8.000000 | 1.000000 | 7.500000 | 0.000000 |
| 25% | 45.499125 | -73.588238 | 1.000000 | 1900.000000 | 108.000000 | 2.000000 | 15.000000 | 1.000000 |
| 50% | 45.515403 | -73.583000 | 2.000000 | 1910.000000 | 189.000000 | 2.000000 | 15.000000 | 1.000000 |
| 75% | 45.520330 | -73.569229 | 3.000000 | 1947.750000 | 265.000000 | 3.000000 | 22.500000 | 3.000000 |
| max | 45.526096 | -73.553165 | 1351.000000 | 2015.000000 | 106022.000000 | 33.000000 | 247.500000 | 6.000000 |

# 2. Our Work (missing data estimation)

*Google Street Images for Deep Learning*
*-- 4 images for each location*

0 deg

90 deg

180 deg

270 deg

*An example: (Latitude: 45.493075,  Longitude: -73.582118)*

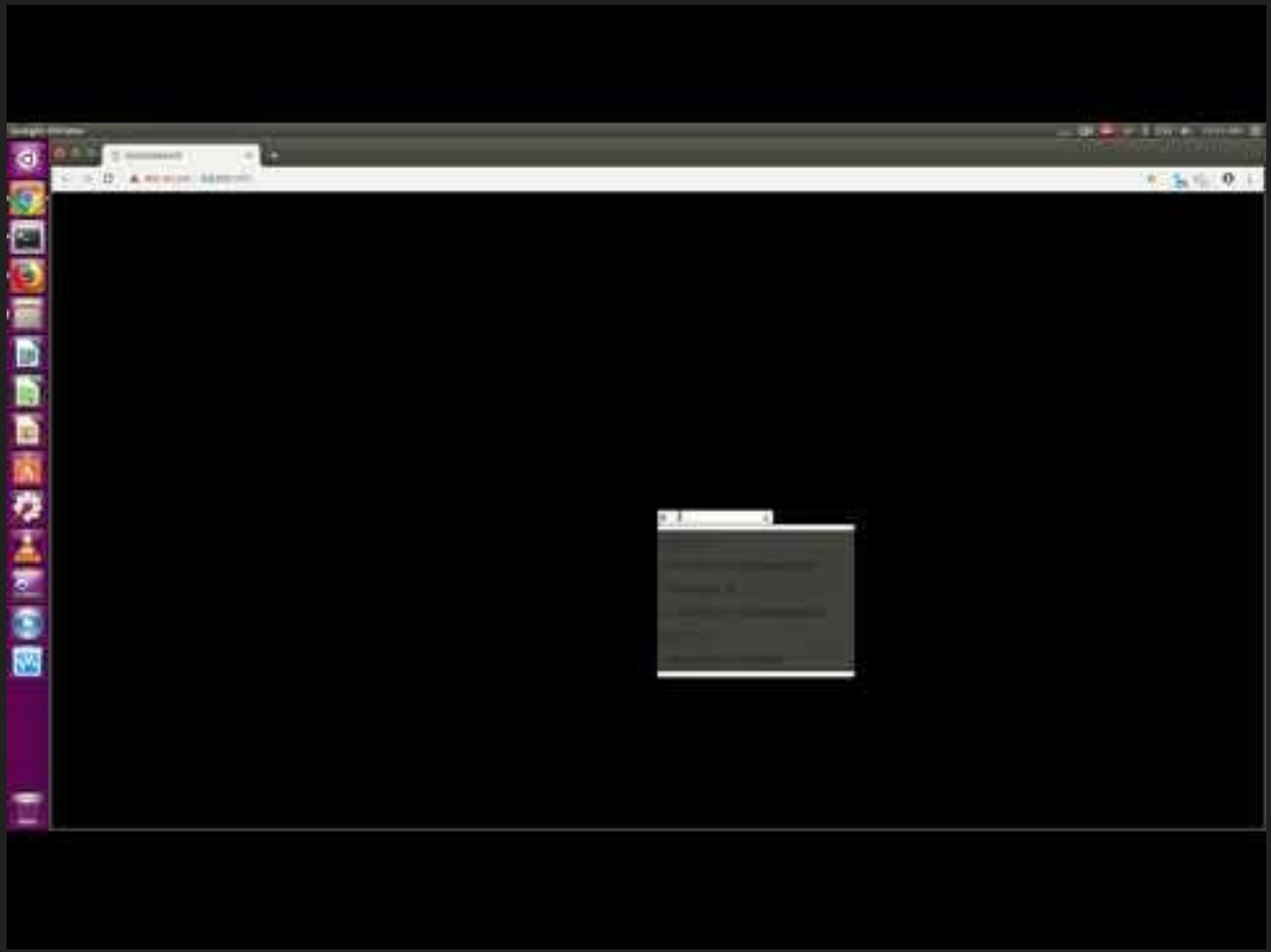
# 2. Our Work (missing data estimation)

Attributes:

Distance(from centre), Area, Construction year, Units.

Prediction Accuracy:

| zones | Floors | Type | Year | Height | # Units |
|---|---|---|---|---|---|
| 95% | 72% | 98% | 27% | 98% | 8% |



# 3. Creativity & Contribution

- 3000+ records
- 10 Attributes for each building
  - longitude, latitude, height, units, type, living area ...
- Missing Data Prediction with ML
  - Scraped Images + Deep Learning
  - Semi-labeled Data + Machine Learning
- User Friendly Interface

# 4. Future Work

- Complete the dataset with the help of Google Maps
- Missing values
- Extension: Small Area --> Whole Canada
- Web Design

Mila

# Thank You !
# Questions?

Government of Canada | Gouvernement du Canada