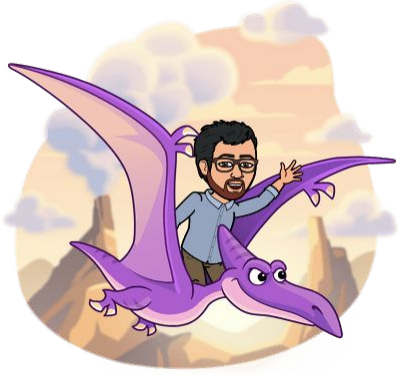
Estimating Parking Capacity in Somerville

City of **Somerville**

IACS

The team



Infrastructure

Additional Data Support

Center for Geographic Analysis

The Institute for Quantitative Social Science

Problem statement

Big picture:

Inventory of all parking available in Somerville

What we contribute:

Inventory of residential driveways in Somerville

= Location of driveways + estimate of driveway capacity

Scope of work

1. Where are the driveways in Somerville?
    a. By Ward & Precinct
    b. By Street Block
    c. Exact location

2. What is the driveway capacity?
    a. Citywide
    b. By Ward/Precinct
    c. By Street Block
    d. By Driveway

Learning goals

- Computer vision
- Image segmentation
- Labelled versus unlabelled
- Working with noisy labels

Things we need to learn more about

- Quirks of satellite data
- Image segmentation
- Semi-supervised/unsupervised learning

Initial ideas

- Use tabular data to back out parking capacity
  - Use number of parking permits or registered vehicles
- Hand-label images
  - Draw boxes around driveways
- Create masks from Somerville GIS data and then train a classifier on those messy labels
- Object recognition/detection
  - PoolNet

Literature Example

Learning to Detect Roads in High-Resolution Aerial Images

- Use labelled data to predict road versus non-road
- To get labelled data:

  “use synthetic road/non-road labels that we generate from readily available vector road maps”

- What’s applicable to our problem
  - Use street layers from GIS data to have “labels” for roads
  - Build a model to predict roads in images of Somerville
  - Subtract roads from map image layers
  - Hopefully what is left is other polygons that will contain driveways and parking areas

State of Data

- Parcels ✔
- **Satellite Imagery****
- Parking permits ✔
- Vehicle registrations
- Parking tickets
- Car excise tax data
- Other open municipal data

**have 2015 data but looking for more recent imagery - IQSS/CGA