



Using Computer Vision to Detect Housing Units from Satellite Imagery

Stephanie Eckman
Qiang Qiu, Duke University



Housing Unit Frames

- Housing unit frames needed for face-to-face & mail surveys
 - Mail can use postal service list (CDSF)
 - Face-to-face can too..
- Listing difficult in rural areas
 - Roads have no names
 - Houses have no numbers
 - Clusters are really large
 - Unclear if a dirt road leads to a housing unit
 - Personal safety

Concerns:

- **Undercoverage** (Eckman & Kreuter)
- **Listers disagree** (Eckman 2013)
- **Bias** (Eckman & Kreuter)

Identifying Residential Buildings



Research Question

- Can we use
 - High resolution satellite imagery
 - And computer vision
- To create rural housing unit frame?



Data Sources

- Functional Map of the World
 - 1 million satellite images
 - 50,000 buildings, 25% residential
- NC building footprints
 - Created in 2010, updated sporadically
 - Wake County (Raleigh, NC)
 - Use code – collapsed to residential / nonresidential
- Google maps satellite images

Train

- Global fMoW data

Test

- On buildings from Wake County

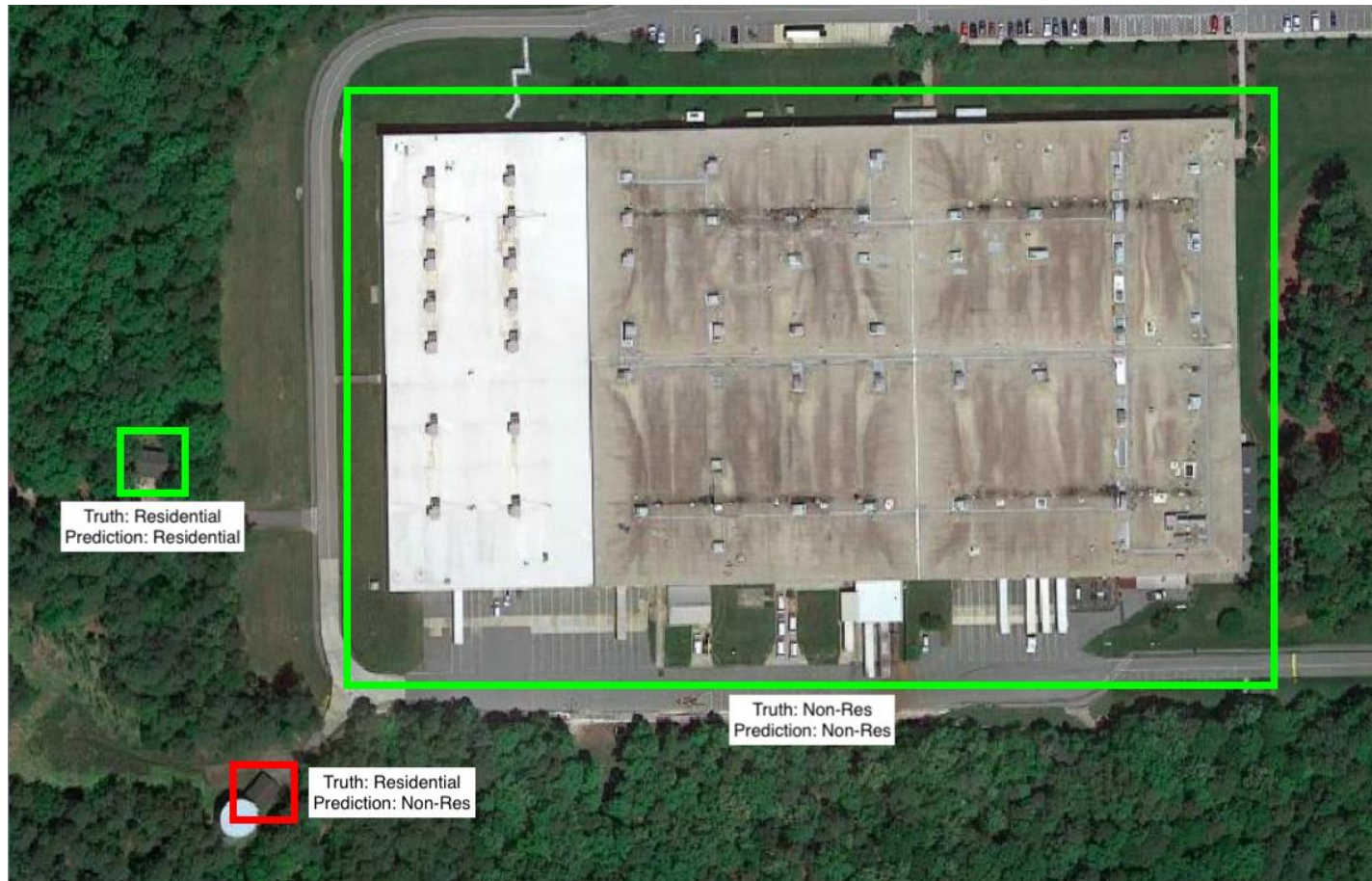
Fine-Tune

- Using Wake County images

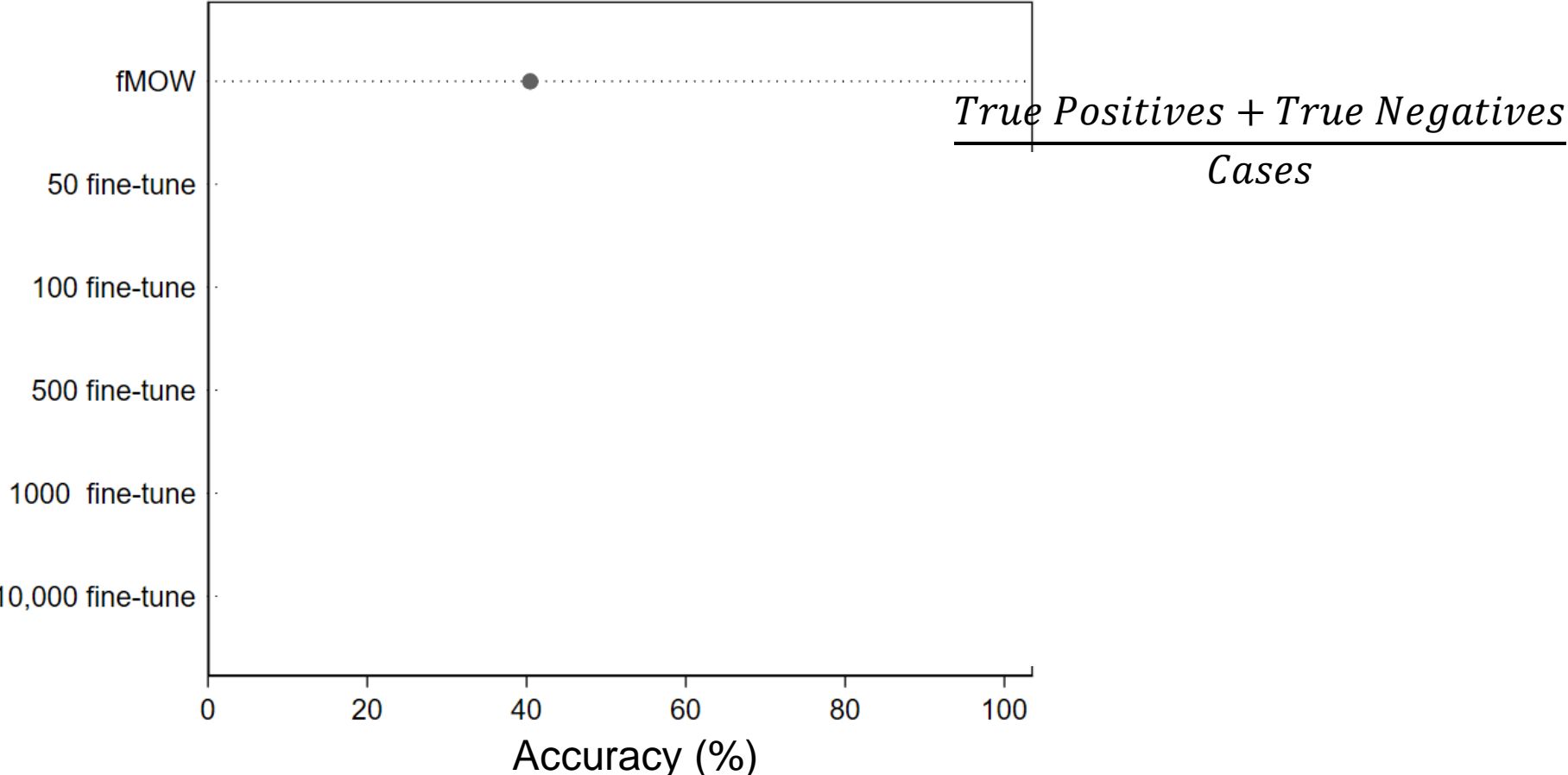
Results



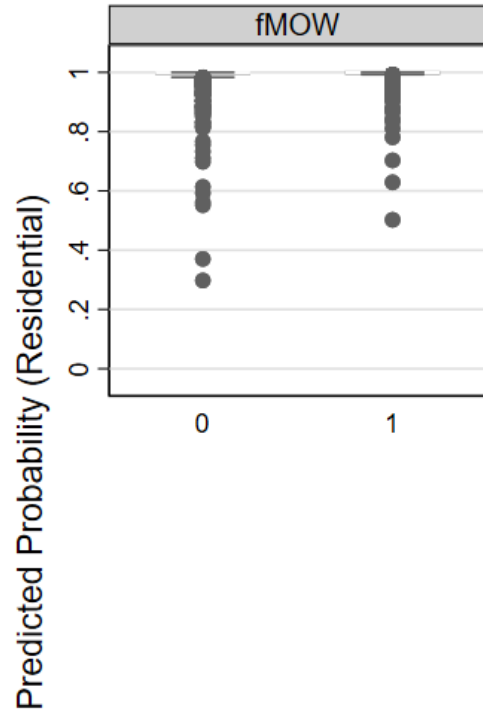
Results



Accuracy, by Model



Probability Residential, by True Residential Status & Model





Thank You

Stephanie Eckman

Fellow, Survey Research

seckman@rti.org

<http://stepheckman.com>

@stephnie