



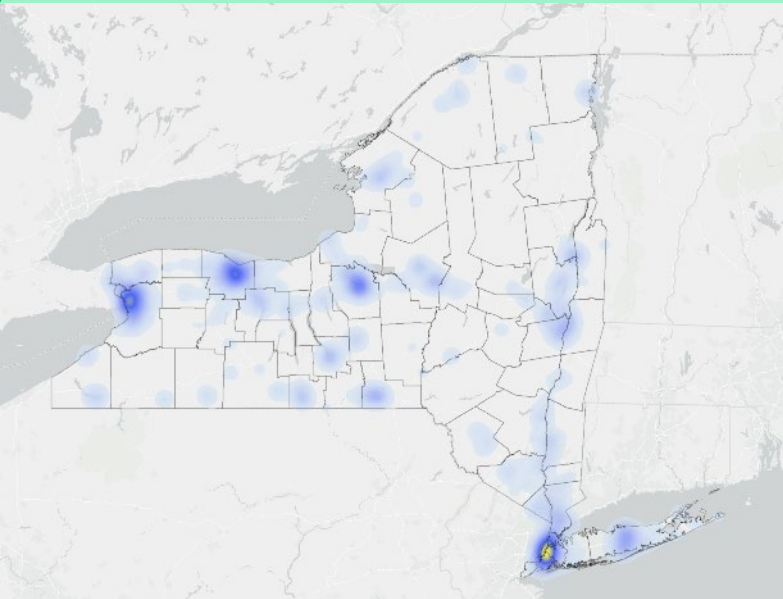
## Practical Applications for Deep Learning: Assessing Buildings at Scale with Computer Vision

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Artificial Intelligence, Real Savings  
Midwest Energy Solutions Conference  
January 30, 2024

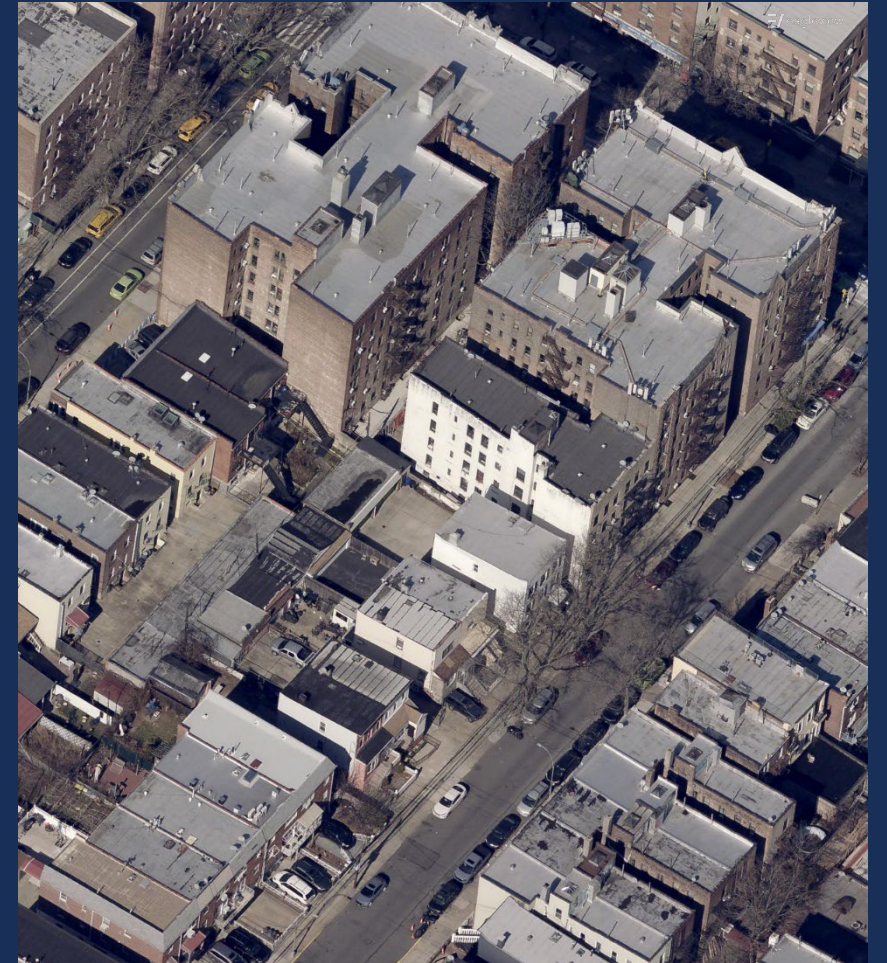
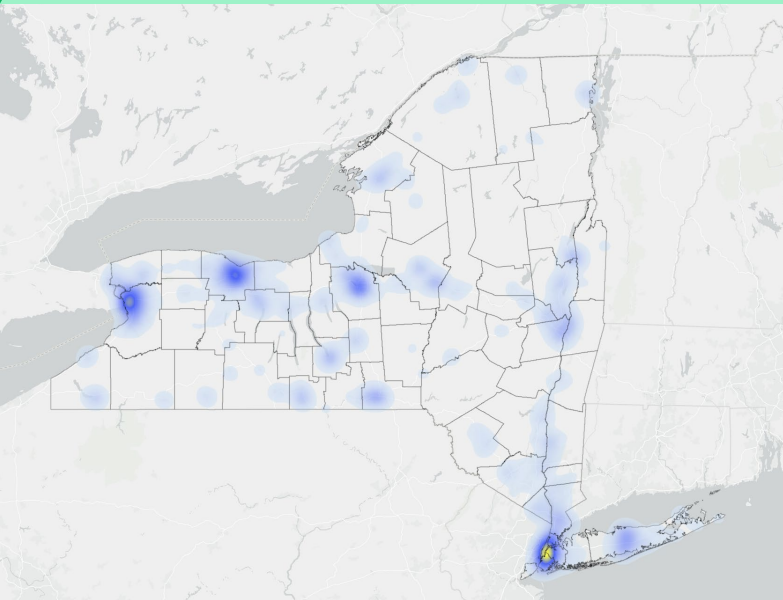
# New York Statewide Multifamily Baseline Study

Over 400 detailed and comprehensive site visits across New York state



# New York Statewide Multifamily Baseline Study

Can we assess  
**every individual** MF  
building statewide?



Developing new programs, particularly for some novel retrofit solutions, requires a detailed understanding of the exact quantities and locations of buildings. A population-wide analysis can't attain the same level of detail that site visits provide, but can it identify a complete inventory of buildings at a statewide scale, along with some useful structural characteristics about each one?



How many multifamily buildings are in New York State?

- ✓ Searching for: number of multifamily buildings in New York State
- ✓ Generating answers for you...

Your personal and company data are protected in this chat

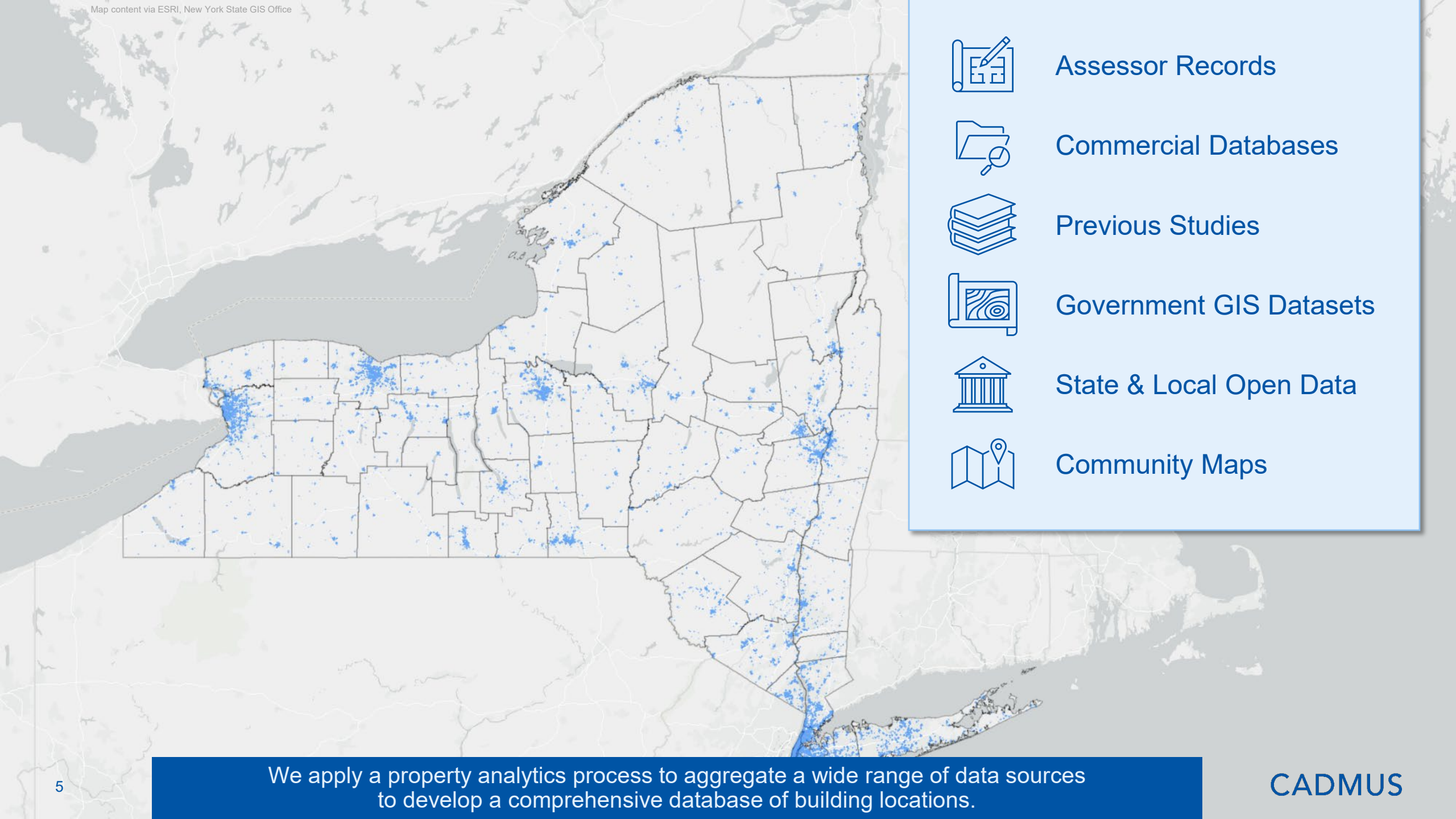
I'm sorry, but I couldn't find the exact number of multifamily buildings in New York State. However, you might find relevant data in the [NMHC Quick Facts Data Download](#) or the [NYSERDA Multifamily Statewide Baseline Study](#). These sources provide various statistics related to multifamily buildings, which could help you find the information you're looking for. Please note that the data might not be up-to-date, and it's always a good idea to check the most recent sources.

Learn more  1 [nmhc.org](#) 2 [nyserda.ny.gov](#) 3 [bing.com](#)



1 of 30 responses ●

The first challenge is to locate those buildings. Can AI complete this step? Not today. Generative AI has to learn from somewhere. As energy efficiency professionals we still need to do the foundational research.



Assessor Records



Commercial Databases



Previous Studies



Government GIS Datasets



State & Local Open Data



Community Maps

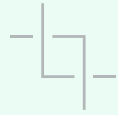
We apply a property analytics process to aggregate a wide range of data sources to develop a comprehensive database of building locations.



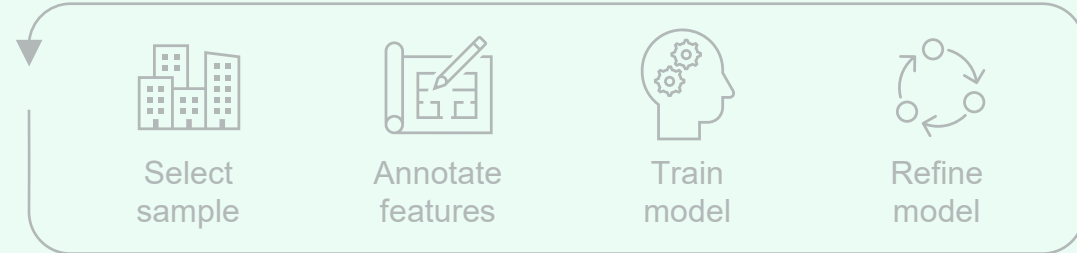
Locate buildings



Download images



Crop to building



Select sample



Annotate features



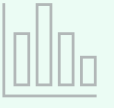
Train model



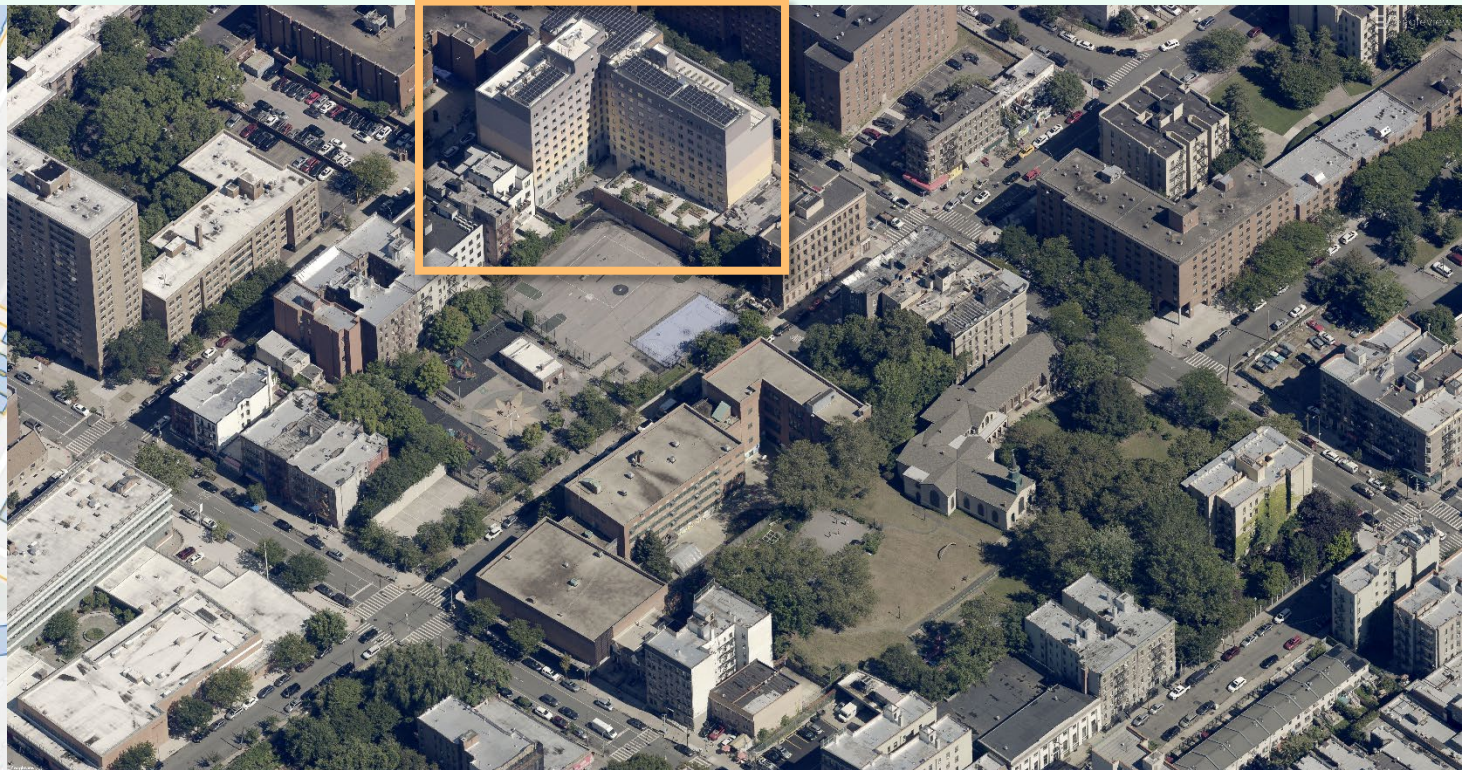
Refine model



Apply to population



Analyze outputs



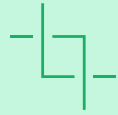
After identifying the building locations, we must isolate each building of interest on each image.



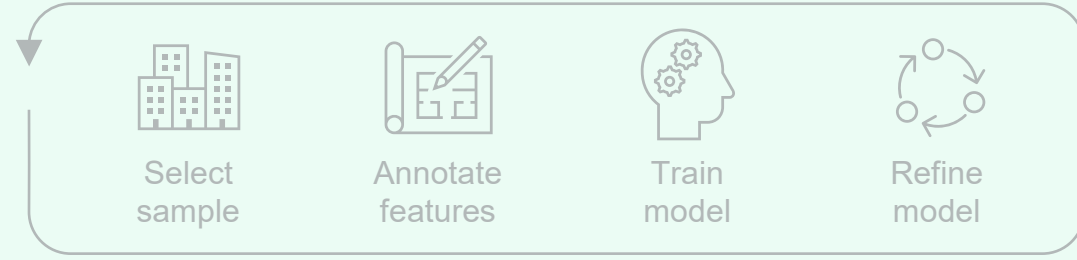
Locate buildings



Download images



Crop to building



Select sample



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Train model



Refine model



Apply to population



Analyze outputs



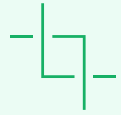
CADMUS



Locate buildings



Download images



Crop to building



Select sample



Annotate features



Train model



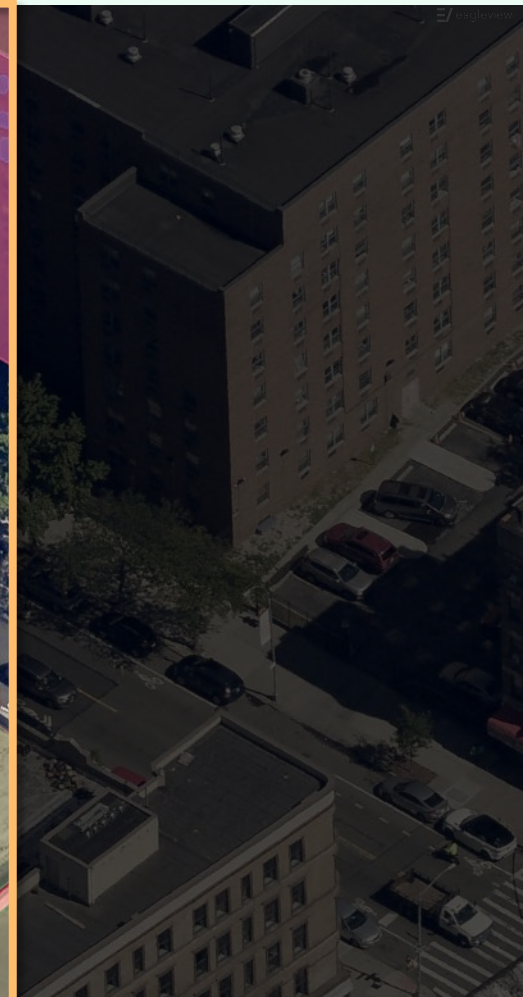
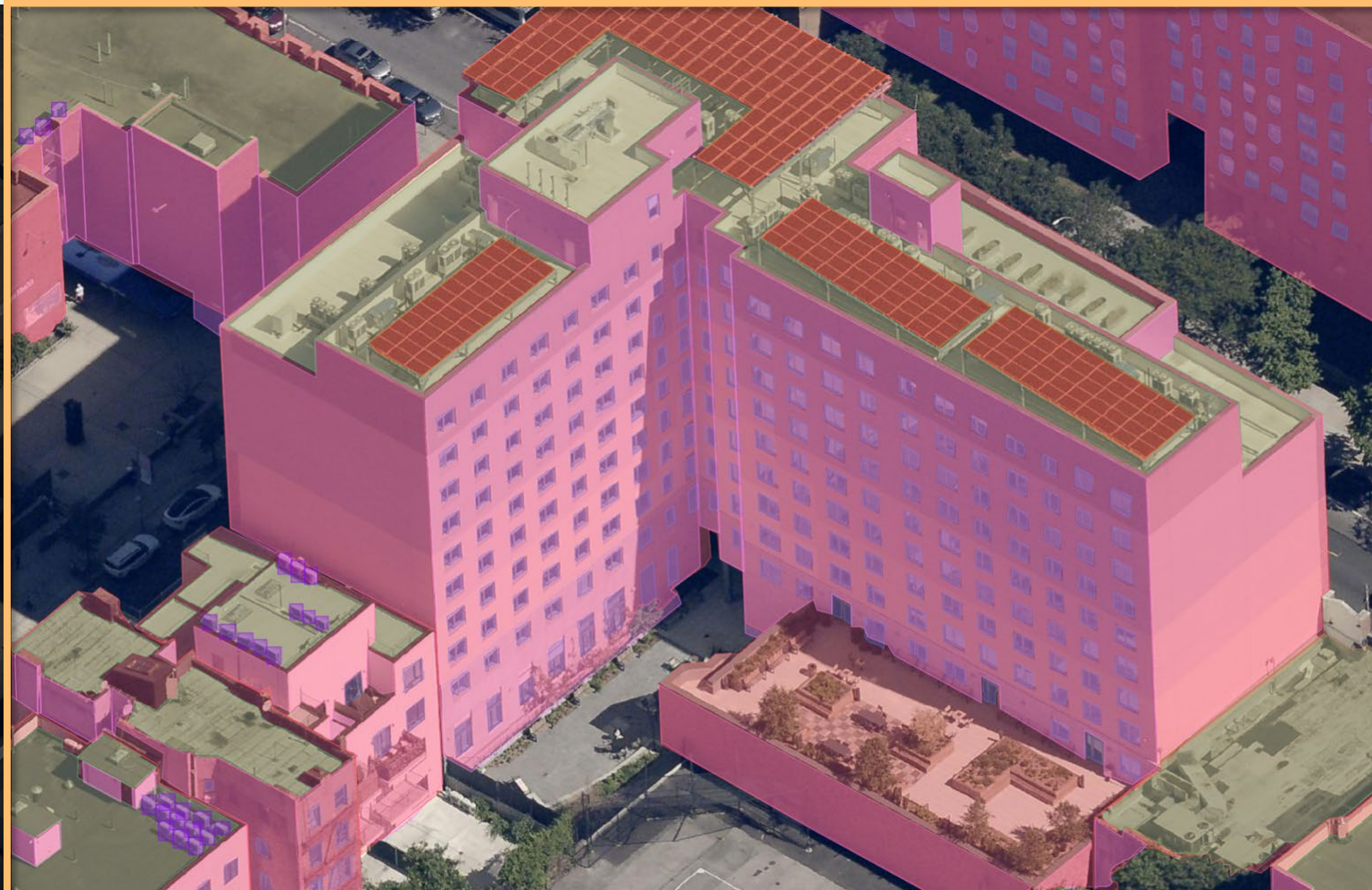
Refine model



Apply to population



Analyze outputs



After isolating images of selected buildings, we can start training the computer vision model to recognize the desired attributes by manually labeling images, training a model, and testing it on additional images.

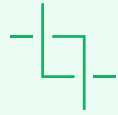




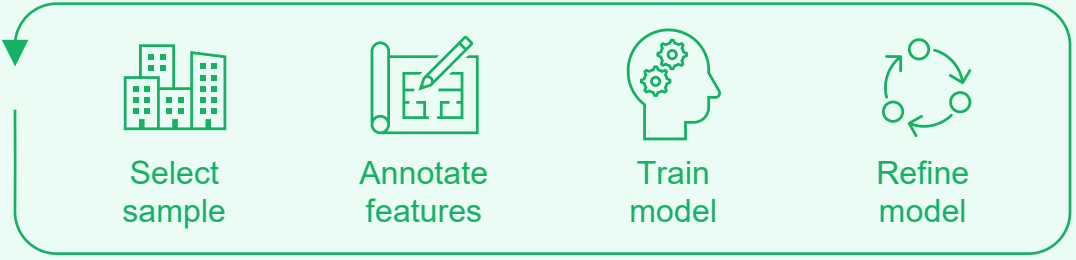
Locate buildings



Download images



Crop to building



Select sample



Annotate features



Train model



Refine model



Apply to population



Analyze outputs



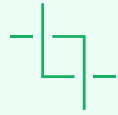
Once a satisfactory model has been developed, we can acquire images for the entire building population and apply that AI model to each image to extract identified features.



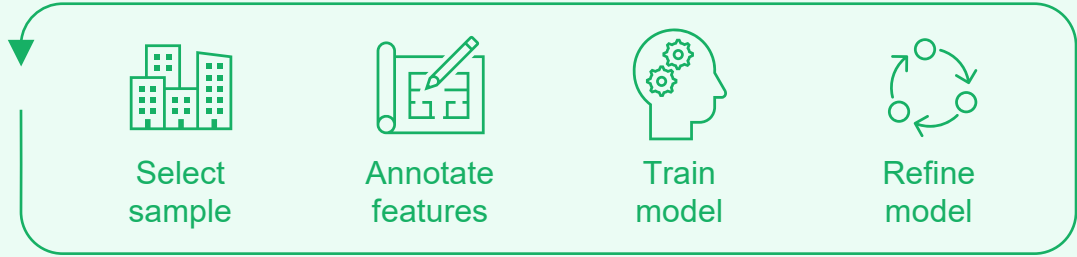
Locate buildings



Download images



Crop to building



Select sample



Annotate features



Train model



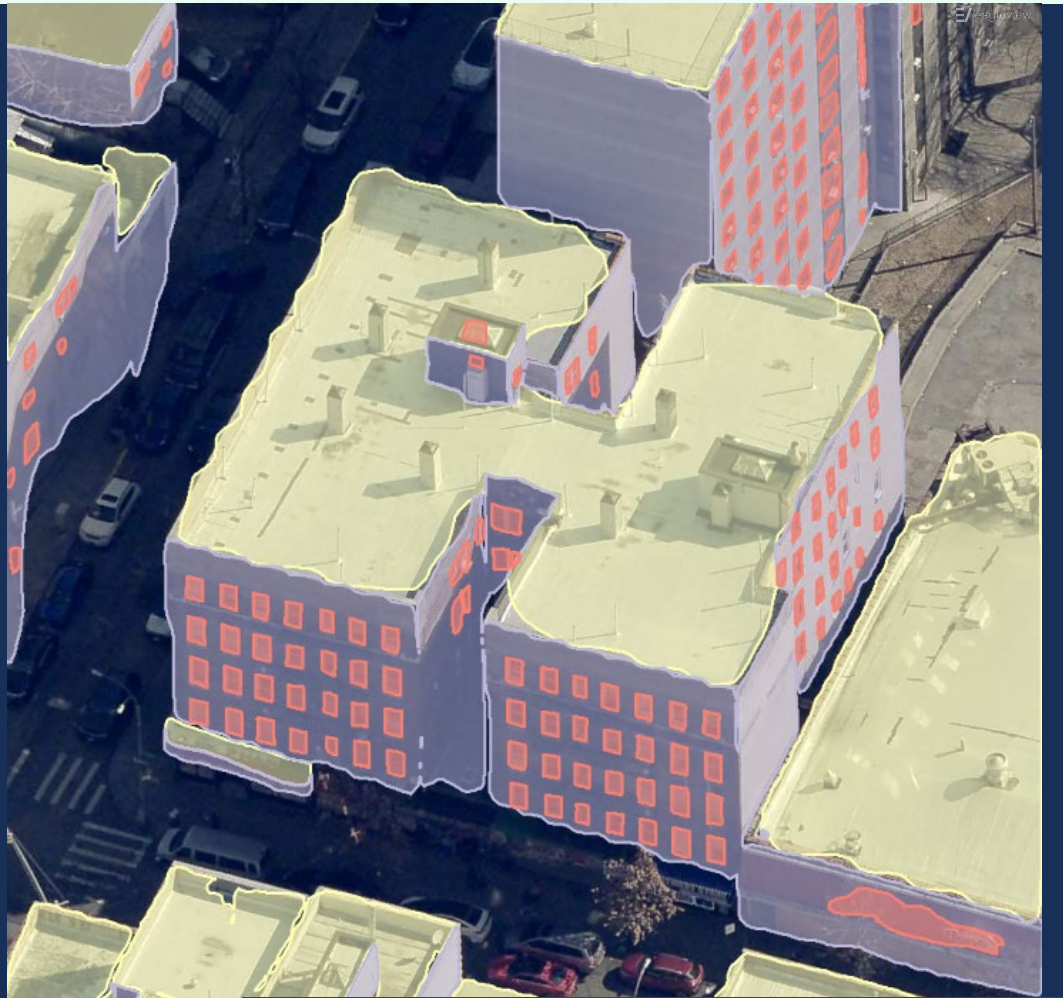
Refine model



Apply to population



Analyze outputs



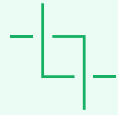
A computer vision AI model has no inherent understanding of the analysis we intend to use it for, and will return results across the entire image.



Locate buildings



Download images



Crop to building



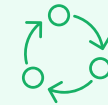
Select sample



Annotate features



Train model



Refine model



Apply to population



Analyze outputs



We must conduct additional analysis to select features relevant to each building, and then use those features to calculate useful metrics like building dimensions and window-to-wall ratio

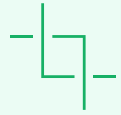
CADMUS



Locate buildings



Download images



Crop to building



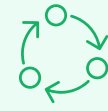
Select sample



Annotate features



Train model



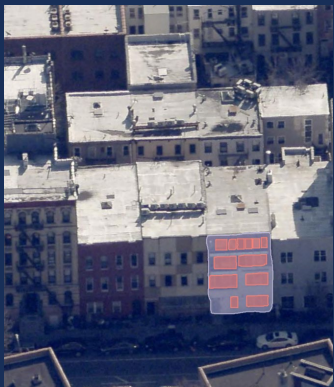
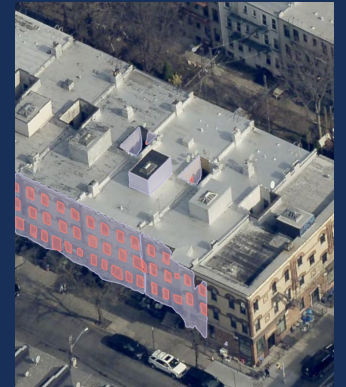
Refine model



Apply to population



Analyze outputs



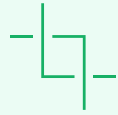
We can then apply that analysis process to the features extracted from each image across the entire population, and begin to integrate those results into a useful dataset.



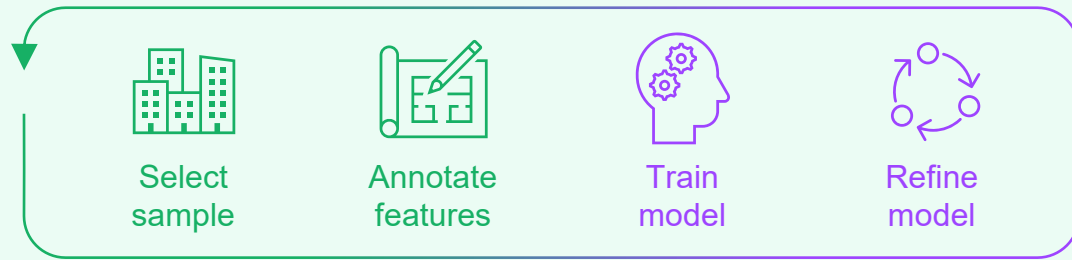
Locate buildings



Download images



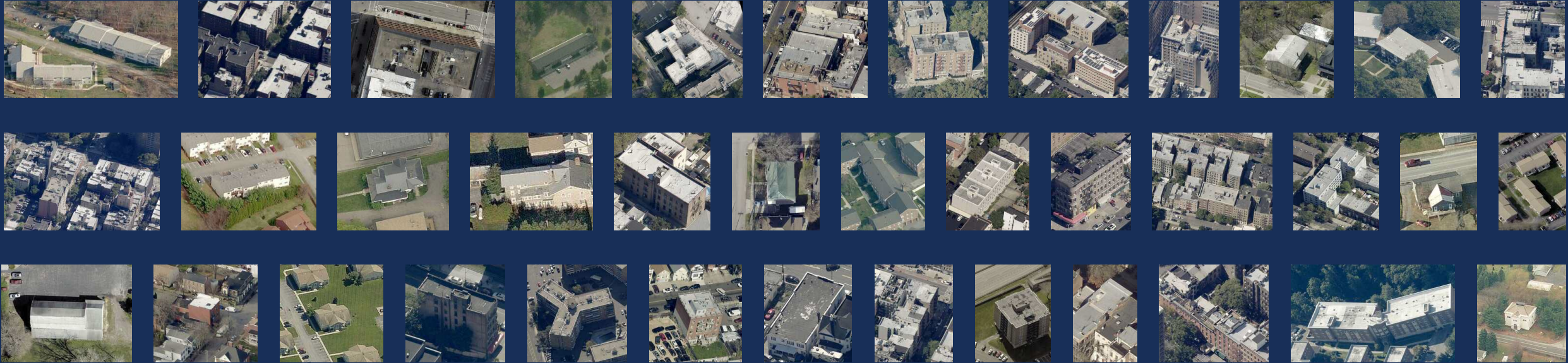
Crop to building



Apply to population



Analyze outputs



>130k buildings

>600k images

>30 attributes

# CADMUS



# Thank You

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