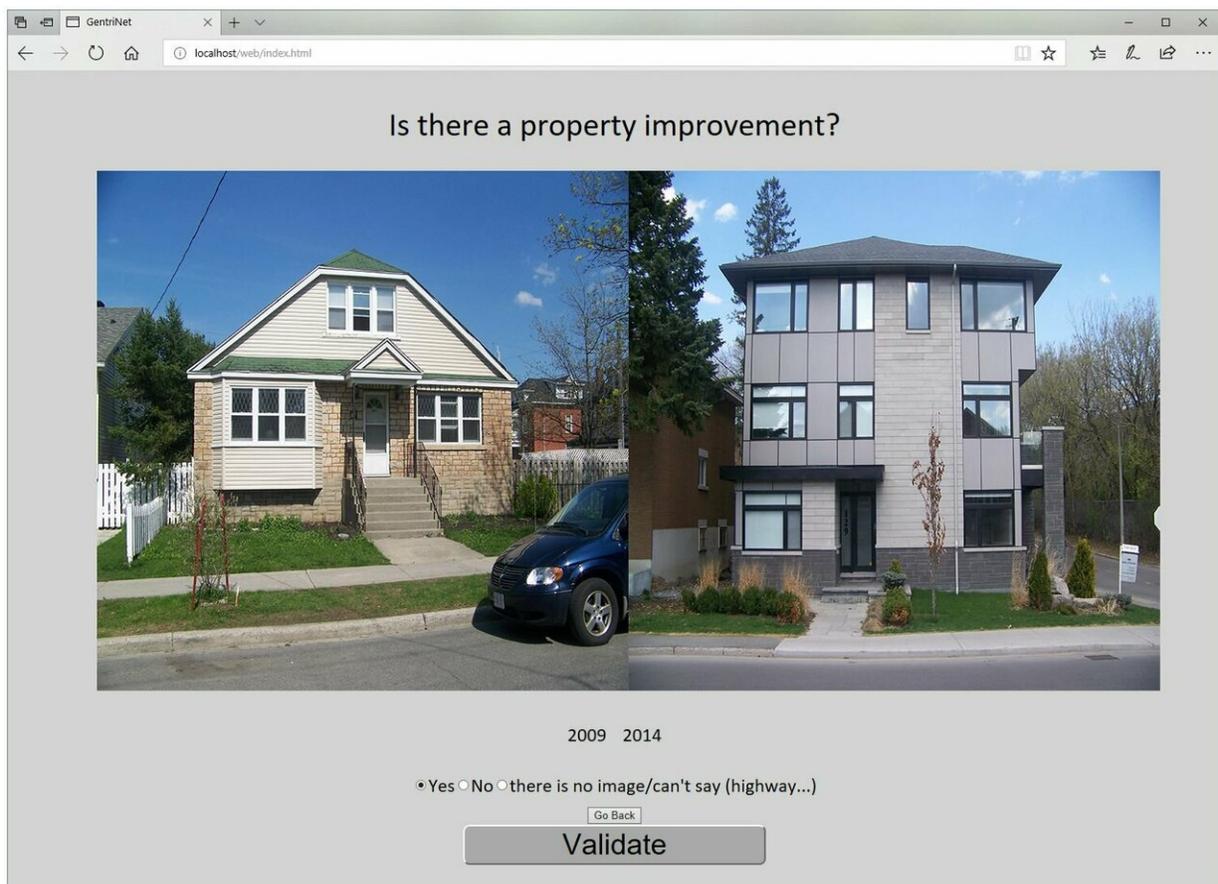


# Tracking urban gentrification, one building at a time

March 13 2019



Training data collection web interface. Credit: Ilic *et al*, 2019

A new deep-mapping computer model can detect visual changes to individual properties, allowing researchers to more-rapidly track

gentrification within neighborhoods and cities, according to a study published March 13, 2019 in the open-access journal *PLOS ONE* by Lazar Ilic, Michael Sawada, and Amaury Zarzelli of the University of Ottawa, Canada.

Gentrification has been observed in many western cities with wide-ranging effects. Previous studies have sought to use [census data](#) to identify and analyse [gentrification](#), but its resolution is limited in space and time, and creates artificial divisions at census boundaries. The authors claim the present study is the first to instead use the appearance of individual properties —the smallest spatial unit upon which a gentrification process can act—to indicate possible gentrification.

The authors accessed Google Street View (GSV) 360-degree panoramas of every property within the urban core of Ottawa, Canada, and adjacent regions, for every year from 2007-2016. They trained a deep-mapping computer [model](#) to process this GSV data, looking for visual changes to the properties over time that could indicate gentrification: improvements such as new fences, repainting or window replacement. After training, the model achieved 95% accuracy in detecting gentrification indicators as compared to a human investigator.

For the Greenbelt neighbourhood, the model detected 3483 instances of gentrification indicators at 2922 unique locations. The generated gentrification density map aligned very closely to a map showing where development/building permits had been granted.

The model relies on a photographic dataset that is maintained and updated over time, such as the GSV maps used here. Changes to the ways these photographic datasets are collected can reduce the model's accuracy. However, the authors note that their deep-mapping model can be easily recreated in locations with similar datasets available: a relatively-modest time investment can now produce highly spatially- and

temporally resolved maps of the gentrification process.

The authors add: "Gentrification is reshaping our cities but at the same time it is hard to determine where and how fast the phenomena occurs in large dynamic urban centers. We used a [deep learning](#) AI to scour hundreds of thousands of Google Street View images of Ottawa's buildings to flag where and when gentrification-like visual improvements to properties took place and, for the first time, provided the most detailed maps of spatial evolution of gentrification through time in a major city. These maps have direct implications for planning, social justice and addressing inequality in this large urban center."

**More information:** Ilic L, Sawada M, Zarzelli A (2019) Deep mapping gentrification in a large Canadian city using deep learning and Google Street View. *PLoS ONE* 14(3): e0212814.  
[doi.org/10.1371/journal.pone.0212814](https://doi.org/10.1371/journal.pone.0212814)

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