Predictive Modeling to Assess Gentrification Susceptibility

Purpose

For the last several years the Puget Sound real estate market – particularly the market in Seattle – has been growing at an astronomical rate and, while that is great news for homeowners, real estate agents, and real estate developers, it is causing serious issues for those closer to the low end of the socio-economic scale. Perhaps chief among those issues is gentrification -- the purchase and renovation of houses and stores in deteriorated urban neighborhoods by upper- or middle-income families or individuals ("Gentrification"). Frequently this improves property values but often displaces low-income families and small businesses.

It is perhaps too late for Seattle to be saved from widespread gentrification, but as the overflow from that market further spreads to surrounding cities, it may be possible to identify areas most susceptible to gentrification in the hope that civic leaders, armed with this information, are able to enact proactive measures to alleviate and mitigate the potential impacts of gentrification.

Predicting areas where gentrification is likely, might allow Tacoma to proactively enact policies to protect vulnerable populations and to mitigate the overall effects even as the real estate market in the area continues to be amongst the hottest in the country.

Objective

By selecting indicators where data is widely available and somewhat standardized to identify areas susceptible to gentrification, it becomes possible to create the type of broad, yet specific analysis that this research seeks. Indicators fitting those criteria for this analysis include: median income, overburdened renters, ethnicity, single-family housing values, accessibility to parks and highways, and proximity to subsidized housing.

Tacoma, Washington was selected as a test case to assess whether the selected predictive indicators accurately identify areas within the city that are most susceptible to gentrification.

Using the results of the analysis of Tacoma, the initial development of an automated tool has begun that , upon completion, will allow municipalities, urban planners, or other interested groups to identify areas susceptible to gentrification anywhere in the United States.

Methods

The most recent tabular data, 2015, was retrieved from the US Census Bureau –Median Household Income in the Past 12 Months (in 2015 Inflation-Adjusted Dollars), Median Gross Rent as a Percentage of Household Income in the Past 12 Months (Dollars), and Race – were obtained at the block group enumeration level to increase accuracy in the overall analysis.

Data used to determine single-family housing value – current as of 2008 – was obtained from the Washington State Geospatial Data Archive and was generalized to block groups where the average single-family housing value was calculated as the average of the value for all single-family dwelling parcels within each block group.

Analysis of accessibility to parks and highways, and proximity to subsidized housing was performed using a streets network dataset created specifically to carry out spatial analysis on these topics based on appropriate distance measurement – drive time minutes, walk time minutes, or miles.

An index was developed where a range of data for each indicator was quantified into five classes, giving each class a numerical 'score' (1-5) where a '1' indicates a lower susceptibility to gentrification and a '5' indicates a higher susceptibility to gentrification based solely on the indicator being analyzed. Because no single indicator can directly predict susceptibility to gentrification, a calculation was performed using the quantified (1-5) 'scores' contained within each indicator, which produced a composite 'score' (7-35) where a '7' indicates a lower susceptibility to gentrification, and a '35' indicates a higher susceptibility to gentrification based on the totality of the analyses performed.

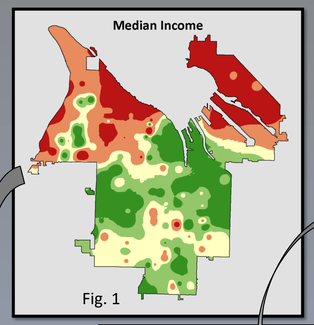

Fig. 1

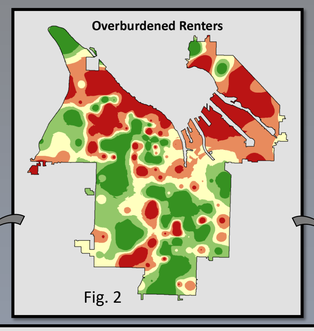

Fig. 2

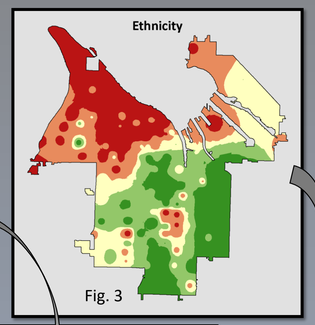

Fig. 3

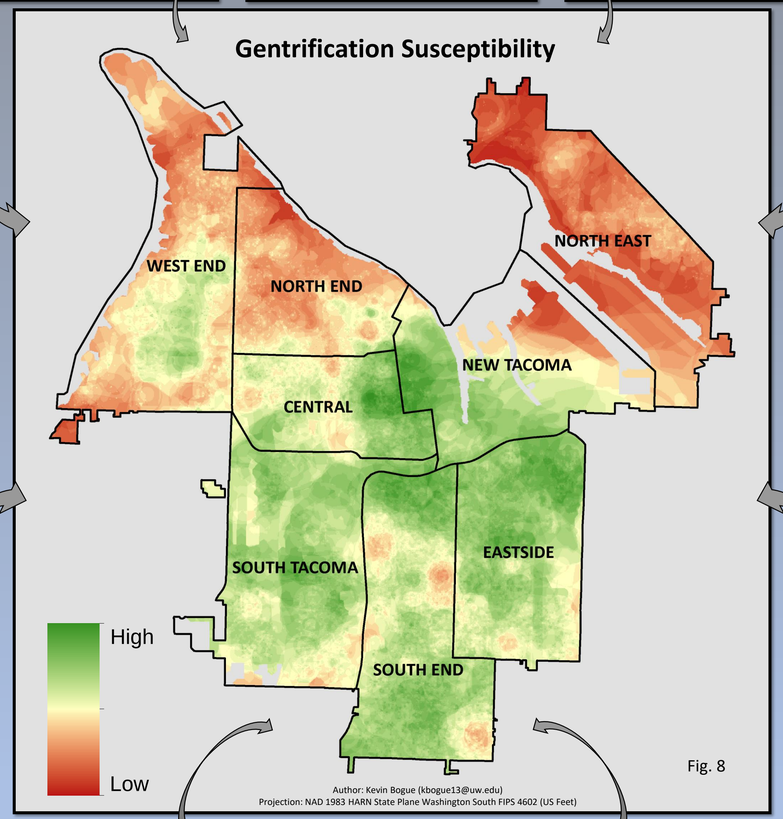

Fig. 8

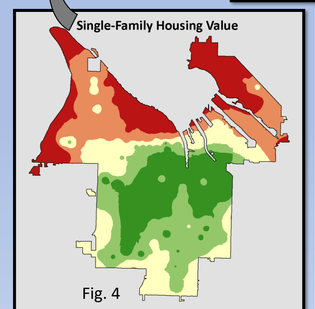

Fig. 4

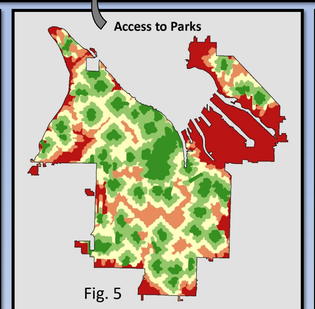

Fig. 5

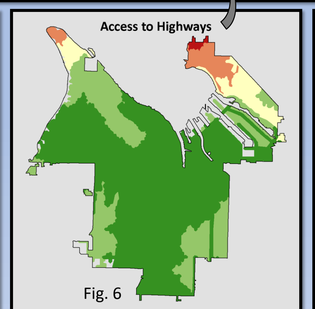

Fig. 6

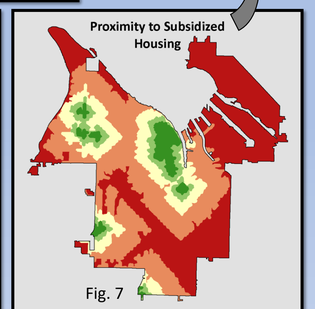

Fig. 7

Results

Final quantified analysis for median income, overburdened renters, ethnicity, single-family housing value, accessibility to parks and highways and proximity to subsidized housing (Fig. 1- Fig. 7) were used as inputs calculate a composite 'score,' based on the sum of the calculated values (1-5) for each analysis. The lowest possible score was '7' – achieving the lowest score (1) for each input – which represents the least susceptibility to gentrification. The highest possible score was '35' – achieving the highest possible score (5) for each input – which represents the highest susceptibility to gentrification.

Actual calculated scores ranged 8-34 and have been visualized beneath an overlay of the neighborhoods comprising Tacoma (Fig. 8). The lowest scores (symbolized red and indicating the lowest susceptibility to gentrification) are largely found in the West End, North End, and North East neighborhoods. The highest scores (symbolized green and indicating the highest susceptibility to gentrification) are largely found in the Central, New Tacoma, Eastside, South End, and South Tacoma neighborhoods. The findings are in line with the expected outcome of the analysis.

Automation

Currently a rudimentary iteration of the automated tool has been created using ArcGIS' ModelBuilder where four of the seven gentrification susceptibility indicators have been modeled (Fig. 9) – median income, overburdened renters, ethnicity, and single-family property value. However, the final three indicators – access to parks, access to highways, and proximity to subsidized housing – are currently unable to be modeled using ModelBuilder as they require the creation of a network dataset, which, due to the incredible number of variables required to create, is beyond the capabilities of ModelBuilder and requires a more in-depth working knowledge of python scripting than I currently possess.

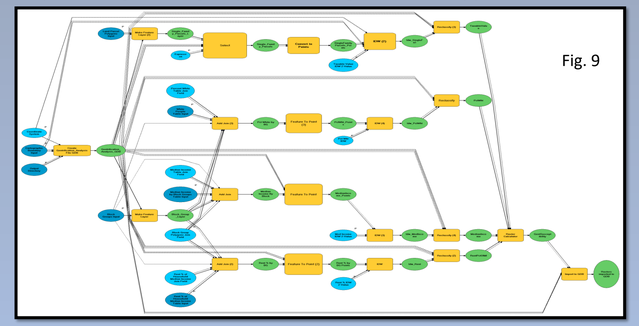
Fig. 9

Citations & Acknowledgements

Data Sources:
United States Census Bureau, Washington State Geospatial Data Archive, and Pierce County Open GeoSpatial Data Portal.

Academic Sources:
Chapple, K. (2009, August). Mapping Susceptibility to Gentrification: The Early Warning Toolkit. Retrieved February 3, 2017, from http://communityinnovation.berkeley.edu/reports/Gentrification-Report.pdf

Galster, G., & Peacock, S. (1986). Urban gentrification: Evaluating alternative indicators. *Social Indicators Research, 18*(3), 321-337. doi:10.1007/bf00286623

Gentrification. (n.d.). Dictionary.com Unabridged. Retrieved February 15, 2017 from Dictionary.com website http://www.dictionary.com/browse/gentrification

Monmonier, M. (1996). How to Lie with Maps (2nd ed.). Chicago, IL: The University of Chicago press.

Rosenberg, M. (2017, March 6). Seattle and Eastside home prices, after brief slowdown, surge to record highs. *The Seattle Times*. Retrieved April 24, 2017