

Quantifying Gentrification

By Amy Boncelet, Matthew Shen, Thomas Wallace

Gentrification: it's hard to define but you know it when you see it. Bespoke coffee shops with \$20 lattes. Independent boutiques with artisanal jams. High-rise condos loaded with amenities. These days, the term seems to be applied to any area where the rents are rising or when expensive stores redefine neighborhoods.

However, how do we know if a neighborhood is actually gentrifying? New York City's real-estate market has always been increasingly expensive, so we cannot use rental prices alone to determine if a neighborhood has been gentrifying. So what else goes into "gentrification"? What makes a place convert from the working-class neighborhood that was present for decades to a place where yuppies (young, urban professionals) want to live?

We had the same question, so we decided to answer it. We are a group of data scientists who live in different neighborhoods of New York City. Each of our chosen neighborhoods could be argued to have gentrified over the years in its own right - Astoria, Upper East Side, Morningside Heights - but have they?

Gentrification is a hot and polarizing topic, especially in a city like New York. It can be presented as a sign of progress – neighborhoods are cleaner, there are more dining and shopping options, home values increase. But it's also a zero-sum game. The process is akin to urban renewal, and can bring yuppies to an area and push out older, minority communities. One of the first mentions of gentrification is by Ruth Glass, who described it as: "the succession and replacement of classes", where "the middle class returns to the inner city", attracted by "convenient transportation, bustling commerce, and specific cultural atmosphere". Since we're data scientists and place value in numbers, we decided to put some math behind our curiosity to answer this question of quantifying gentrification in New York City.

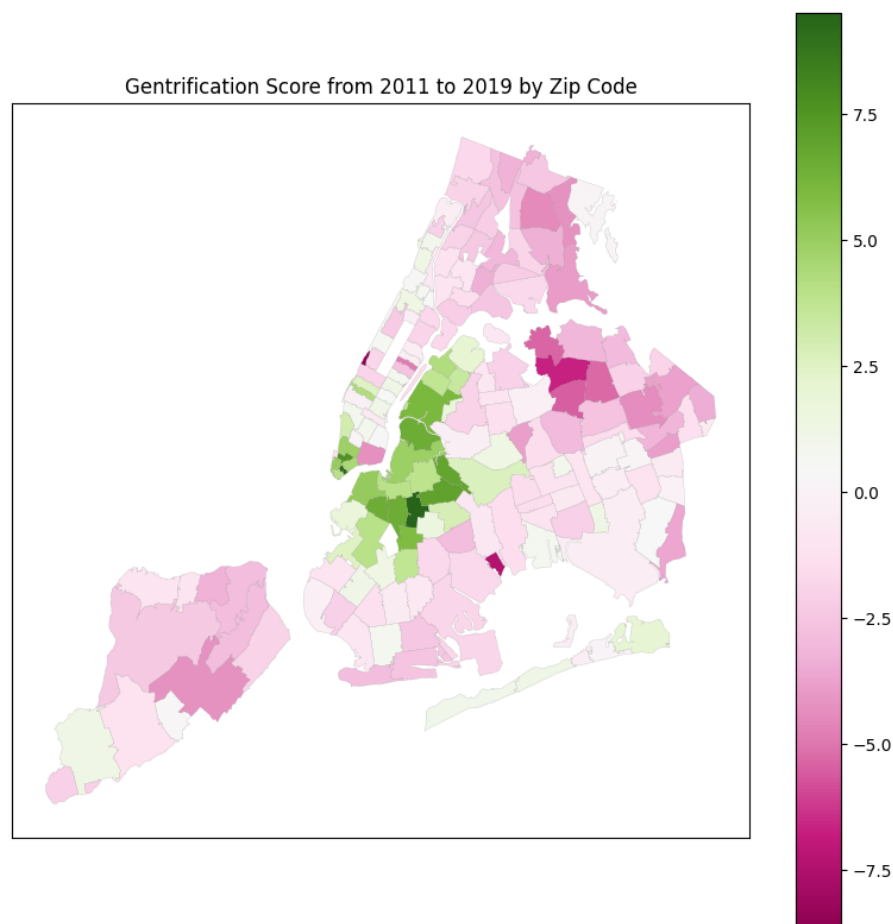
The first problem is figuring out what goes into gentrification. Based on our [research and popular theories](#), there are many criteria that can be included. We wanted to focus on the human and socio-economic demographics, so we isolated the following six "gentrification factors" to use in our analysis:

- Percent of the population that is white
- Median Income
- Education level (Percentage of population with a Bachelor's degree)
- Median Rent
- Median Age
- Percent of population that are immigrants (foreign born non-US Citizen)

The first four factors tend to increase as an area becomes more gentrified, while the last two tend to decrease. We gathered US Census data for each of the above factors from 2011 through 2019¹ for each zip code throughout New York City.

Taking the difference between the 2019 and 2011 data for each factor gave us the change for each zip code between those years. We weighted each factor equally (a proportional change in median rent would be equally as important as a change in median age) to create “gentrification scores” for each zip code. Those scores were compared to New York City as a whole - if the score was positive that area was gentrifying more compared to the city overall. If it was negative, it was not.

The map below plots the gentrification score for each zip code - darker green signifies the areas that have gentrified the most and darker pink, the least. In the last decade, the areas of Williamsburg, Greenpoint, DUMBO, Prospect Heights, Bet-Stuy, and Bushwick in Brooklyn, Long Island City and Astoria in Queens, and the Financial District and Chelsea in Manhattan were the areas that gentrified the most.



¹ 2011 is the year these census demographic data were first available. We chose 2019 as the most recent year of data, as COVID-19 affected the typical urban migration patterns, rent prices, and income in 2020 and 2021 for most areas of New York City, so the data for those years may be atypical.

Most of these results line up with our suspicions and popular theories of what neighborhoods have gentrified. The areas along the east river in Brooklyn and Queens and in Chelsea have long been [a case study in](#) how warehouses and factories have transformed into luxury apartments and beer gardens. People priced out of Manhattan neighborhoods have increasingly moved across the river in to these neighborhoods in Brooklyn and Queens. Chelsea had been known as a working class neighborhood, but is now famous for its rapidly increasing rent prices - [the High Line](#) is credited for this transition.

However, the Financial District was an unexpected area to top our list of the most gentrified areas. This is an area mainly filled with white-collar office buildings, but has a growing number of residential buildings being constructed/converted in recent years. We believe major infrastructure projects like the Big U and the reconstruction of the world trade centers have revitalized this area from a monotonous, gray, financial hub to valuable waterfront property where young “gentrifiers” want to flock to. Additionally, since many of the jobs in the neighborhood are high-paying finance roles, it has attracted the demographic typical that fills those roles - tending to be more white, higher-income, and with higher education levels.

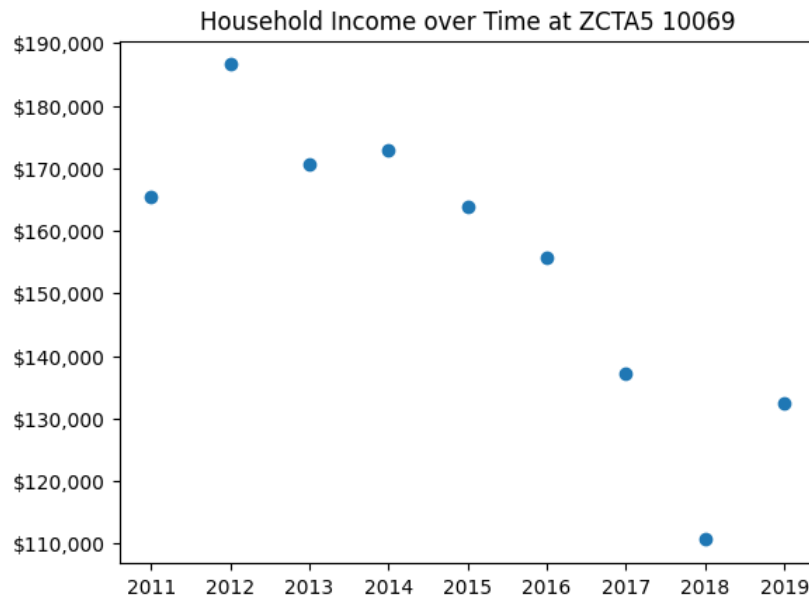
In contrast, the neighborhoods that have gentrified the least in the last decade were Flushing in Queens, East New York in Brooklyn, and Riverside Park South and Yorkville in Manhattan. Each of these neighborhoods have a unique story that puts them low on the gentrification list.

Flushing has historically been an immigrant-heavy neighborhood. Although the makeup of the neighborhood has switched over the years from predominantly hispanic to now east asian communities, the percentage of immigrants has remained the same. This factor also bled into other contributing metrics like percent of the population that is white and median income.

The neighborhood of East New York has been largely unchanged during this period. It has stayed a predominantly minority community ([55 percent](#) of the population is black) over our analysis period. Our group attributed the lack of gentrification of this area to the lack of public transportation in the neighborhood and one of the [highest crime rates in the city](#).

Riverside Park South had one of the most interesting stories to tell. Looking into what is going on in this neighborhood, we noticed there are three buildings affiliated with former President Donald J. Trump’s real-estate company. Our analysis was conducted over the 2016 presidential election, and the liberal-leaning populations in Manhattan typically disagree with many of Trump’s positions. Our team’s theory is that this may have contributed to an [exodus of residents](#) who did not want to be associated with the former president’s views, bringing down the portion of the population that is higher income, white, and holds higher education degrees. Shown in the figure below, household income in this zip code started declining in 2015 (the same year when Trump announced his campaign

for president) and hit a low in 2018 (in the middle of his presidential term, when people in the Trump buildings [campaigning to remove his name](#) from the buildings).



Yorkville in Manhattan's Upper East Side has long been touted as one of the most affluent neighborhoods. This area has been whiter, richer, and more expensive than the city on average for many years, and so the change of these metrics between 2011 and 2019 is not enough to reflect additional gentrification over the last decade. As a result, Yorkville hit a metaphorical wall and could not "gentrify" anymore.

Now, to answer one of the questions presented at the beginning - based on our analysis, which, if any, of the neighborhoods our team lives in have gentrified in the past decade?

Astoria, Queens.

Astoria includes zip codes 11101, 11102, 11103, 11105, and 11106, with an average gentrification score of 3.92. Based on our analysis, Astoria has moderately gentrified between 2011 and 2019. Out of the neighborhoods our team calls home, this one has gentrified the most. Compared to 2011, all of the metrics that we analyzed increased more than the city average. That being said, the factor that had an outsized effect on gentrification in Astoria was the percentage of the population holding a bachelor's degree (accounting for ~40% of our gentrification metric (1.46/3.92)).

Morningside Heights, Manhattan

Morningside Heights is located in West Harlem and includes Columbia University's main campus. The gentrification score of this neighborhood is 1.34. This means the neighborhood has gentrified slightly more than the city average. The largest contributor to our gentrification score in Morningside Heights

was an increase in the population that is white and a decrease in the percentage of the population that are immigrants. The area still has a large non-white population, but the rents and income are higher than average in this neighborhood.

Upper East Side, Manhattan

The Upper East Side is a large neighborhood, spanning 10021, 10028, 10065, 10075, and 10128 zip codes and encompassing the Yorkville neighborhood discussed above. The neighborhood as a whole has a gentrification score of -1.45, meaning it has not gentrified over the past decade. This becomes even more apparent when looking at individual zip codes within it. Take the 10075 zip code - this area, spanning from East 76th Street to East 81st Street, is one of the most “non-gentrifying” zip codes in the city, with a gentrification score of -4.88. As mentioned with Yorkville, the demographics of this neighborhood have been whiter, richer, and more expensive than the city on average for many years.

Since our analysis team will soon be entering the New York City labor market, we will all have a role in shaping the future of the city. It's very possible that we will move to neighborhoods that are in the process of gentrifying - and we may play a part in that process ourselves. Over the past decade, the technology industry has become [a key sector](#) of New York City's economy - bringing jobs and changing the make-up of the city. As thousands of software engineers and data scientists flood the streets of New York, we need to ask ourselves: How can we make responsible decisions when picking the communities we want to be a part of?

Our analysis quantifying gentrification in New York City has resulted in more than just a series of scores. It tells the story of how different neighborhoods have changed over the past decade and shows us the rich history of New York City. From presidential elections to industrial zoning laws, the changes that we see in our neighborhoods cannot merely be understood with wide eyes and binoculars. To truly understand the dynamic shifts over time, taking historical, economic, and social implications of each individual community into account is key. This analysis has given us a more robust understanding of our own neighborhoods. Understanding the factors that contribute to neighborhood changes is critical for a more resilient, equitable, and sustainable city for all New Yorkers.

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