

A stylized illustration on the left side of the page features several rectangular buildings of varying heights in shades of orange and red, each with a grid of white squares representing windows. To the right of the buildings is a flagpole with the New York City flag, which consists of three vertical stripes of blue, white, and orange, with the city seal in the center of the white stripe. Below the flagpole are two simplified tree shapes, one orange and one red, each with a thin vertical line for a trunk.

# **New Residential Buildings in New York City**

An Analysis of New Construction  
by Loren Dunn

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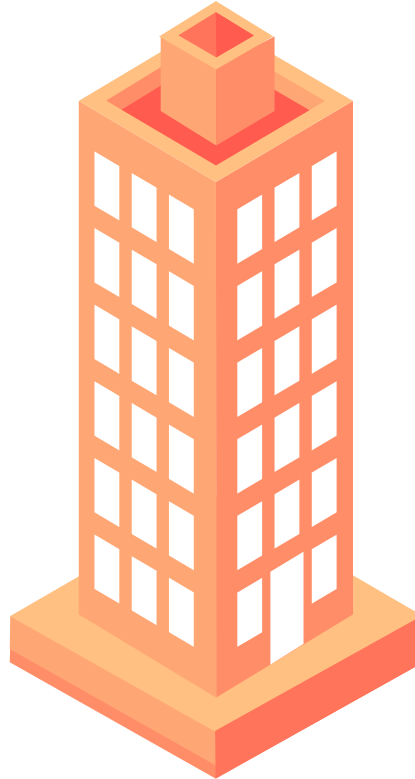
The Problem



The Questions



The Process



The Observations



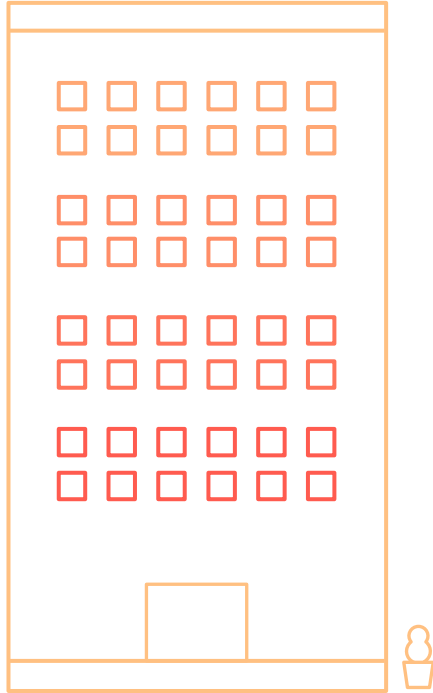
The Modeling



The Conclusions



# The Problem



## Rent

Is astronomical in NYC.



## Income

Avg. rent represented 40% of avg. income, 2019<sup>1</sup>



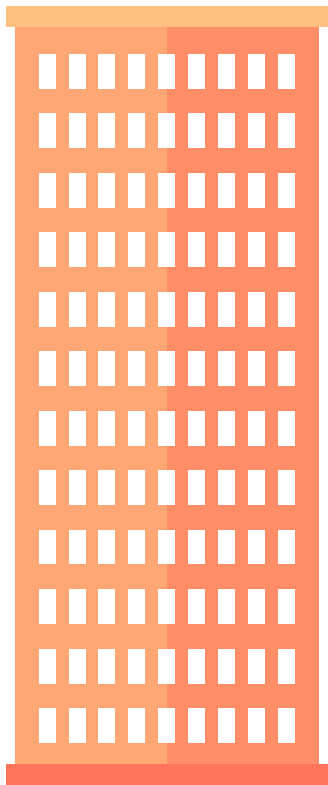
## New Construction

Can relieve pressure on housing stock



<sup>1</sup> <https://www.cnbc.com/2019/03/07/heres-the-share-of-income-that-goes-to-rent-in-cities-across-the-us.html>

# The Questions



## The Government

Where should the government focus on developing housing?

## Builders

Where are the most promising places to build?

# The Process

## Data Collection

- NYC Open Data<sup>1</sup>
  - Dept. of Buildings – Building Permits
  - NYPD – Criminal complaints
  - Parks Dept. – Location and size of Parks
  - MTA – Location of subway entrances
  - Census Tract Boundaries
  - Landmarks Preservation Commission – Historic districts
- NYC Dept. of Planning <sup>2</sup>
  - Census tract demographic data

## Data Cleaning

- Preparing data for exploratory data analysis (EDA) and modeling

## Exploratory Data Analysis (EDA)

- Comparing permit data to city- and borough-wide data
  - Use of random points

## Modeling

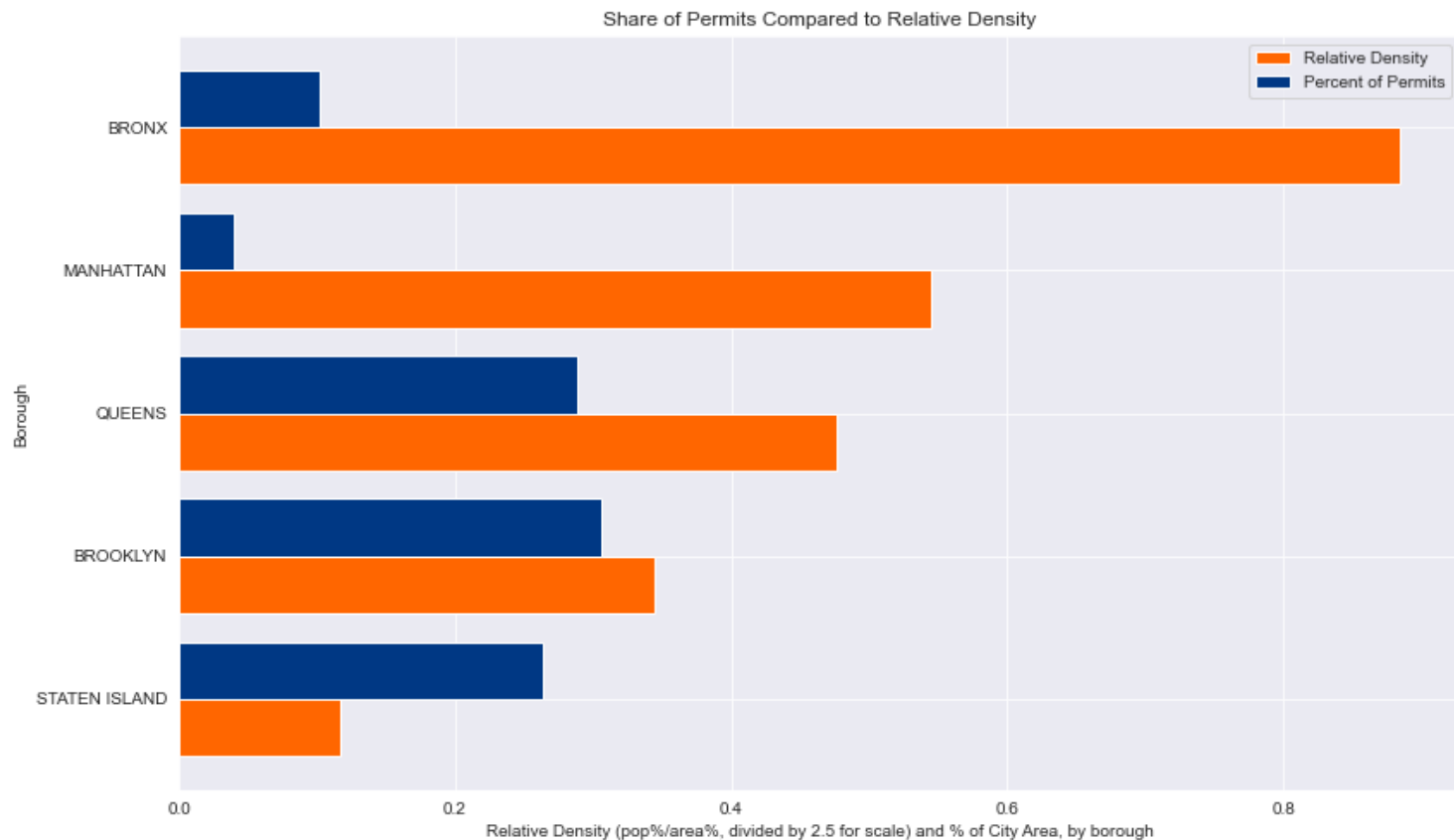
- DBSCAN
- Random points
- Experimented with different feature sets, parameters

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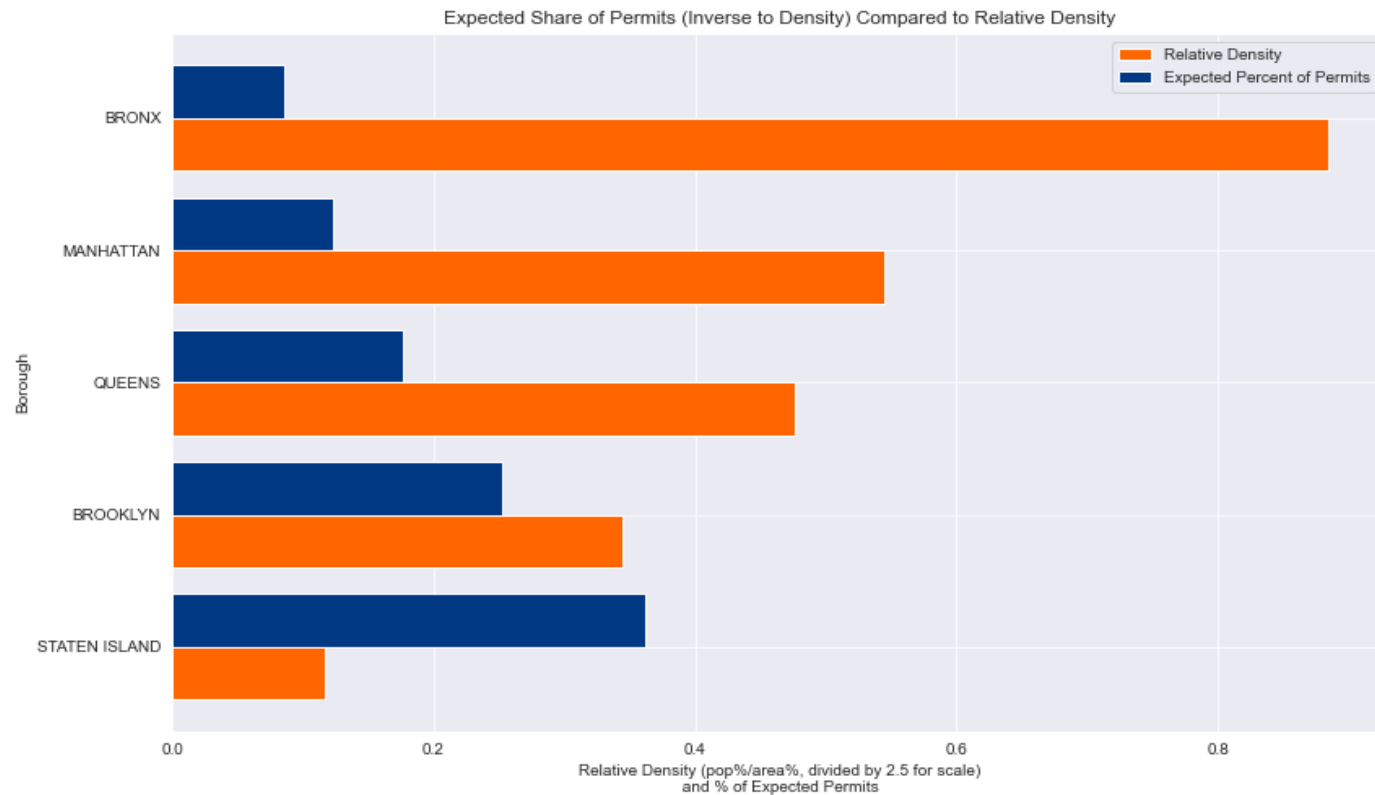
<sup>1</sup><https://opendata.cityofnewyork.us/>

<sup>2</sup> <https://www1.nyc.gov/site/planning/planning-level/nyc-population/nyc-population.page>

# EDA – Permits v. Density

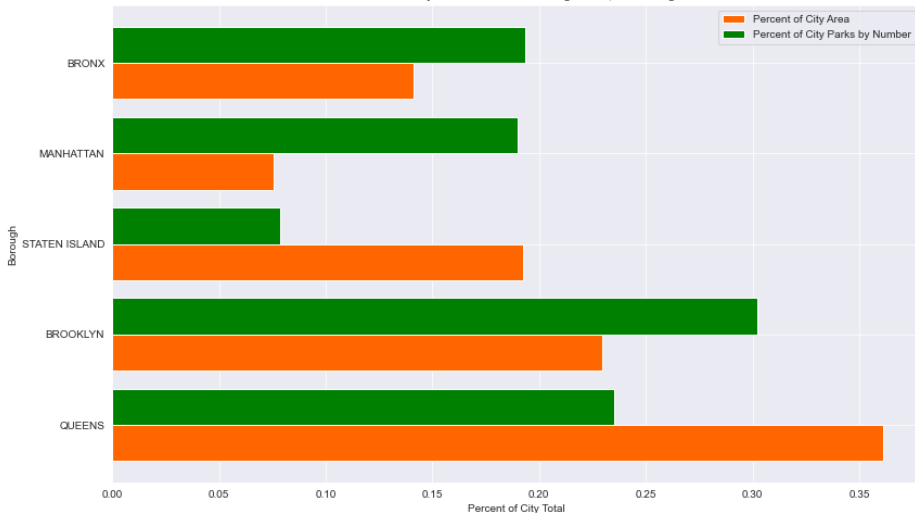


## Expected Share of Permits v. Relative Density

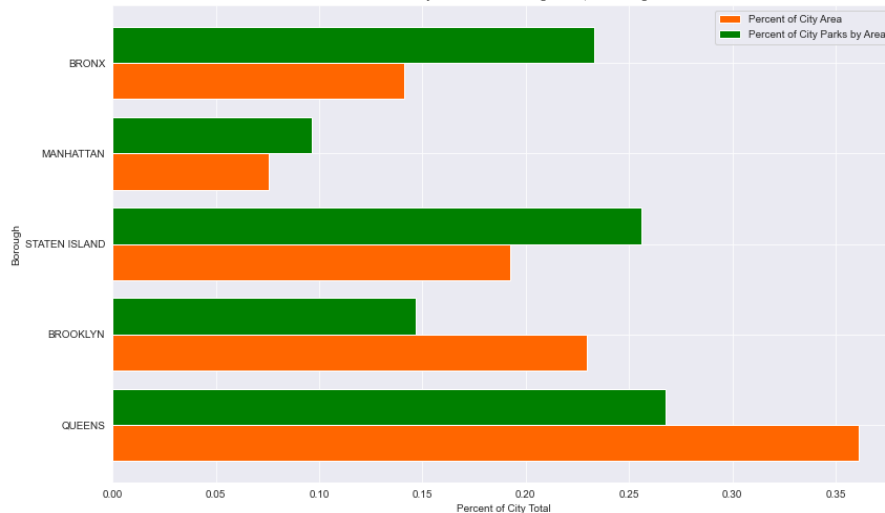


# EDA - Parks

Distribution of Parks by Number versus Borough Area, Percentages of Total

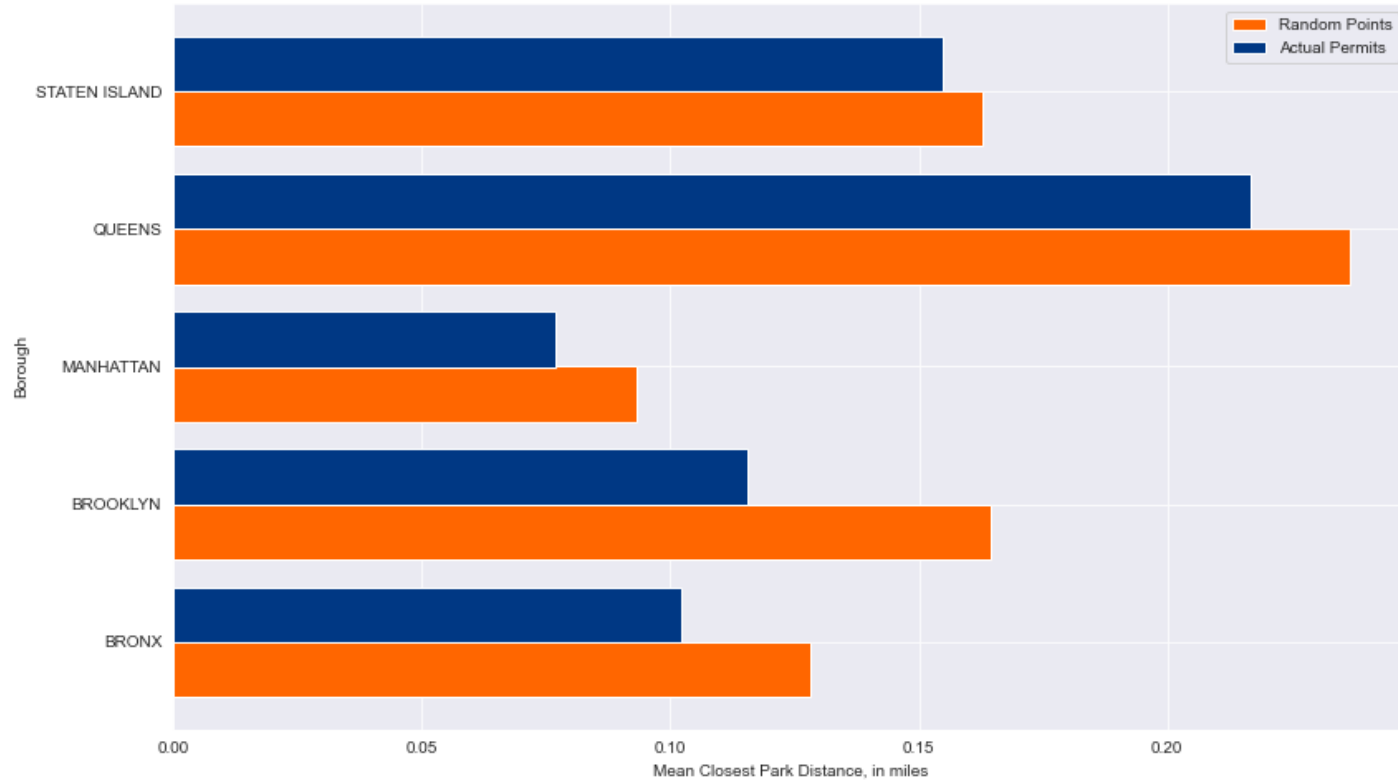


Distribution of Parks by Area versus Borough Area, Percentages of Total

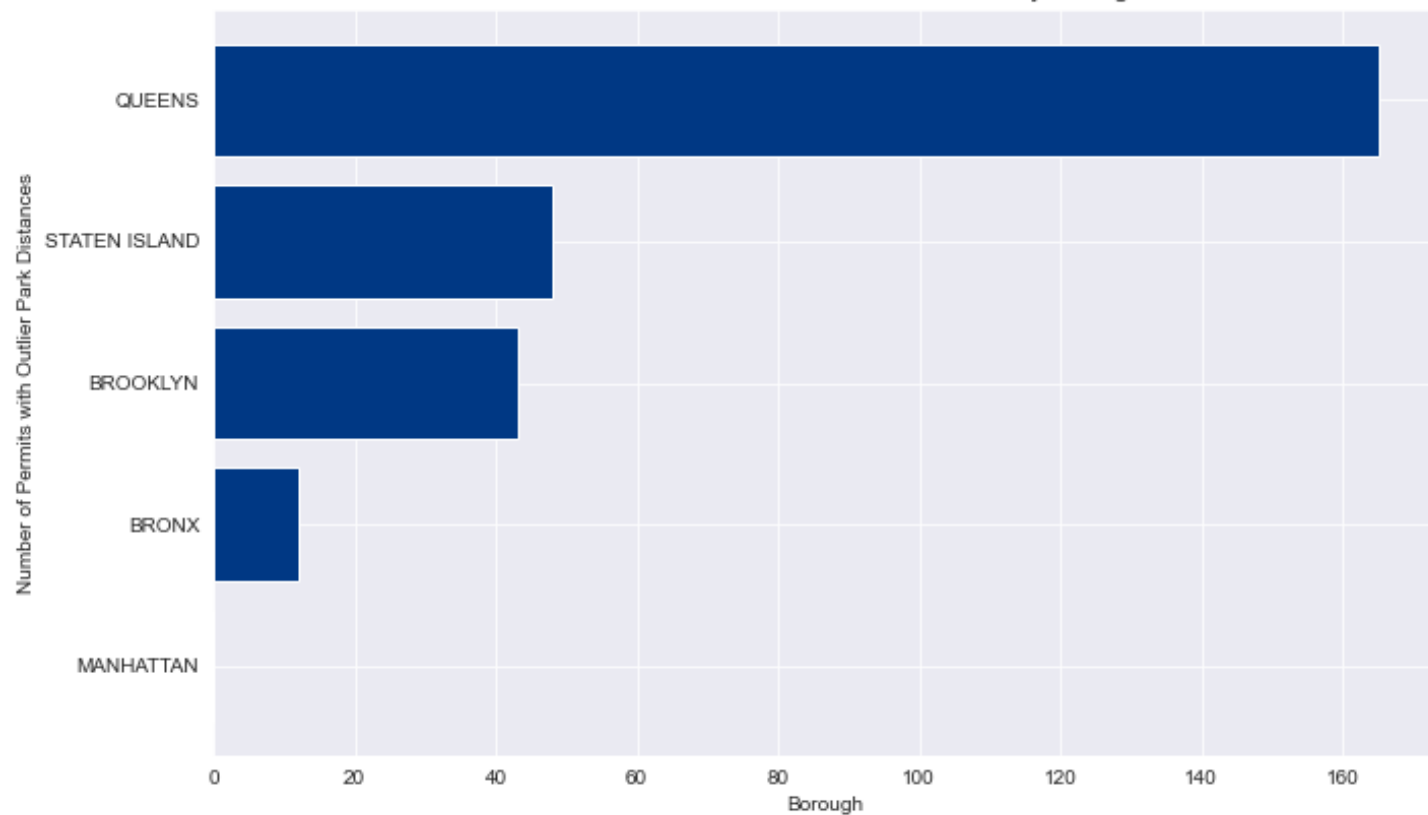




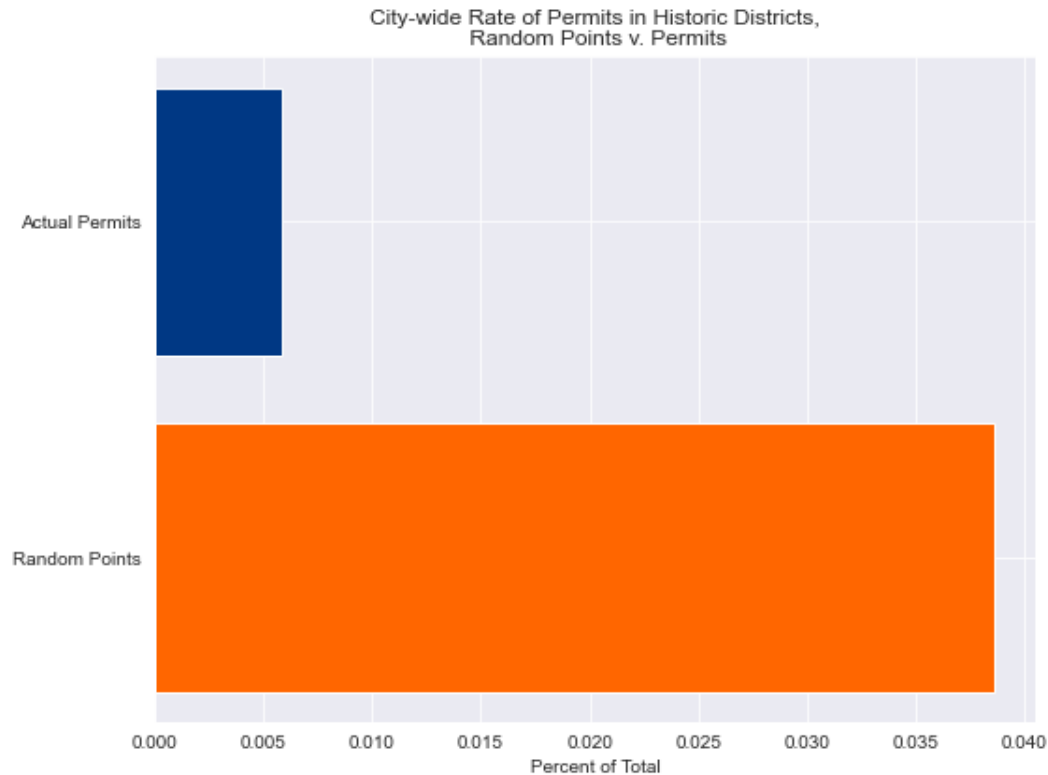
Mean Closest Park Distance for Actual Permits versus Random Locations



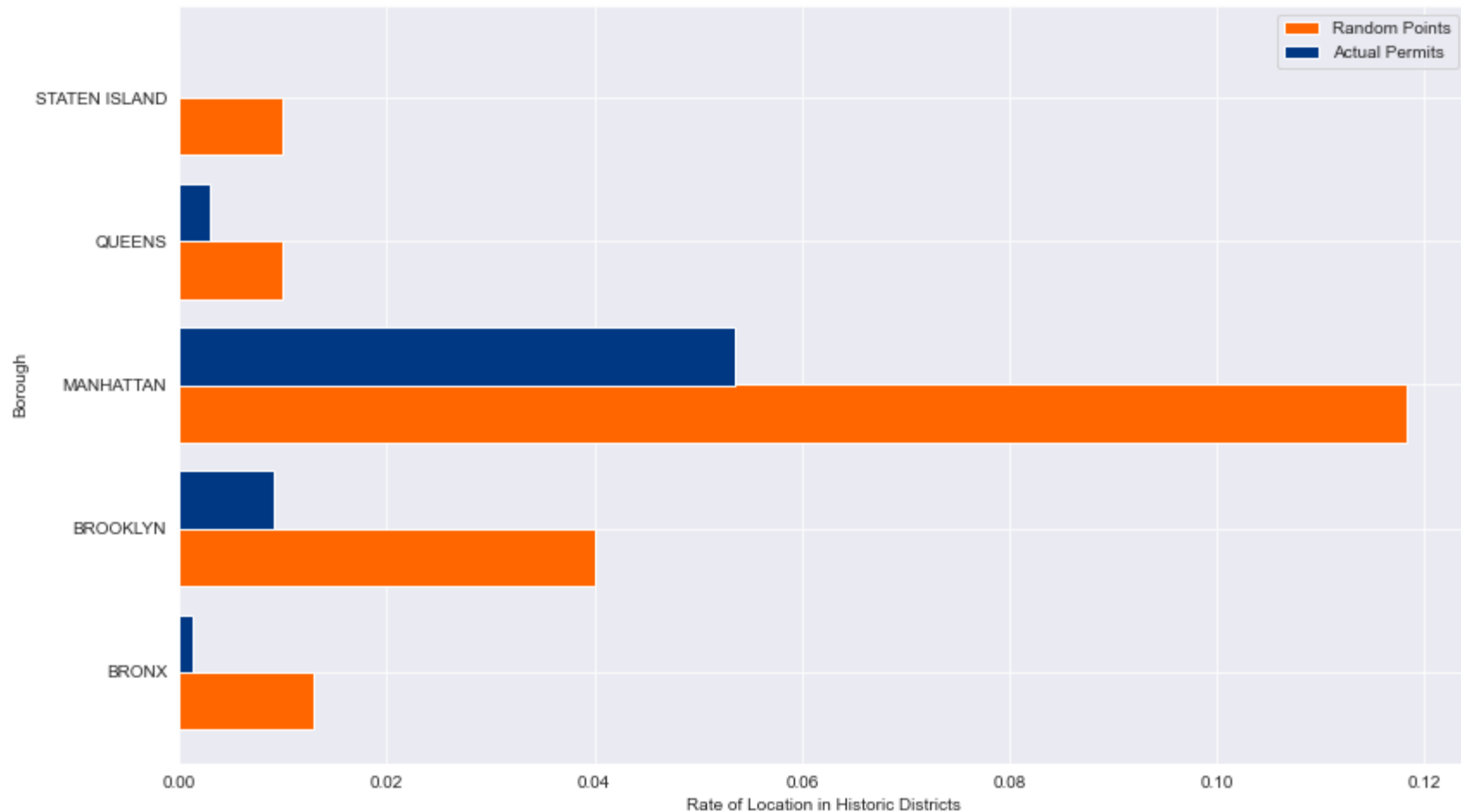
Number of Permits with Outlier Park Distances by Borough



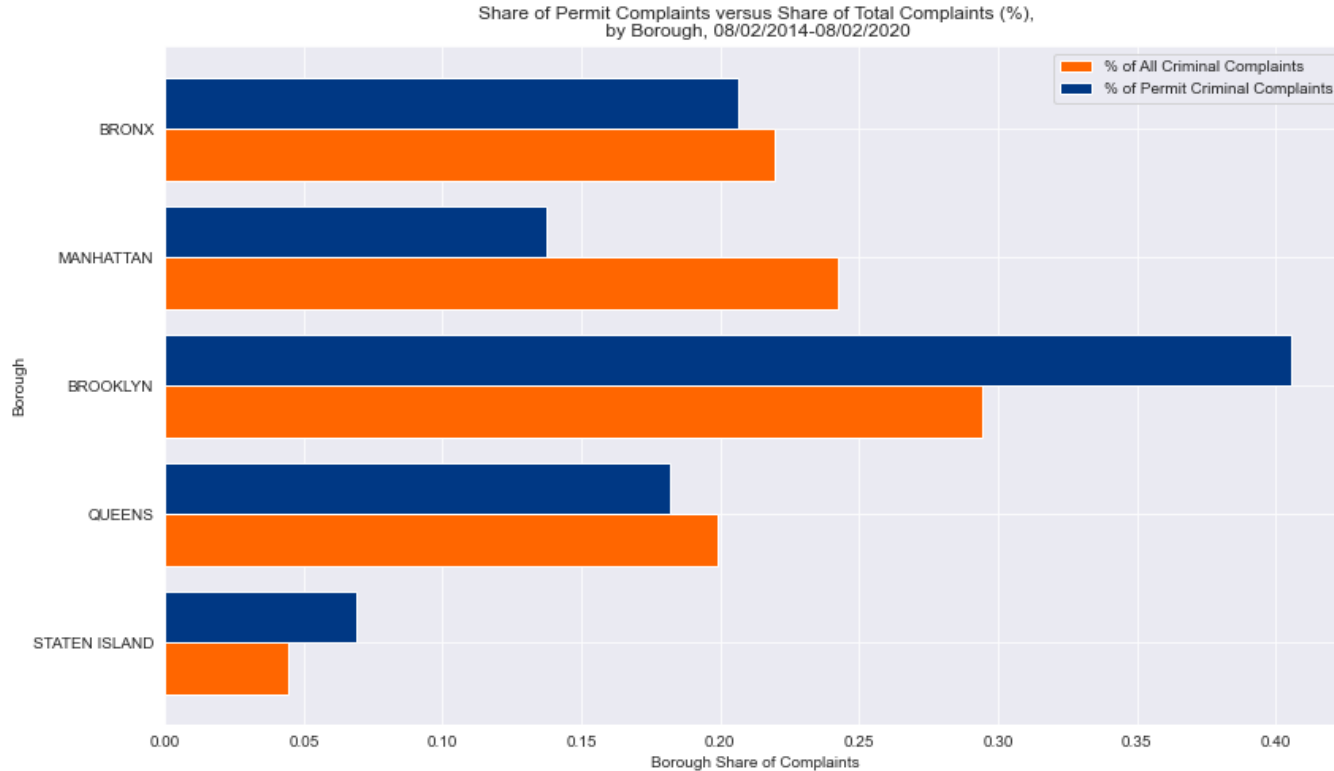
# EDA – Historic Districts



Rates of Location in Historic Districts for Actual Permits versus Random Locations

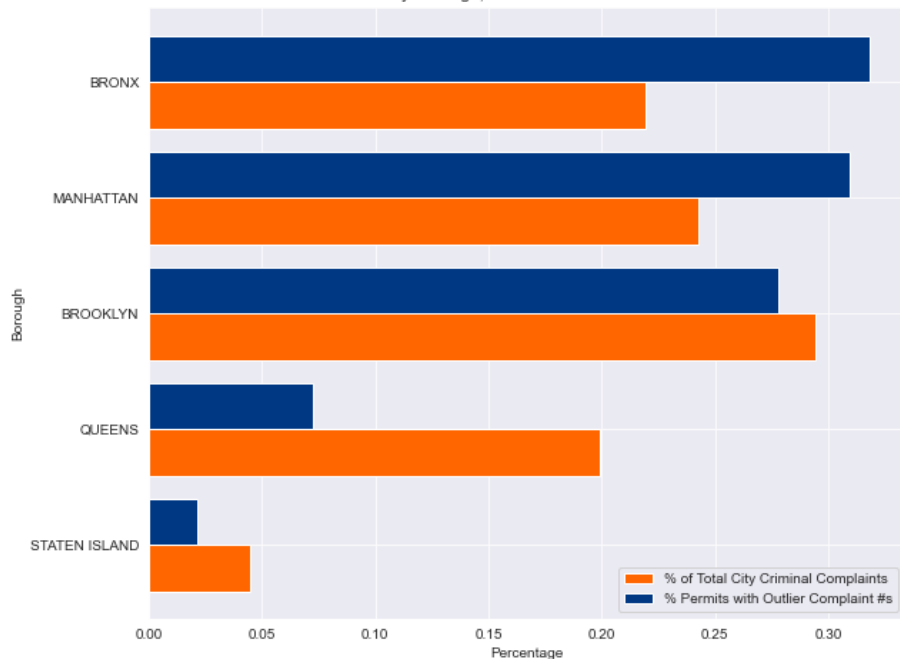


# EDA – Criminal Complaints

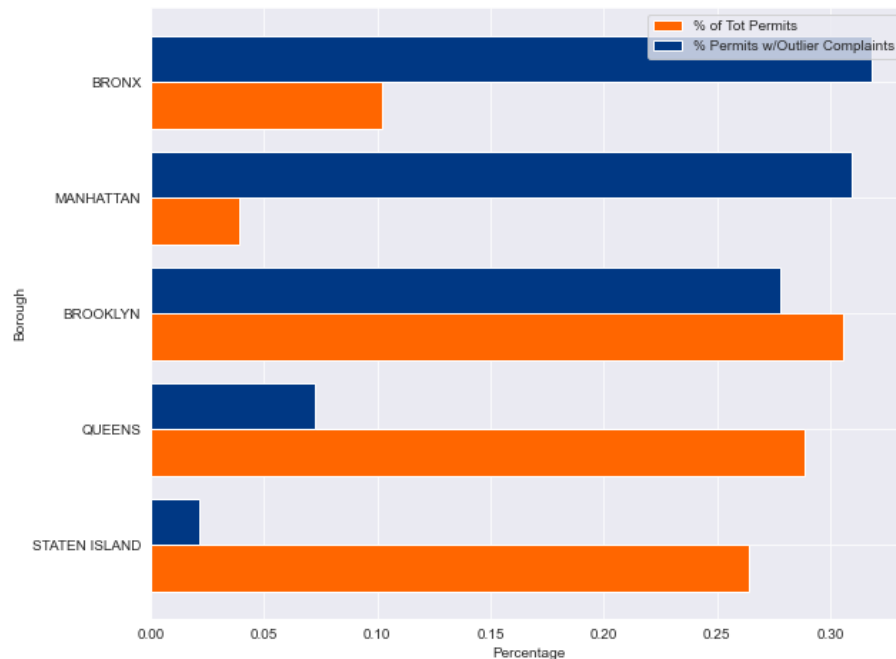


# High Crime Permits

% of Permits w/Outlier Complaints versus % of City Crime,  
by Borough, 08/02/2014-08/02/2020



% of Permits w/Outlier Complaints versus % of Total Permits,  
08/02/2014-08/02/2020



# Modeling With DBSCAN



## Features

Fewer features  
more effective



## Silhouette Score

.762  
High with add'l  
categorical features



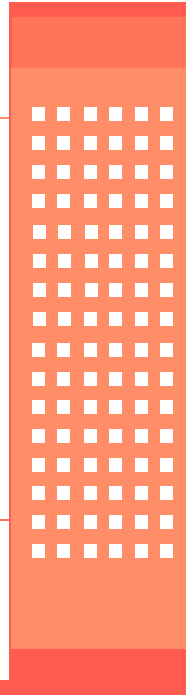
## Random Points

DBSCAN didn't  
distinguish  
random points



## "Training"

...then placing  
random points.



# Conclusions

## Density

Encourage building in less dense boroughs

## Parks

Build more parks in Queens

## Historic Districts

Be careful declaring more.  
Consider easing construction.



## Crime

Could reflect where it's easy to build, or where it's profitable

## Modeling

Absent info about failed applications, this data does not appear sufficient





# Thanks!

Questions?

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