

Boston's Nighttime Vibrancy and Housing Prices



Background



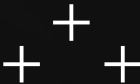
Why is Nighttime Vibrancy important?

Economic & Cultural Driver
Encourages Safety - SDG 11
Tourism & Hospitality
24 Hour Economy



Research Questions:

1. What is the correlation between Nightlife Vibrancy and Housing prices in boston neighbourhoods?
2. What are observable spatial and temporal patterns in Boston's vibrancy?



Data

01

02

03

Safegraph (July 2021)	MA Census tracts 2020	Homeharvest Annual 2021
Obtain visits by night, day, weekends	Obtain tracts and Neighbourhoods in Suffolk County using Pairwise Clip	Web scrape using Home Harvest API by city and year
<u>Reproject to North America</u> (<u>EPSG:4269</u>)	Reproject to similar coordinate system	Use ARC GIS pro to obtain GEOIDs with MA tracts data
Create new variables: Night Vibrancy(Mean per tract)	Spatial Join to Obtain vibrancy per tract	Spatial Join with safegraph, tracts data
43536	1615	944 properties in Boston
		944 as output

Methods



1. Spatial Analysis



Spatial Distribution of Night Vibrancy, Housing Prices and their relationship using ArCGis and GeoPandas

2. Statistical Analysis

Feature Selection using Random Forest

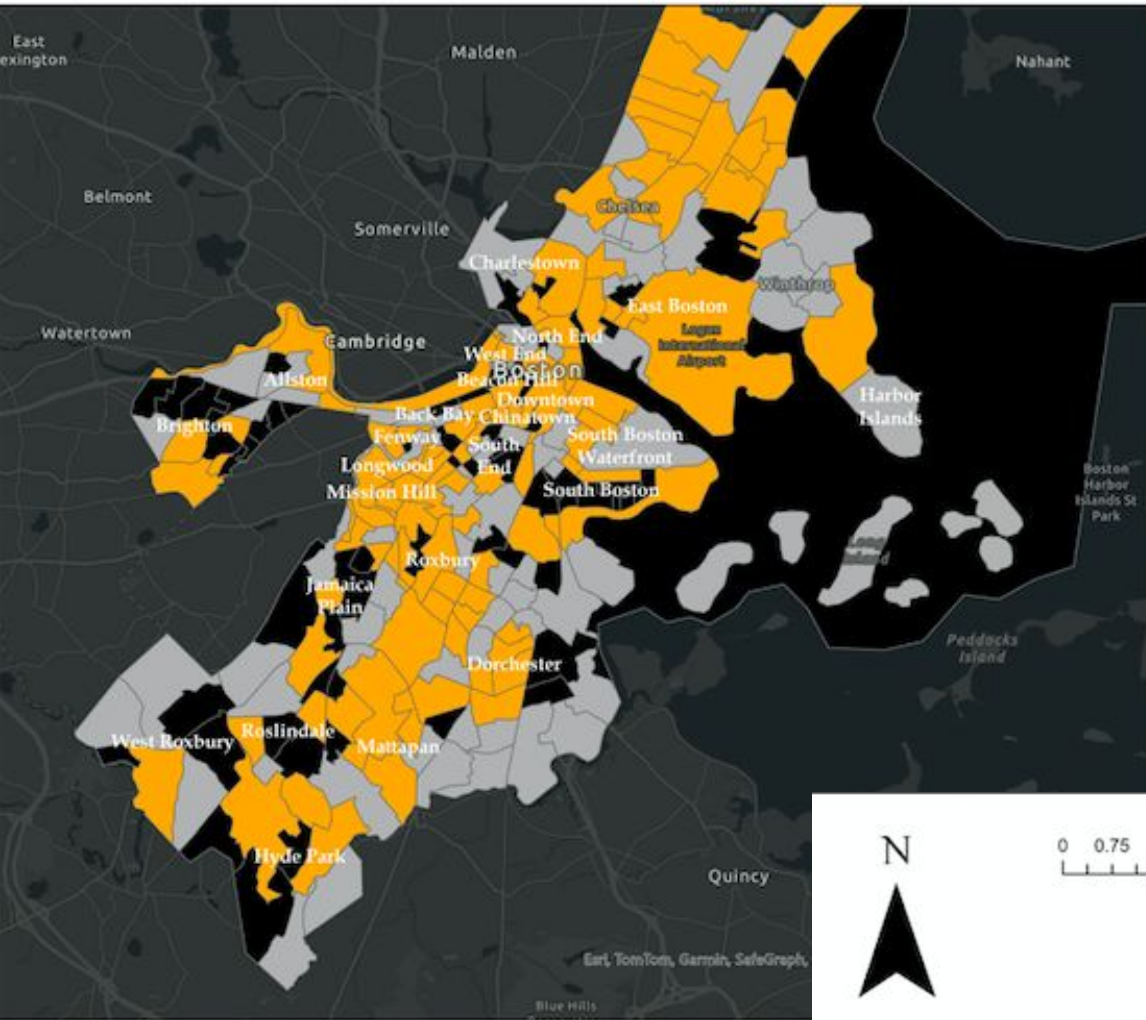
Spatial and Non-Spatial Regression



Correlation Matrix



Nighttime Vibrancy in Boston



High Vibrant
Mission Hill
Downtown
Hyde Park
Chinatown

Low Vibrant
Brighton
Jamaican Plain
South Boston
Rosindale

Medium
West End
East Boston
Mattapan



0 0.75 1.5 3 Miles

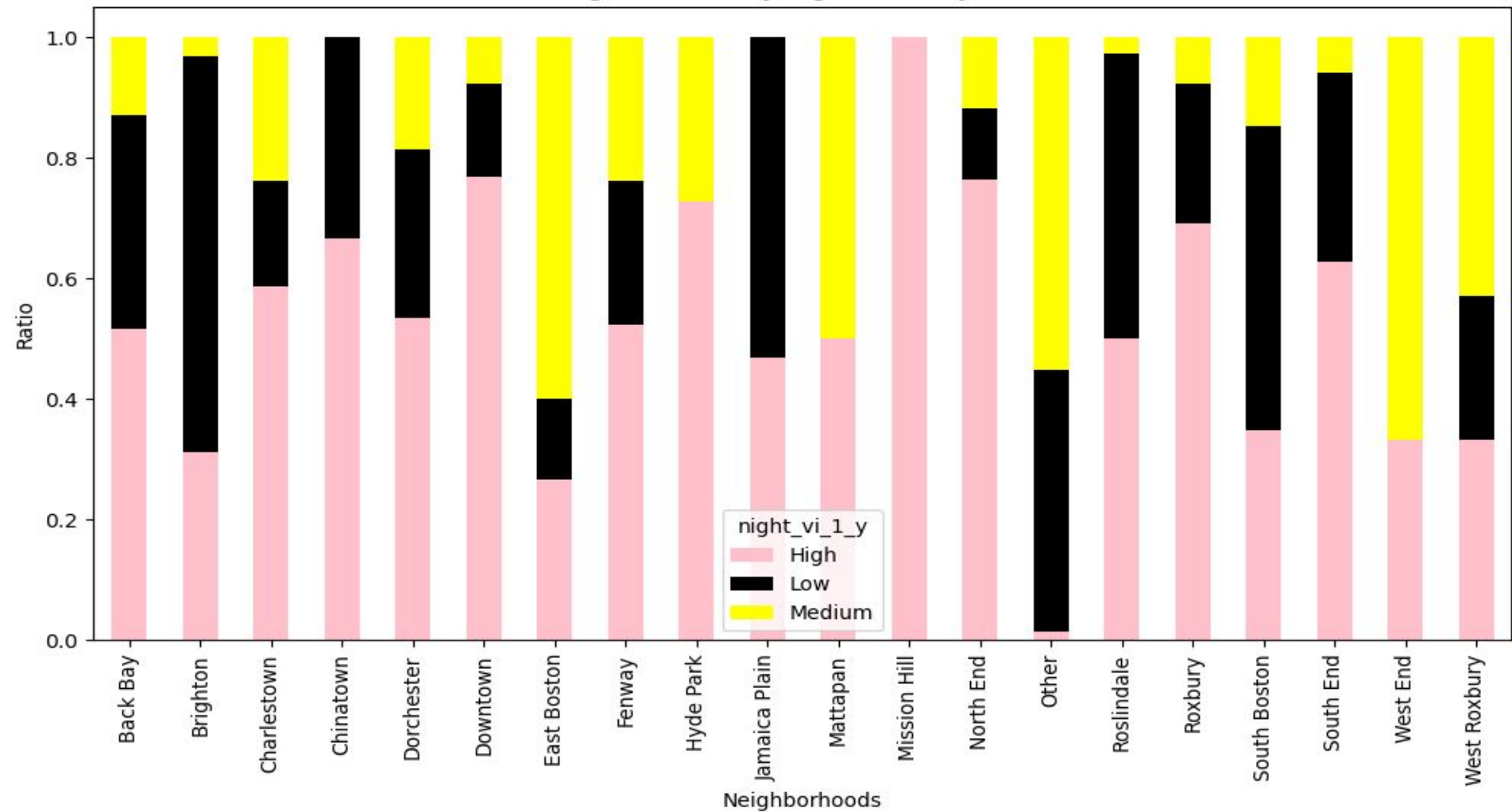
Legend

neighbourhoods
matrix
night_vl_4

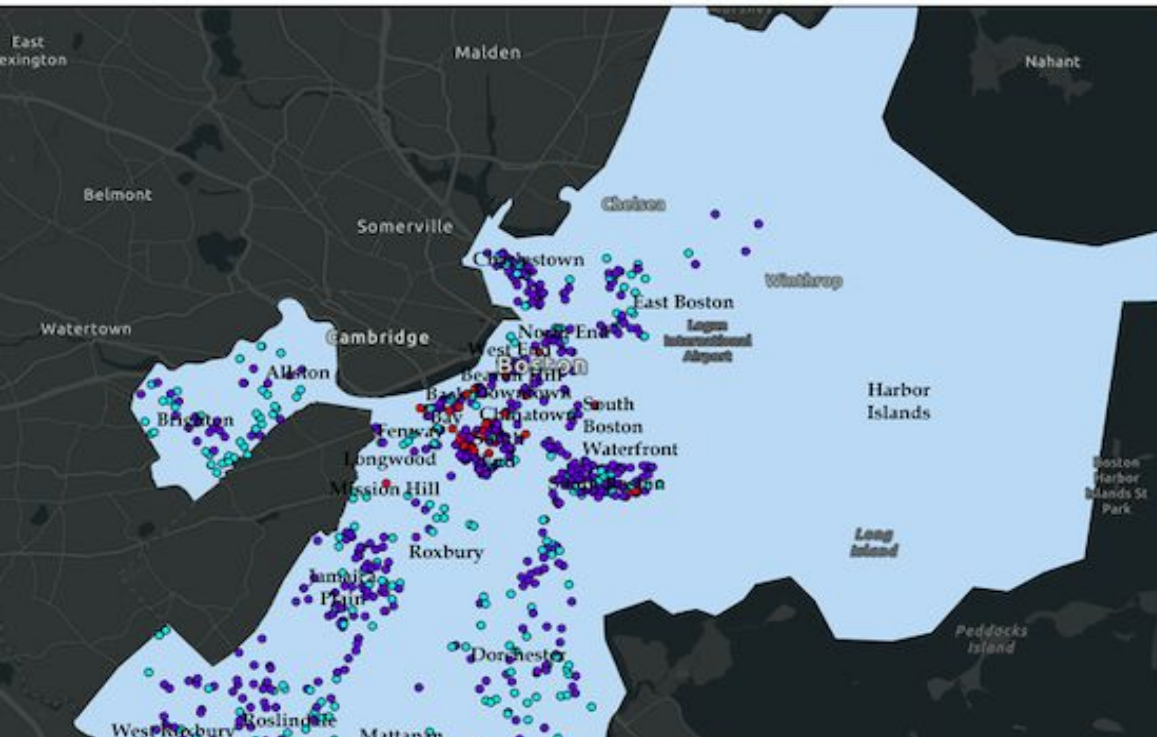
High
Low
Medium
<all other values>

Date: May 05, 2024
Isaac Opiyo Wabwire
Data Source: Homeharvest
Projection: World Mercator

Neighborhoods by Night Vibrancy Ratios



Spatial Distribution of Properties in Boston by Price



High Avg Sold Price
Back Bay over 3M
Fenway over 2.5M
Downtown over 2M



Low Avg Price
Hyde Park about 0.6M
Roxbury about 0.5 M
West Roxbury about 0.4M

Medium
South End about 1.3M
Chinatown about 1.25M
North End about 1M



N

0 0.75 1.5 3 Miles

Legend

sold_price

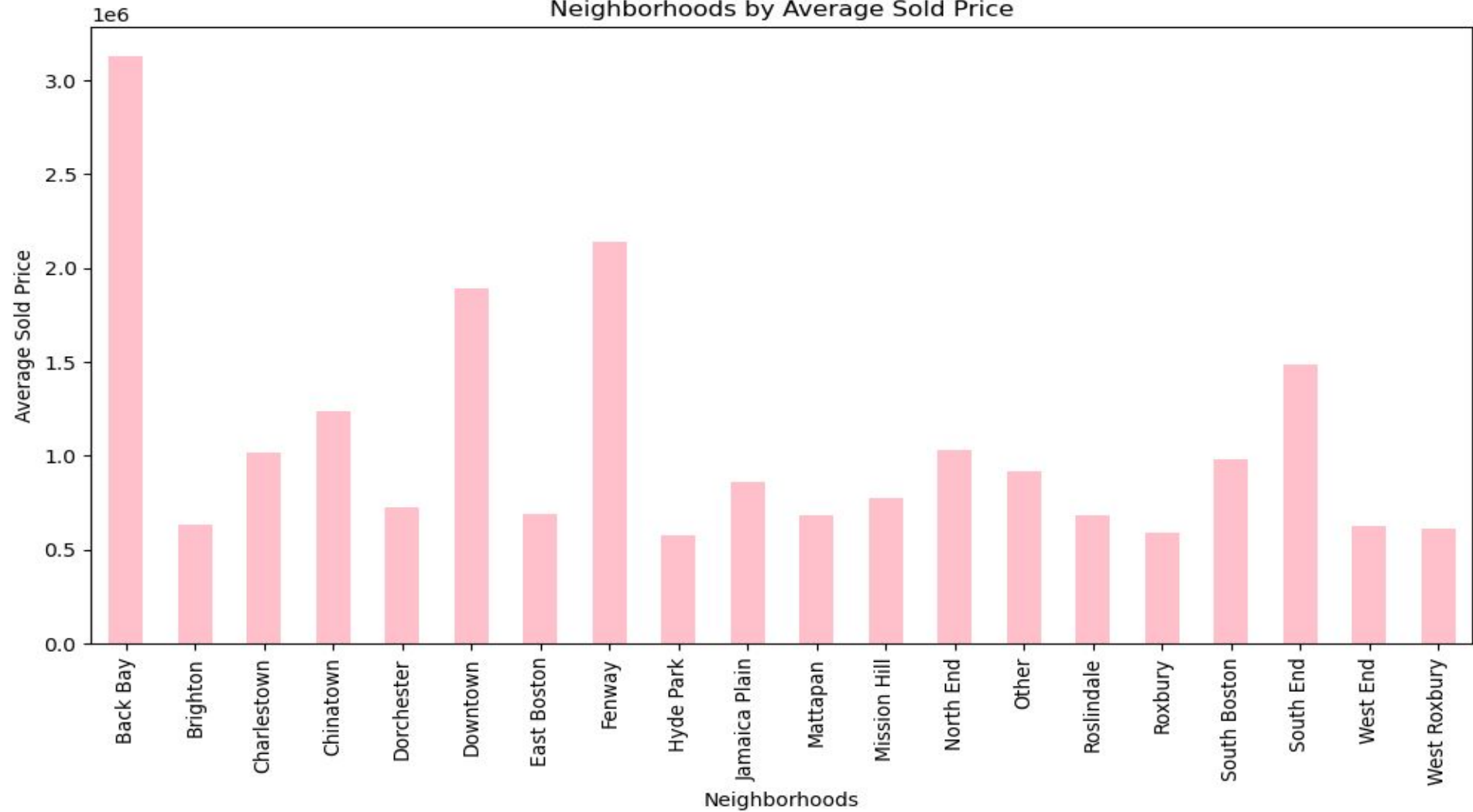
70000.000000 -
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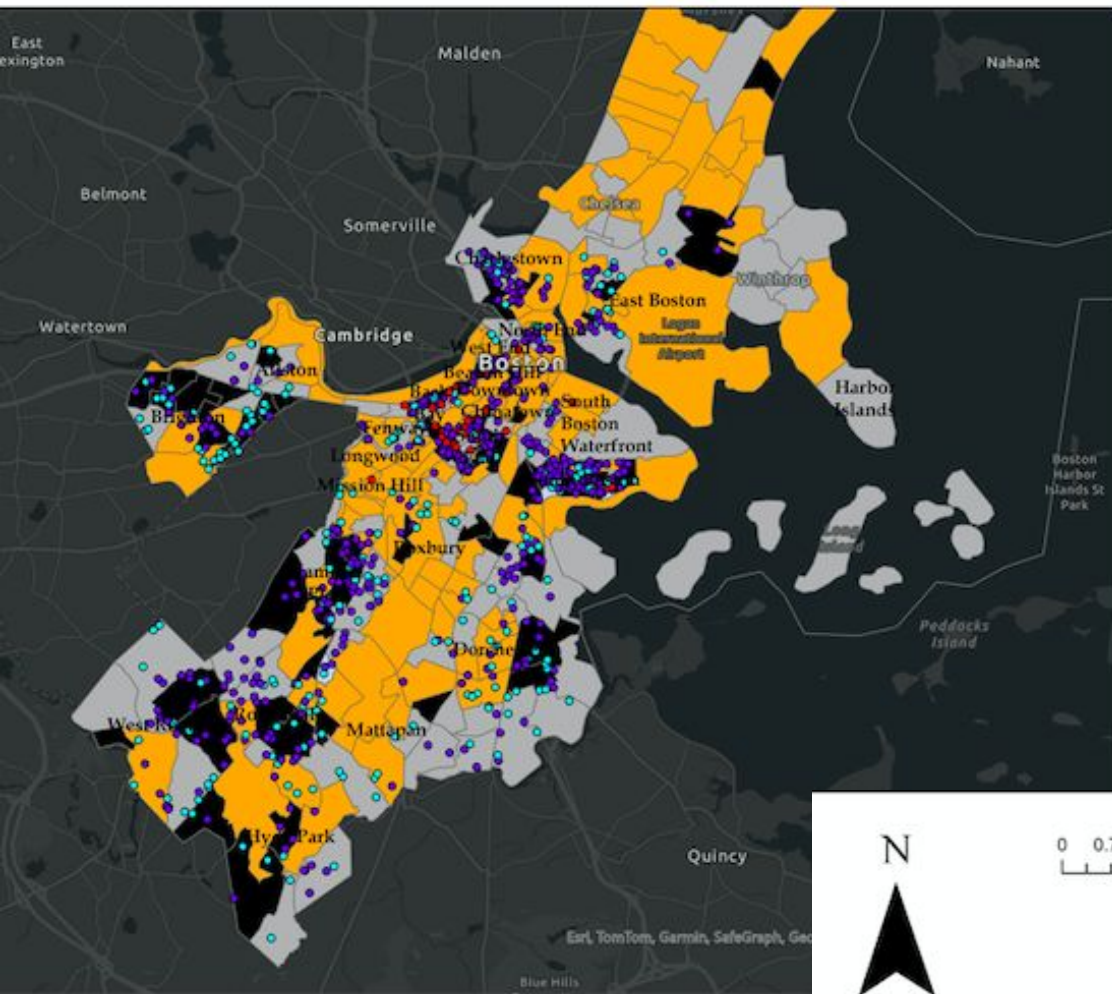
neighbourhoods
matrixs

Date: May 05, 2024
Isaac Opiyo Wabwire
Data Source: Homeharvest
Projection: World Mercator

Neighborhoods by Average Sold Price



Nighttime Vibrancy vs Housing Prices in Boston

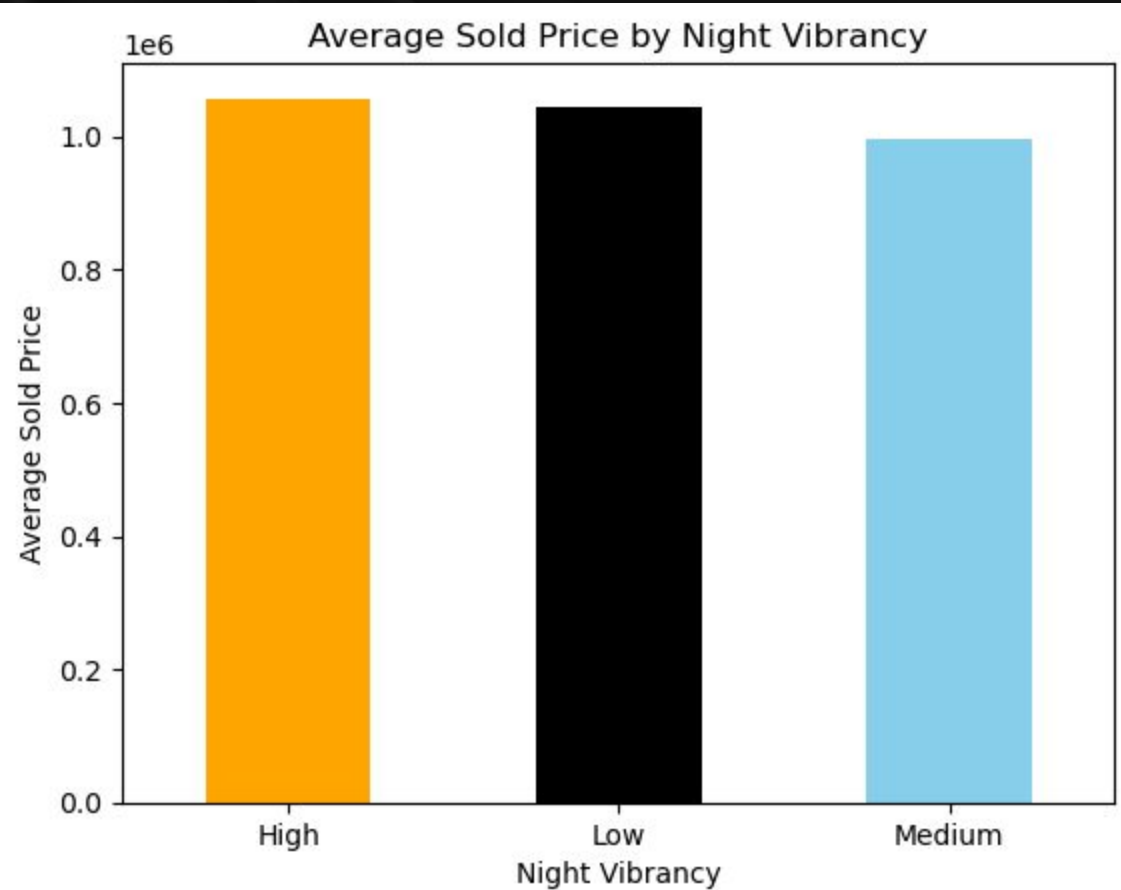


The average sold price remained significantly the same at about 1M across the 3 groups of tracts with High, Low and Medium Night Vibrancy.



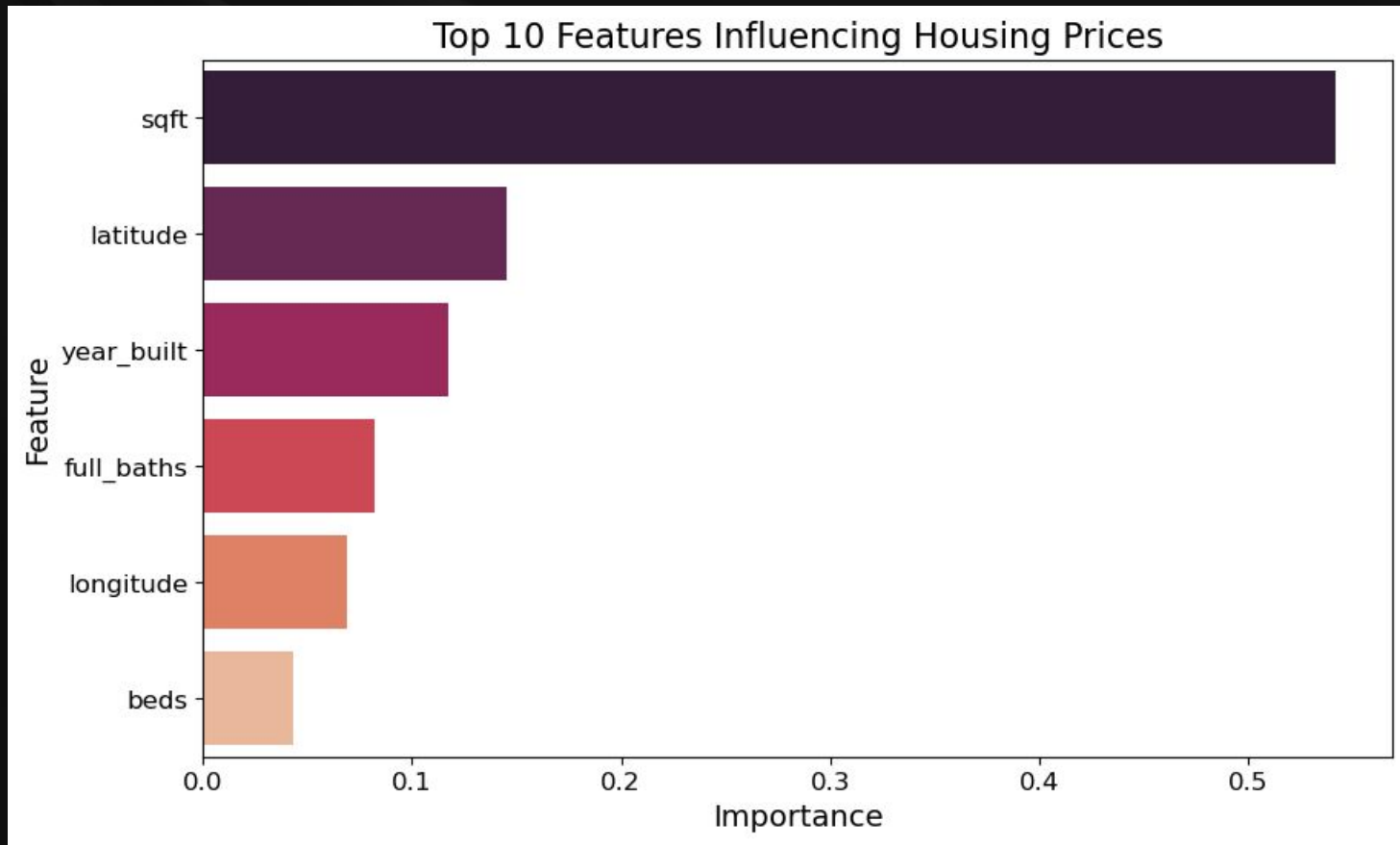
Date: May 05, 2024
Isaac Opiyo
Data Source: Home harvest
Projection: World Mercator

Average Sold Price by Night Vibrancy



Statistical Modelling

1) Random Forest



Statistical Modelling

2) Non Spatial Regression

	Coefficient	T-Statistic	Probability
Night vibrancy	-0.00003	-0.20472	0.83784
Day Vibrancy	-0.00055	-0.26494	0.79112
Weekend Vibrancy	-0.00003	-0.20860	0.83481

$\ln(P_i) = \alpha + \beta X_i + \epsilon_i$ Where $X = [\text{sqft}, \text{full_baths}, \text{beds}, \text{year_built}, \text{night_vibrancy}]$

Negative Coefficients, Not Significant as $P > 0.05$

Statistical Modelling

3) Spatially Lagged Exogenous Regression

	Coefficient	T-Statistic	Probability
Night vibrancy	-0.00003	-0.20472	0.83784
Day Vibrancy	-0.00055	-0.26494	0.79112
Weekend Vibrancy	-0.00003	-0.20860	0.83481

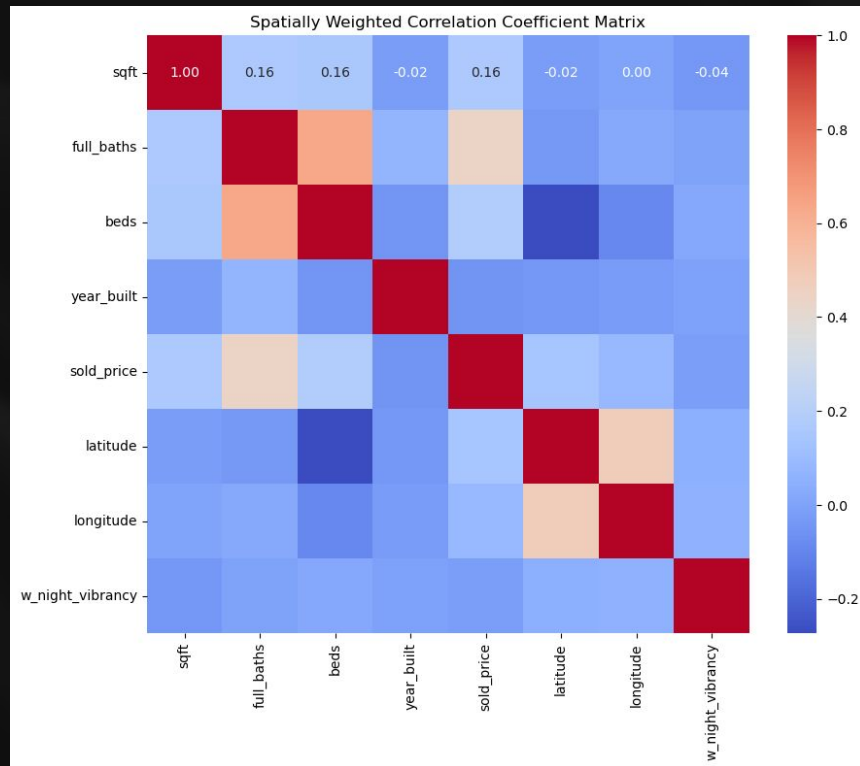
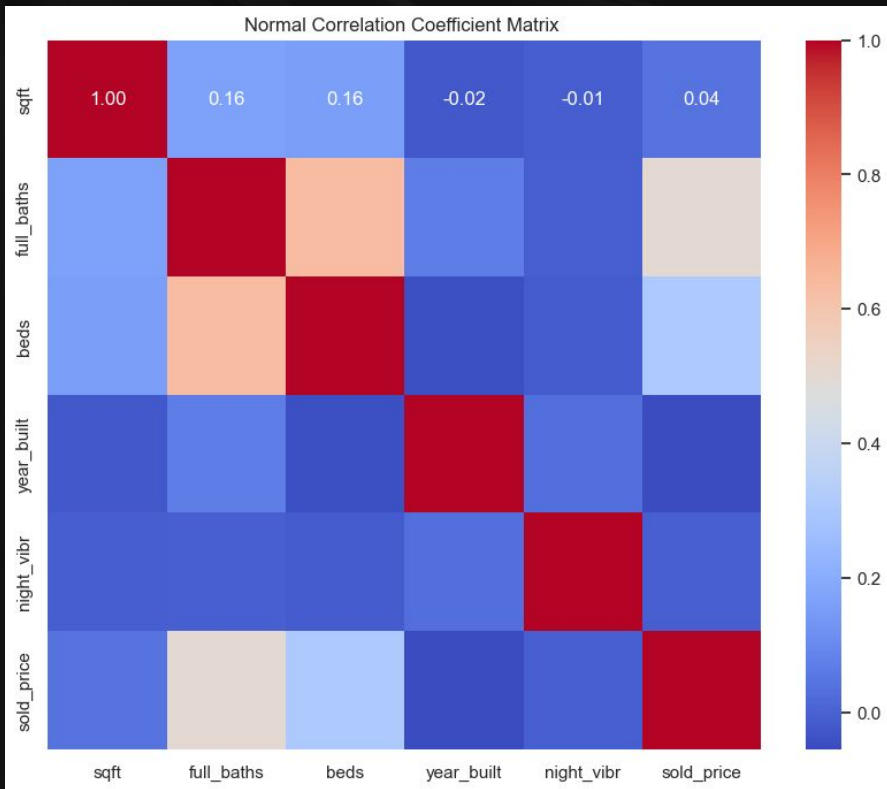
$$\ln(P_i) = \alpha + \beta X_i + \delta \sum_j w_{ij} X'_i + \epsilon_i$$

$\sum_j w_{ij} X'_i$ represents the spatial lag of the exogenous variable X_i .

Negative Coefficients, Not Significant as $P > 0.05$

Statistical Modelling

4) Spatially Weighted and Unweighted Correlation



Negative Coefficients, Not Significant as values close to 0.

Conclusion^x

1) Correlation between Nightlife Vibrancy and Housing Prices in Downtown Boston

Neighbourhoods:

The regression analysis did not find a significant correlation between nighttime vibrancy and housing prices in Boston neighbourhoods.

2) Policy Implications:

SDG 11 initiatives aimed at improving Boston's housing affordability should consider a broader range of factors beyond nighttime vibrancy such as property specific characteristics like square footage, location, year built, number of bathrooms, and beds to positively impact housing prices.

References ✕

1. Li, M., Tu, W., Lu, F. Sensing the Nighttime Economy–Housing Imbalance from a Mobile Phone Data Perspective: A Case Study in Shanghai. Remote Sens. 2022, 14, 2738. <https://doi.org/10.3390/rs14122738> ✕
2. Son NN, Thu NTP, Dung NQ, Huyen BTT, Xuan VN. Determinants of the Sustained Development of the Night-Time Economy: The Case of Hanoi, Capital of Vietnam. Journal of Risk and Financial Management. 2023; 16(8):351. <https://doi.org/10.3390/jrfm1608035>
3. ✕ Juhász, Levente, and Hartwig Hochmair. 2020. “Studying Spatial and Temporal Visitation Patterns of Points of Interest Using SafeGraph Data in Florida.” GI_Forum 1: 119–36. https://doi.org/10.1553/giscience2020_01_s119.