

A nova face da especulação na América Latina

Fundos estrangeiros apostam duro em "habitações temporárias" para enca quadru anúncio

Relationship between Airbnb and real estate speculation in the cities of Lisbon and Rio de Janeiro

Crisley Oliveira | 2024

“O turismo mata os bairros”: como o AirBnB afeta as cidades

Em busca do turismo global, cidades abriram suas portas. O turismo é uma atividade extremamente lucrativa para qualquer tipo de negócio, mas também pode ter efeitos negativos nas comunidades locais.

Lisboa e Nova Iorque

A situação exige uma resposta urgente. É necessário que as autoridades locais implementem medidas para regularizar o uso do Airbnb e proteger as comunidades locais. Isso pode incluir a criação de regras mais rígidas para a licença de imóveis, a aplicação de taxas adicionais e a criação de programas de apoio às famílias locais.

CONTEXTUALIZATION



Airbnb and the sharing economy



Impact of short-term rentals on cities



Gentrification and Touristification

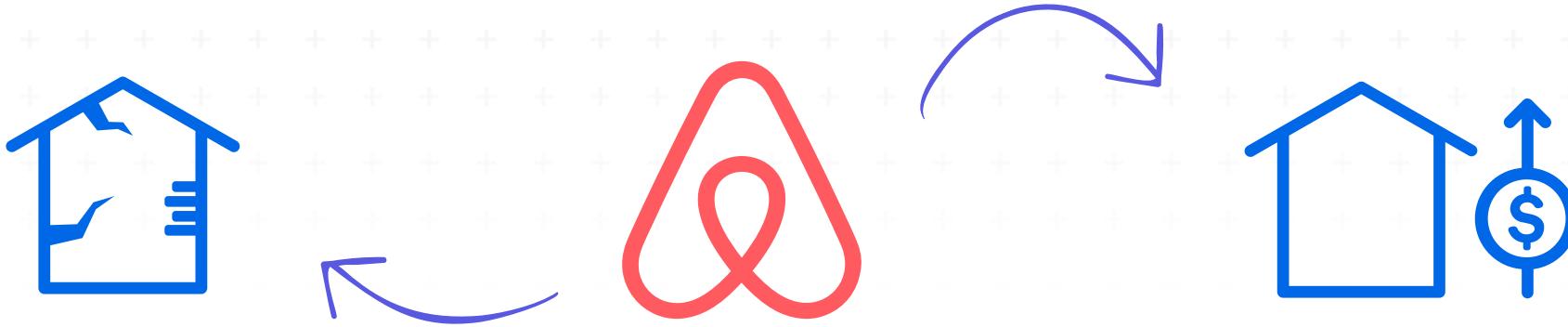


Airbnb as a gentrifying agent



Real Estate Speculation and Airbnb

RELATIONSHIP BETWEEN AIRBNB AND GENTRIFICATION



Identification of underlying patterns

Impact of Airbnb on the transformation of urban areas

Implications for tourism and the local community

STUDY OBJECTIVES

Main Objective



To analyze the relationship between Airbnb, real estate speculation, and the resulting gentrification in tourist cities, using data from the cities of Lisbon and Rio de Janeiro.

Secondary Objectives



- 1
- 2
- 3

To understand the impacts of the shared accommodation model in these cities.

To provide relevant information for decision-making by public and private managers.

To contribute to the development of public policies and regulations that can mitigate potential negative impacts and maximize the benefits arising from this type of tourism.

PROCESS

1

Methodology

2

Exploratory Analysis

3

Spatial Analysis

4

Machine Learning

METHODOLOGY

Data Source

We used Airbnb data from Inside Airbnb and rental data from Quinto Andar and Idealista.

Data Collection Process

- Web scraping for rental data
- Geolocation using Geopandas

Demographic Data

Censuses from INE (National Institute of Statistics) and IBGE (Brazilian Institute of Geography and Statistics).

Development Environment

Python.

EXPLORATORY ANALYSIS

Techniques Used

Descriptive statistics,
data visualization, and
identification of outliers.

Outlier Elimination

Using the Interquartile
Range (IQR) method.

Objective

Understand the
distribution of the data
and identify patterns
and trends.

SPATIAL ANALYSIS

Global Spatial Autocorrelation

Global Moran's Index (I).

Local Spatial Autocorrelation

Local Indicators of Spatial Autocorrelation (LISA).

Objective

Evaluate spatial patterns and dependencies of variables.

MACHINE LEARNING

Gradient Boosting

Algorithm used for modeling.

XGBoost

Implementation of Gradient Boosting with scalability and interpretability.

Applications

Regression

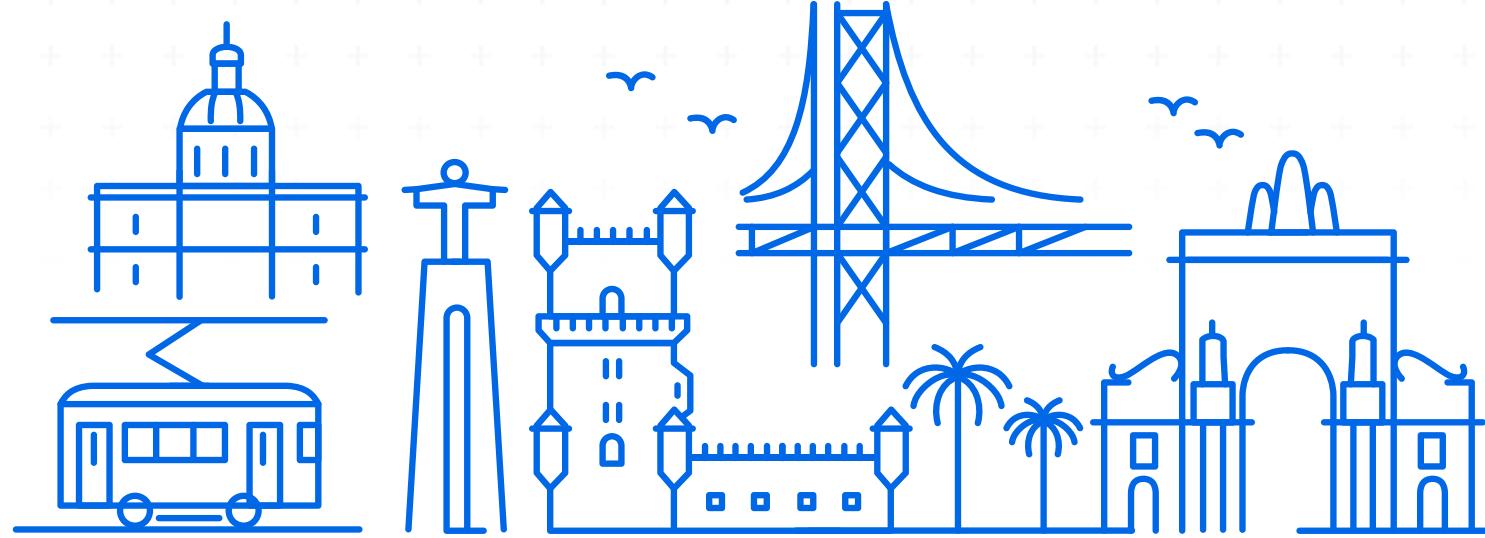
Advantages

Handles complex data well, captures non-linear relationships, and provides insights into the importance of variables.

Relationship between Airbnb and real estate speculation in the cities of Lisbon and Rio de Janeiro

IMPACT OF AIRBNB ON RENTAL PRICES

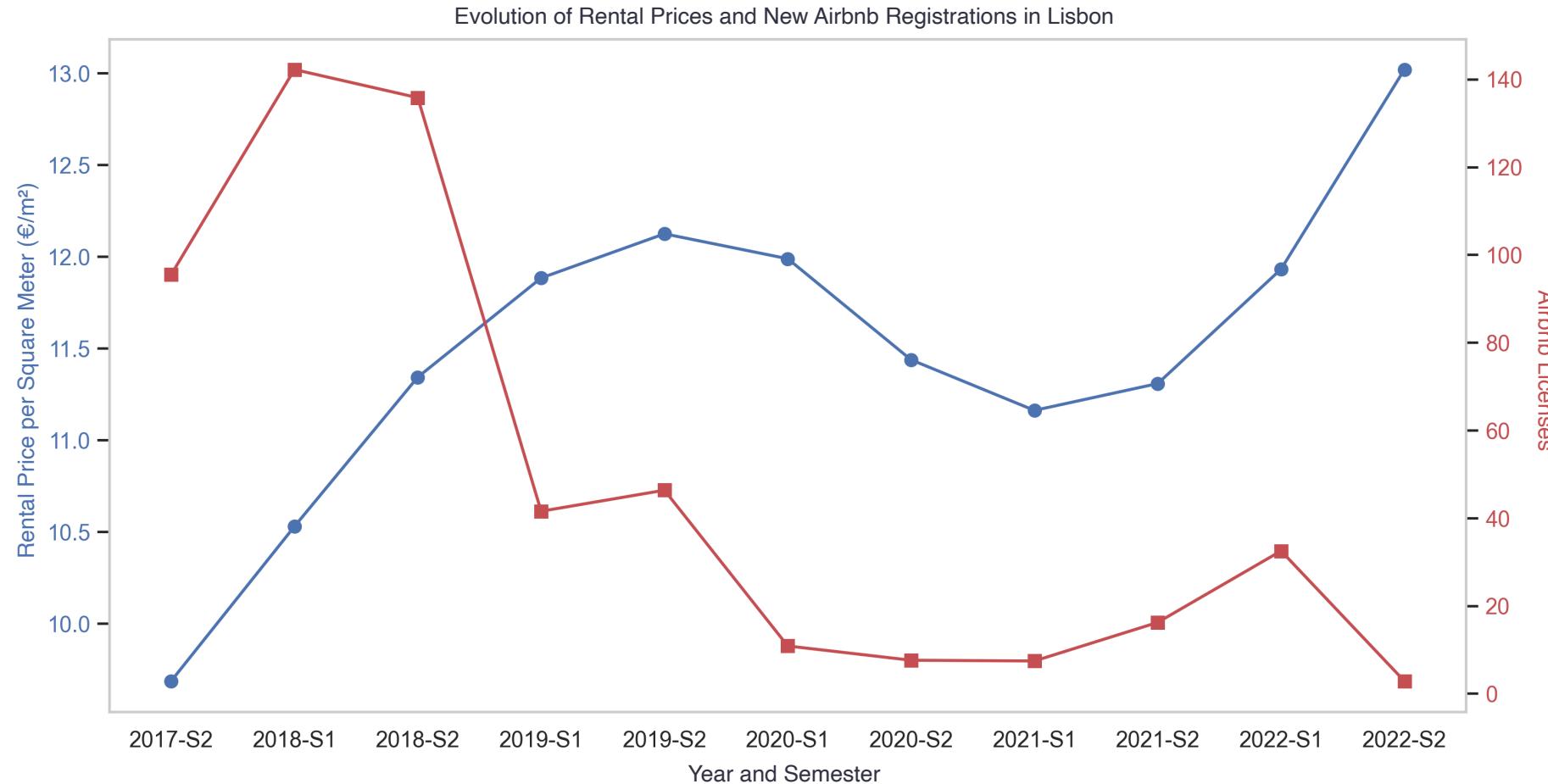
LISBON



Data Source:

Census 2022, Inside
Airbnb, and LxHabita

EXPLORATORY ANALYSIS | TEMPORAL TREND



EXPLORATORY ANALYSIS | TEMPORAL TREND

Rent Price (m2)

2017: € 9,6 m2 → 2022: € 12,9 m2

Airbnb records

2017: 14231 → 2022: 30533

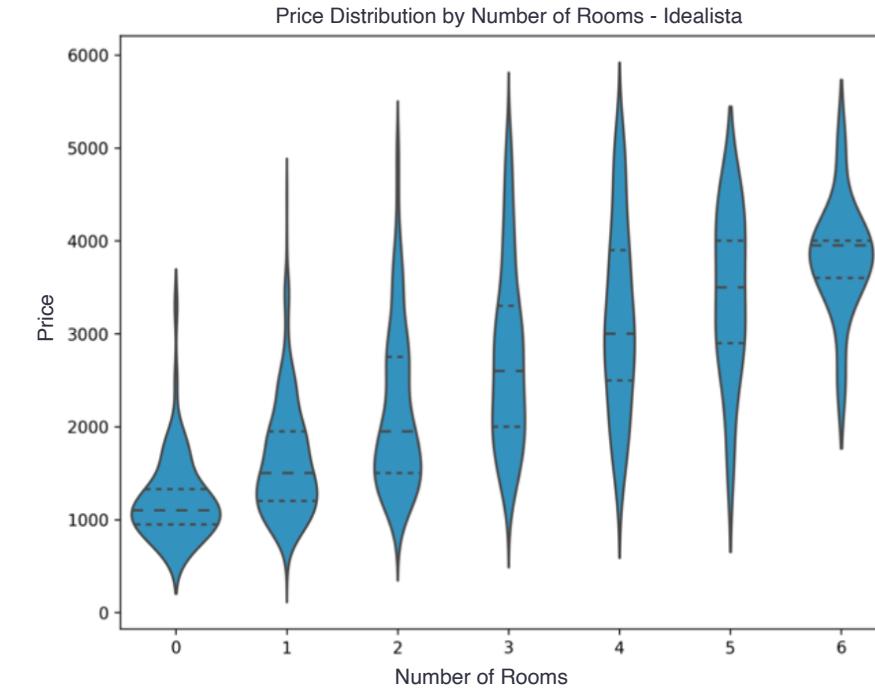
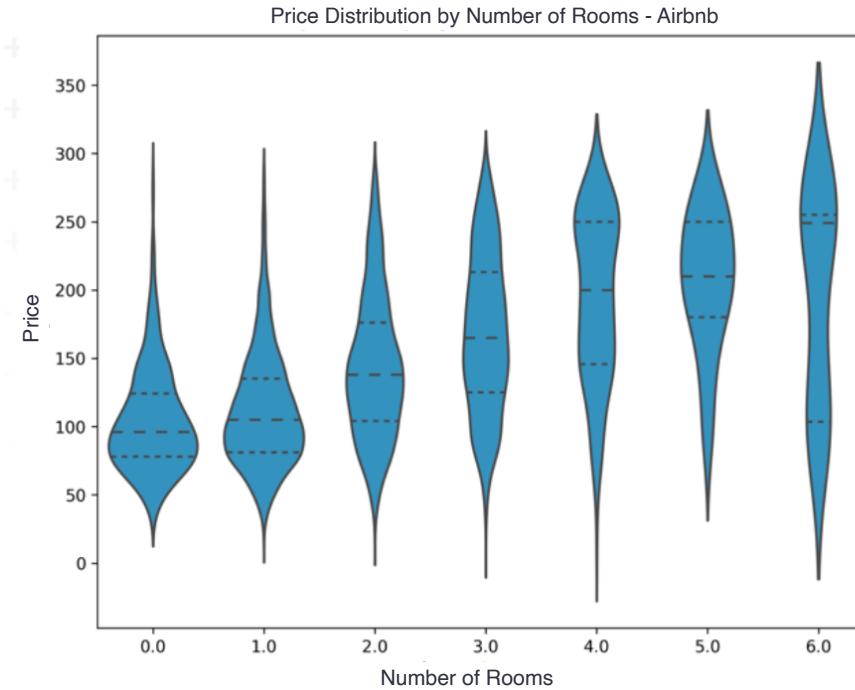
An increase of

34%

An increase of

115%

EXPLORATORY ANALYSIS



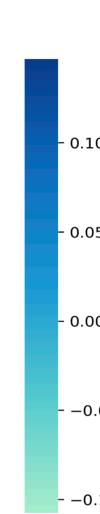
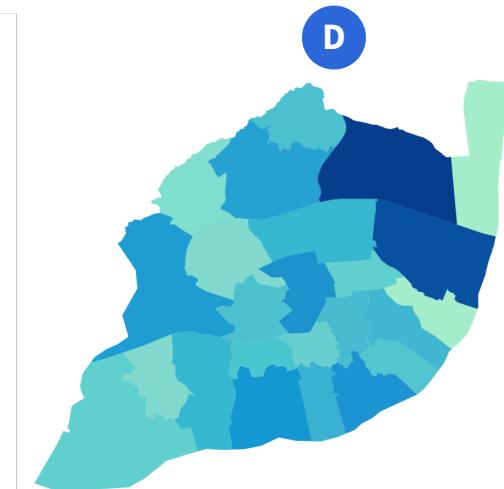
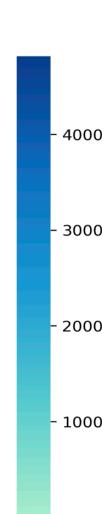
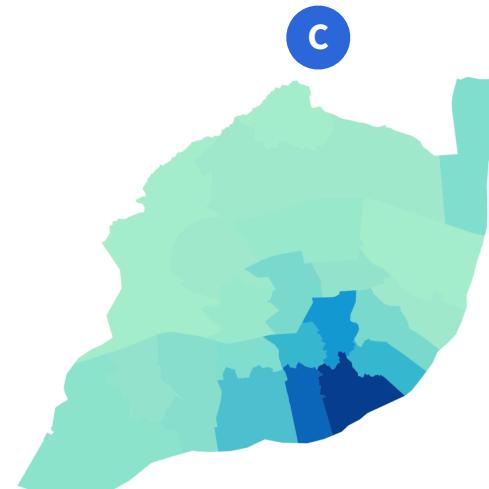
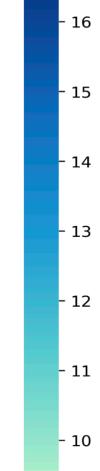
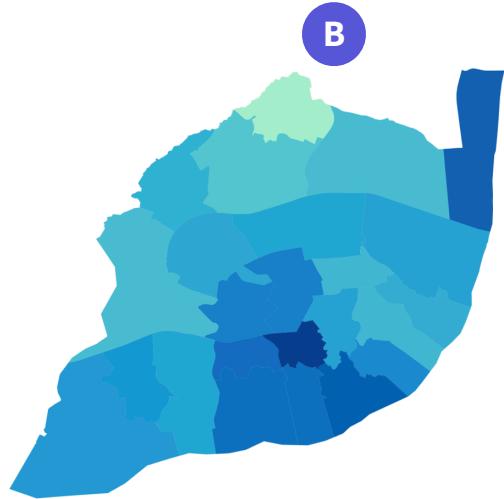
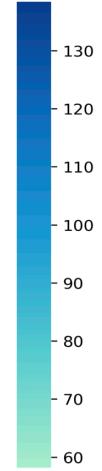
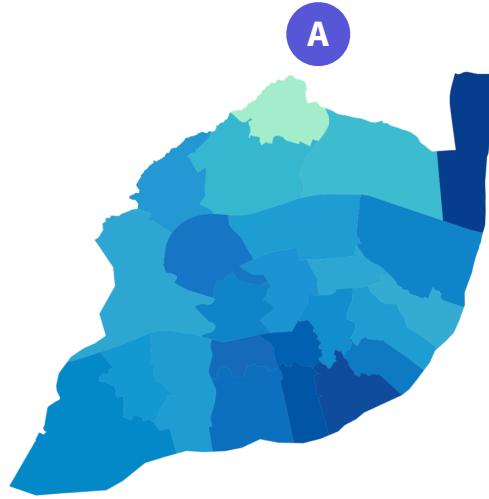
Airbnb

1,6
Rooms

Idealista

2,3
Rooms

EXPLORATORY ANALYSIS



- A | Average daily price of accommodations on Airbnb
- B | Distribution of the average rent price per square meter
- C | Number of licensed properties for operation on Airbnb by area
- D | Variations in new rental contracts

LOCAL INDICATORS OF SPATIAL AUTOCORRELATION (LISA)

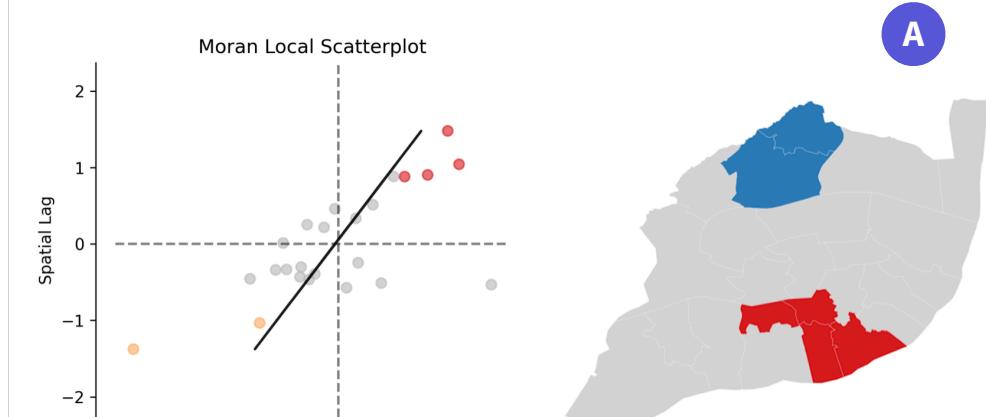
A

Airbnb: Average Price

HH (areas where property prices are consistently high and surrounded by high values) and LL (areas where prices are consistently low and surrounded by low values);



A

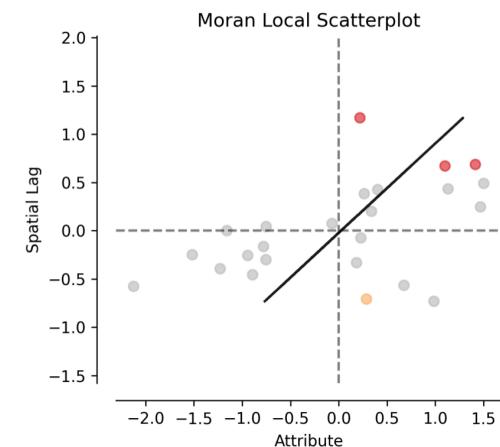


58.19, 92.21
92.21, 97.81
97.81, 107.62
107.62, 117.49
117.49, 138.41

B

Regular Rent: Average Price

HH and HL (areas of high prices surrounded by low prices).



B

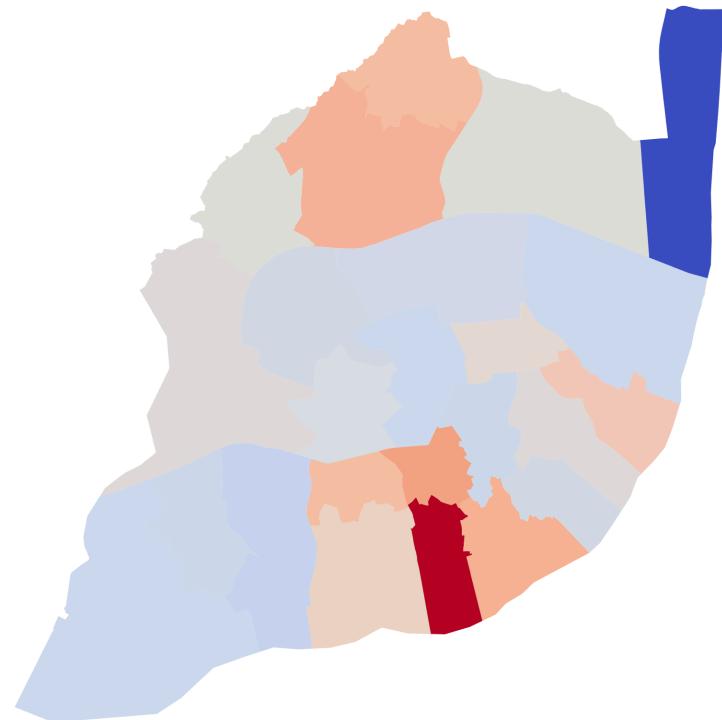


1199.88, 1694.34
1694.34, 2059.10
2059.10, 2181.88
2181.88, 2487.61
2487.61, 2679.31

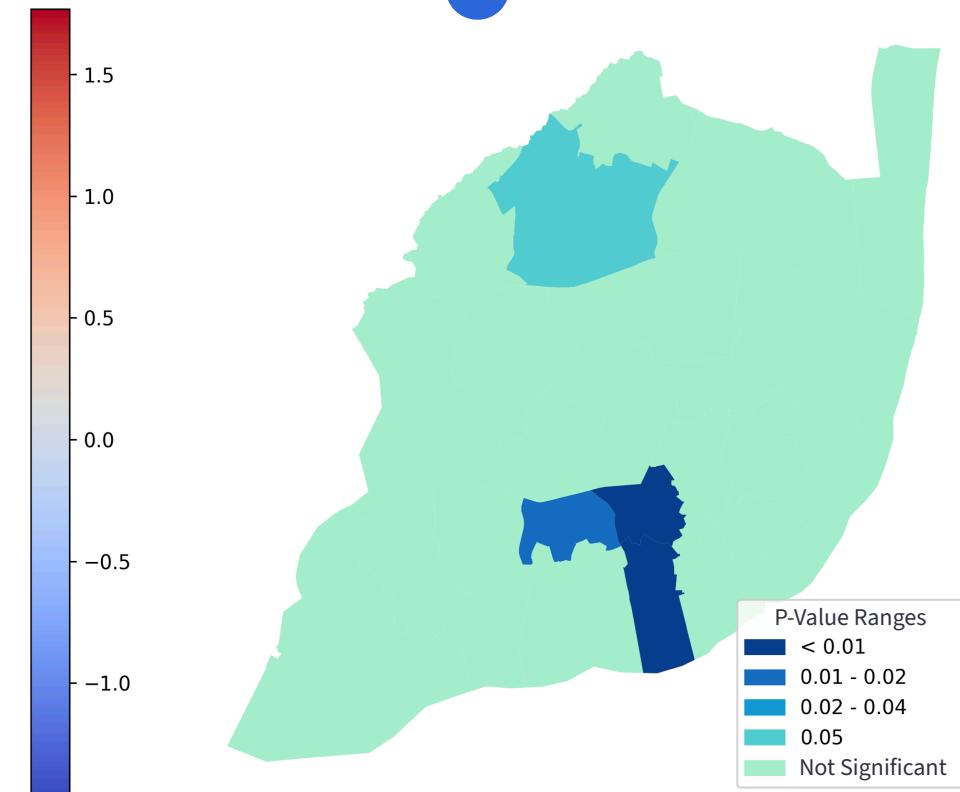
LOCAL BIVARIATE SPATIAL ANALYSIS

Average Price: Airbnb vs Regular Rent

A Local Bivariate Moran's Index



B Local P-Values



LISA: 0,23

p-value: 0,035

A

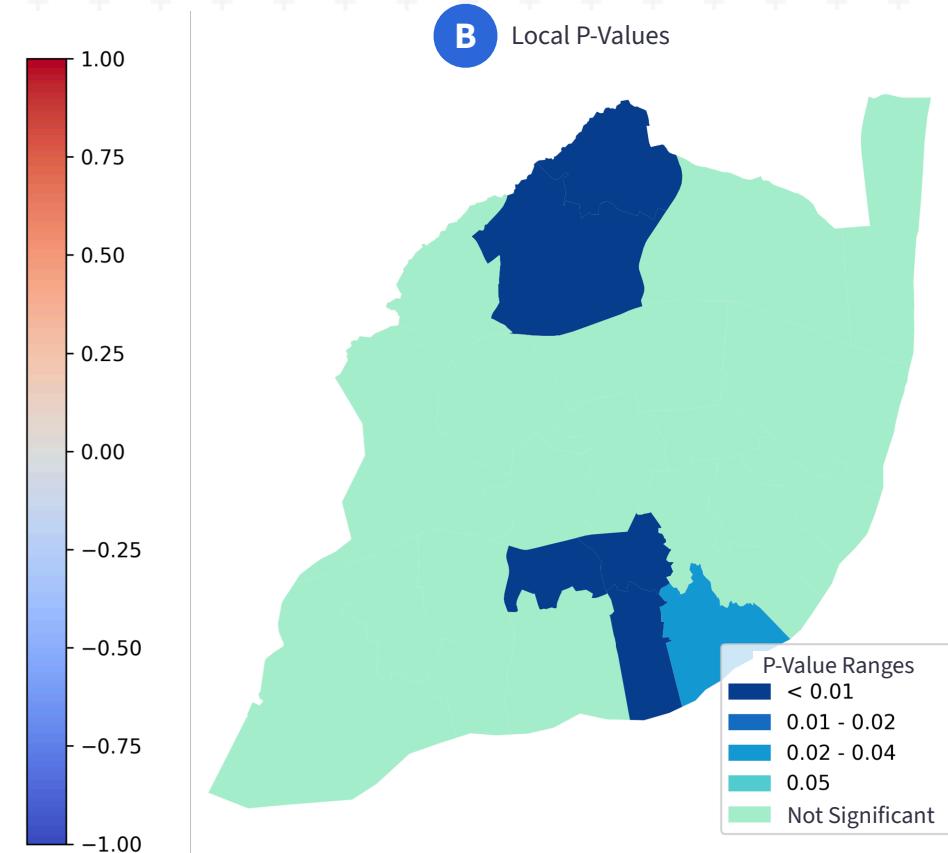
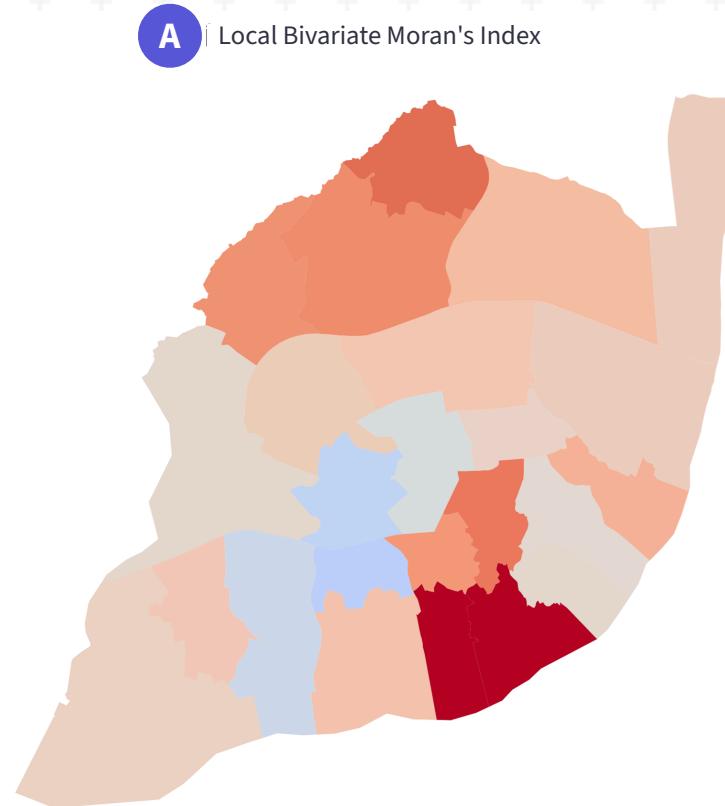
Positive spatial correlation in the northern regions, where there are lower values in both datasets, and in the central and historic center region, high values in both datasets;

B

Significant correlation in the central region.

LOCAL BIVARIATE SPATIAL ANALYSIS

Accumulated Licenses (Airbnb) vs. Rent/m²



LISA Bivariate: 0.463
p-value: 0,001

A Positive spatial correlation in the northern regions, where lower values are present in both datasets, and in the historical center region.

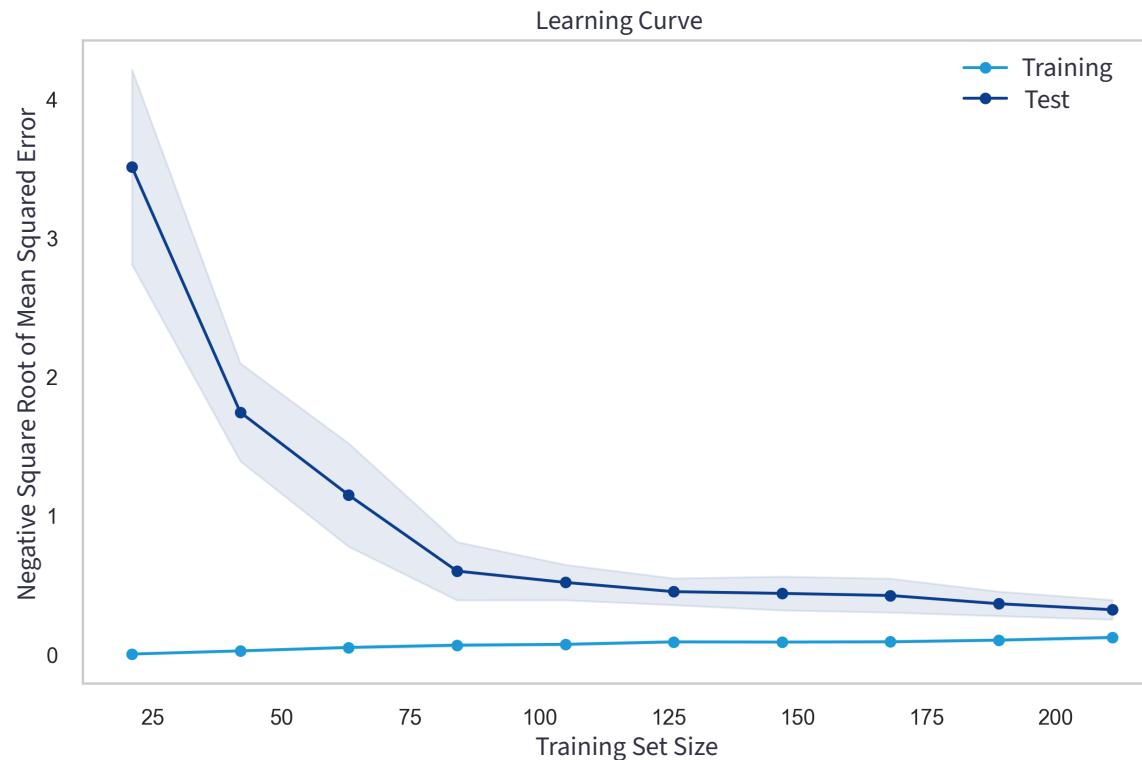
B Significant correlation in the central, historical center, and northern regions.

Relationship between Airbnb and real estate speculation in the cities of Lisbon and Rio de Janeiro

MACHINE LEARNING

MACHINE LEARNING | XGBOOST

Metric	Training	Cross-Validation	Test
Mean Squared Error [MSE]	0,1190	0,3238	0,3322
R-squared [R2]	0,9454	0,8530	0,8732



Hyperparameter	Value
subsample	0,8
n_estimators	150
learning_rate	0,1
min_child_weight	3,0
max_depth	2,0

MACHINE LEARNING | XGBOOST

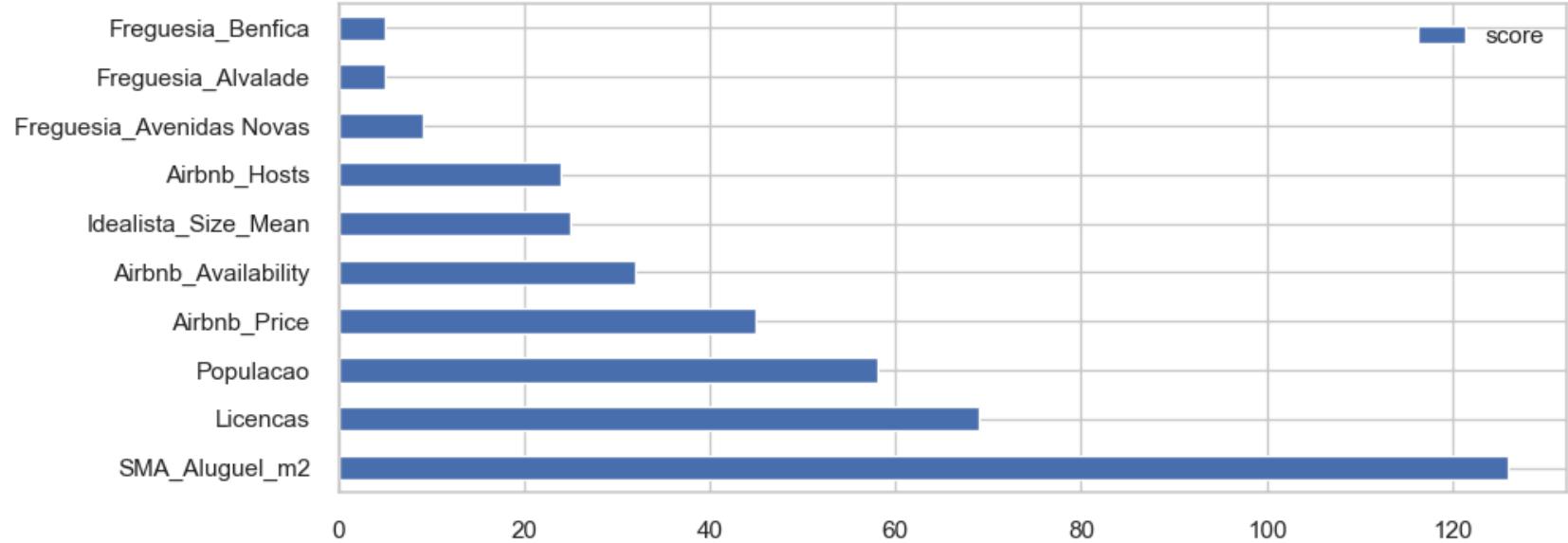
Feature Importance Graph

Most Relevant Features:

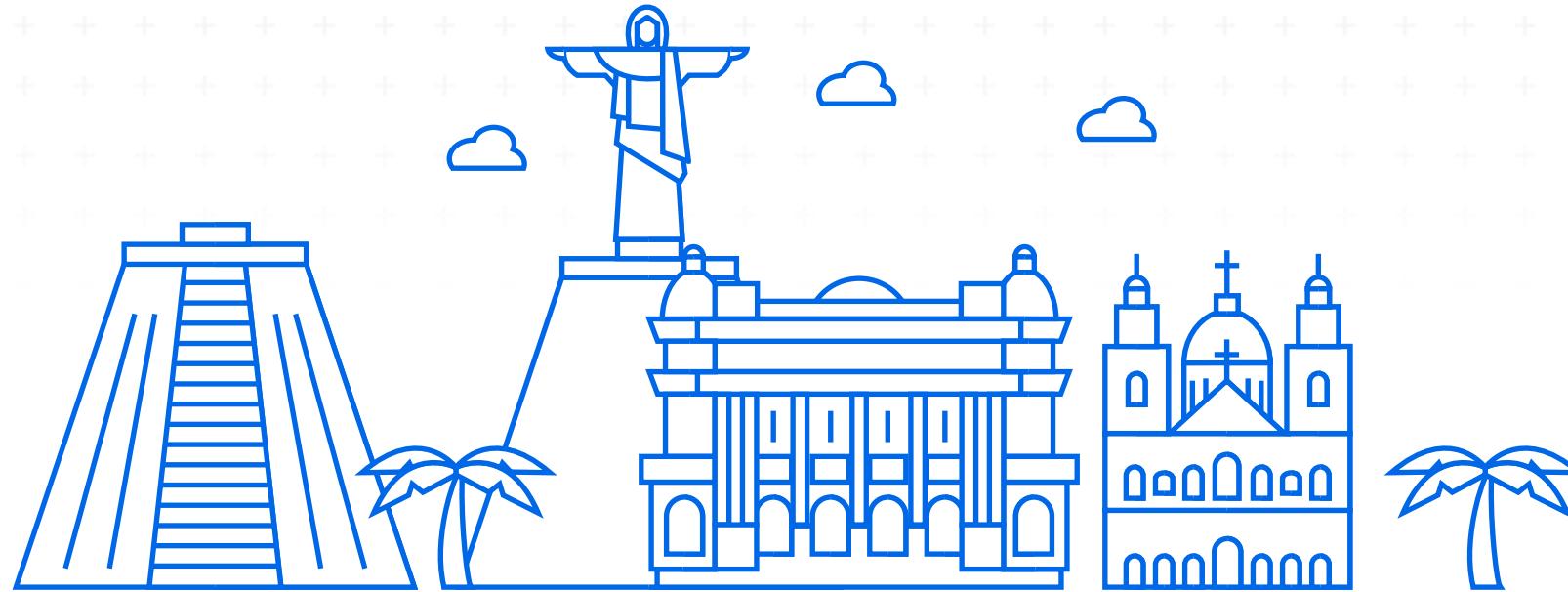
Simple Moving Average (SMA) of rental prices

Number of Licenses

Population Density



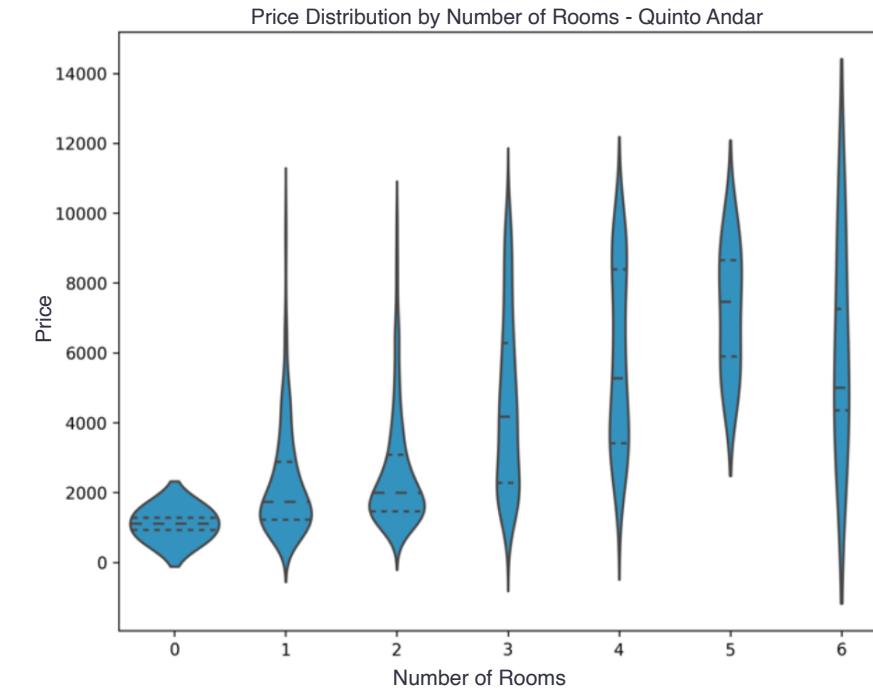
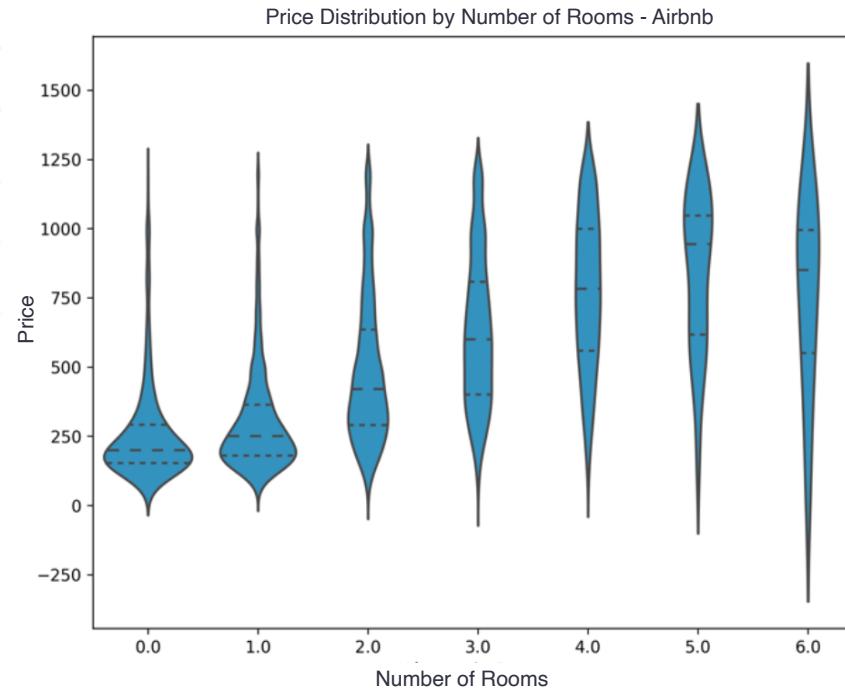
RIO DE JANEIRO



Data Source:

Census 2020, Inside Airbnb,
and Web Scraping Quinto Andar

EXPLORATORY ANALYSIS



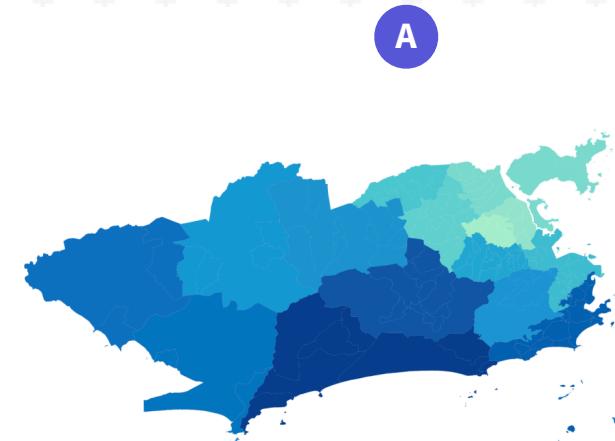
Airbnb

1,6
Rooms

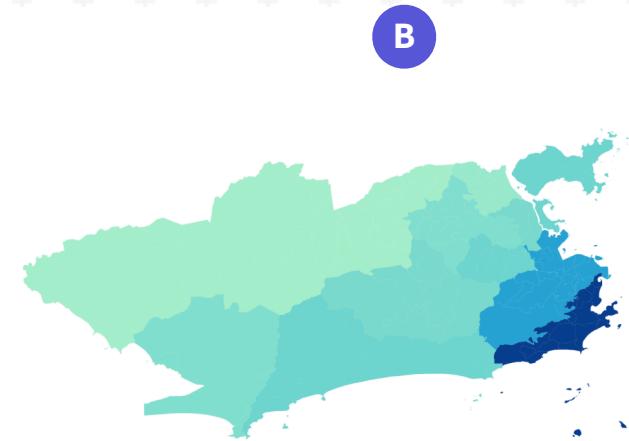
Quinto Andar

2,1
Rooms

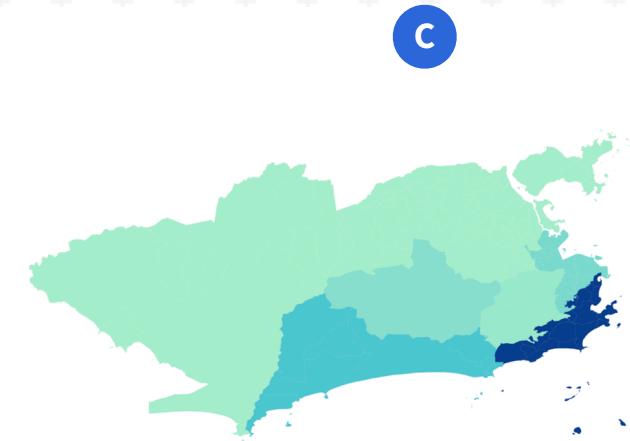
EXPLORATORY ANALYSIS



150
200
250
300
350
400



20
30
40
50
60
70



2000
4000
6000
8000
10000
12000
14000
16000

A | Average daily price of accommodations on Airbnb

B | Distribution of the average rental price per square meter

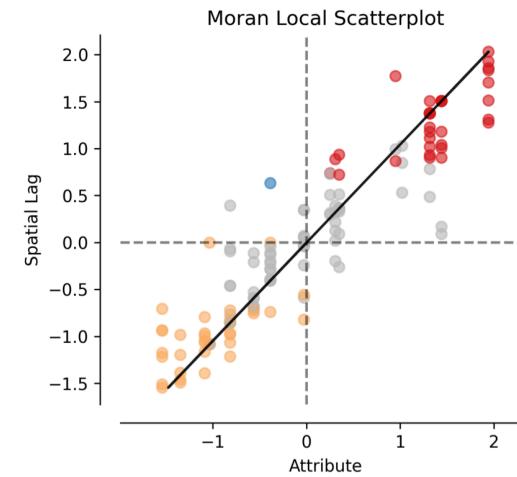
C | Number of licensed properties for operation on Airbnb per area

LOCAL SPATIAL ANALYSIS (LISA)

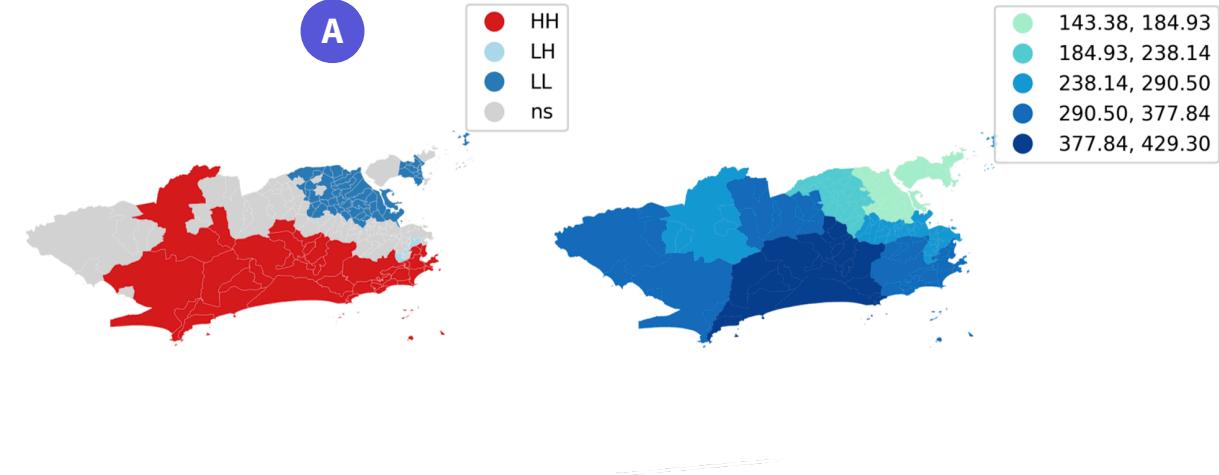
A

Airbnb: Average Price

HH (areas where property prices are high and surrounded by high values), LH (areas with high prices surrounded by areas with low prices), and LL (prices are low and surrounded by low values);



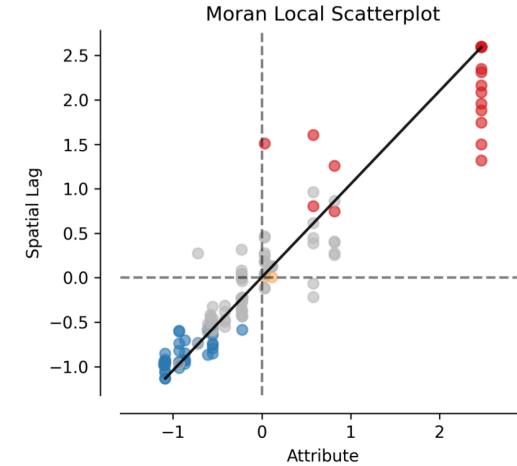
A



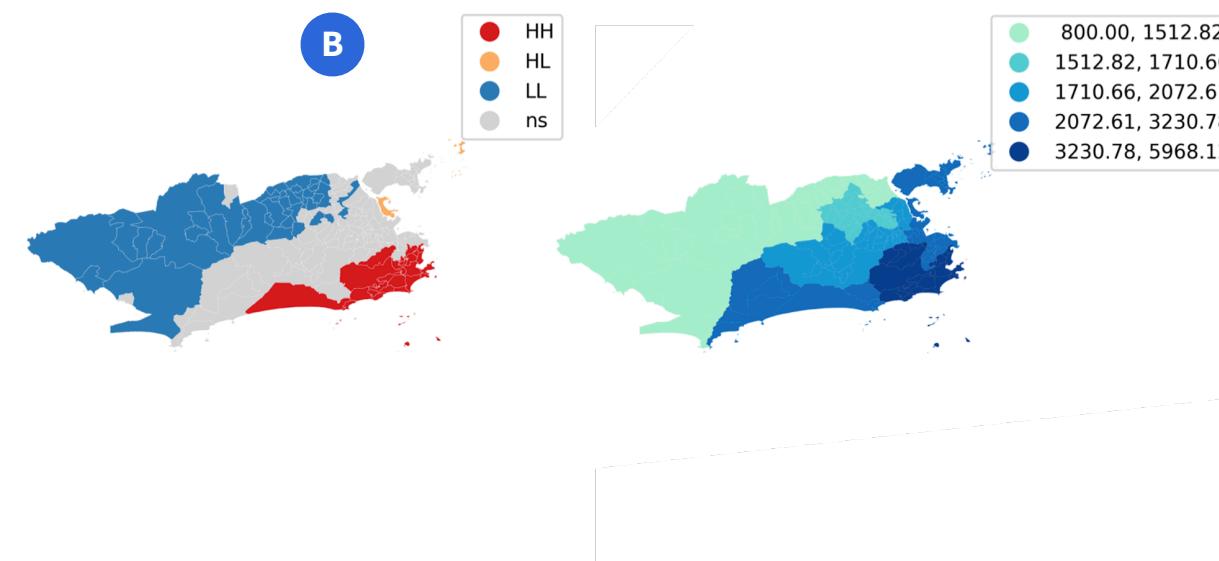
B

Regular Rental: Average Price

HH, HL (high-price locations surrounded by low prices), and LL.

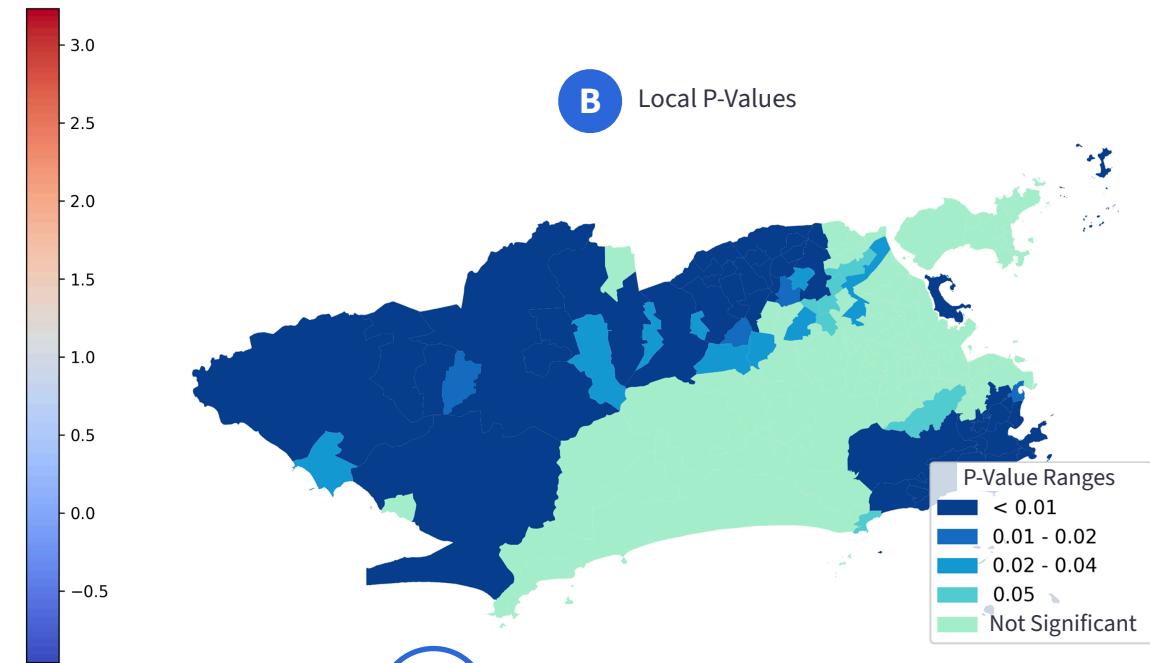
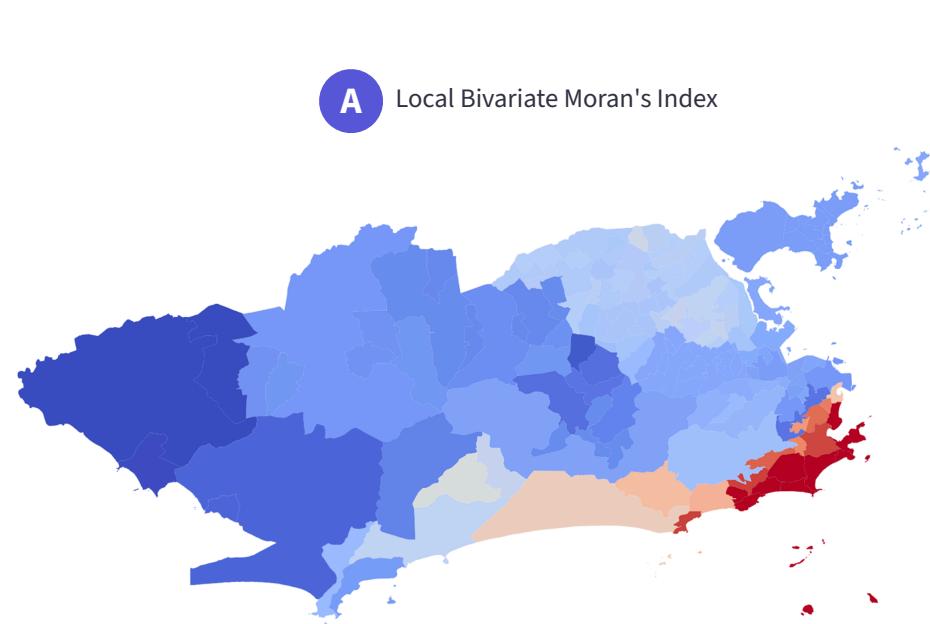


B



LOCAL SPATIAL ANALYSIS (BIVARIATE)

Average Price: Airbnb vs Regular Rental



Strong positive spatial correlation in the southern zone and part of the western zone (Barra da Tijuca), and moderate negative correlation in the remaining western zone;

Significant correlation in the southern zone, part of the western zone, and part of the northern zone.

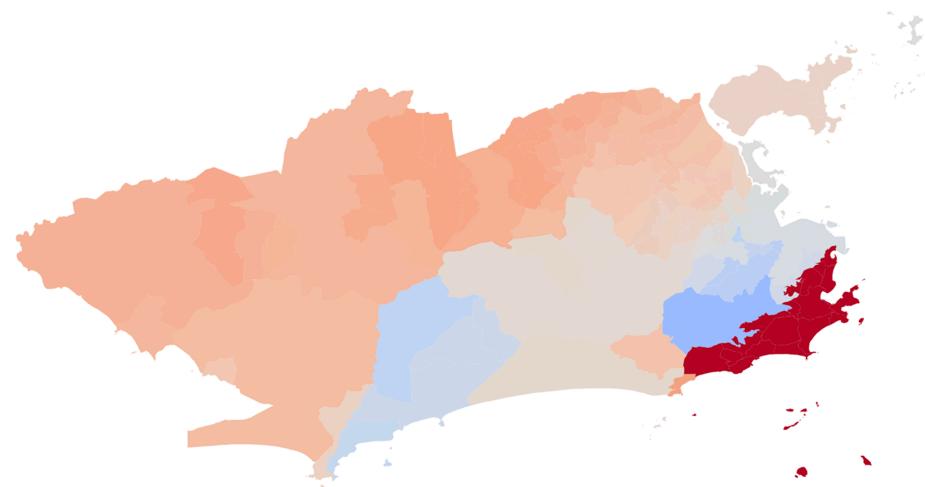
LOCAL SPATIAL ANALYSIS (BIVARIATE)

Accumulated Licenses (Airbnb) vs Rent/m²

LISA: 0,82

p-value: 0,001

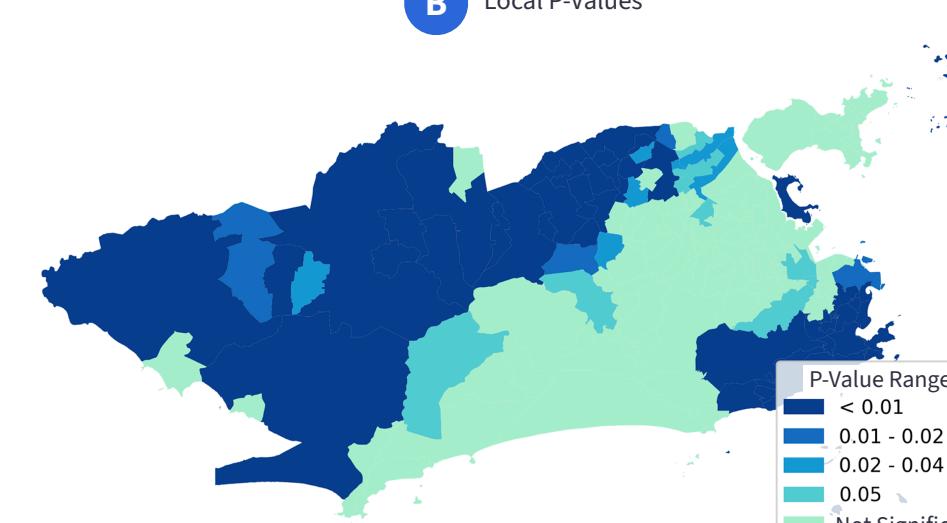
A Local Bivariate Moran's Index



A

Strong positive spatial correlation in the southern zone and part of the western zone (Barra da Tijuca), and moderate negative correlation in the remaining Tijuca region;

B Local P-Values



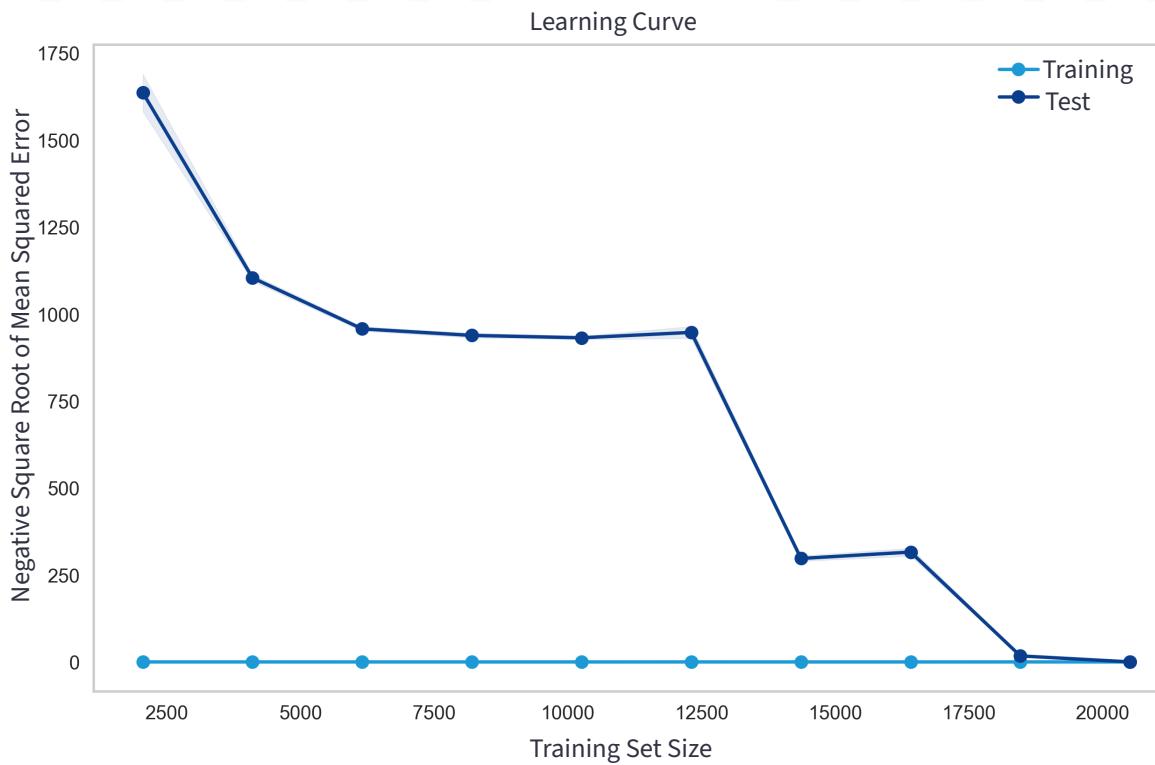
B

Significant correlation in the southern zone, part of the western zone, and part of the northern zone.

P-Value Ranges
< 0.01
0.01 - 0.02
0.02 - 0.04
0.05
Not Significant

MACHINE LEARNING | XGBOOST

Metric	Training	Cross-Validation	Test
Mean Squared Error [MSE]	0,1210	0,1510	0,1205
R-squared [R2]	0,9998	0,9998	0,9998



Hyperparameter	Value
max_leaves	50
subsample	0,6
n_estimators	50
learning_rate	0,1
min_child_weight	2,0
max_depth	5,0
colsample_bytree	0,5
reg_alpha	0,1

MACHINE LEARNING | XGBOOST

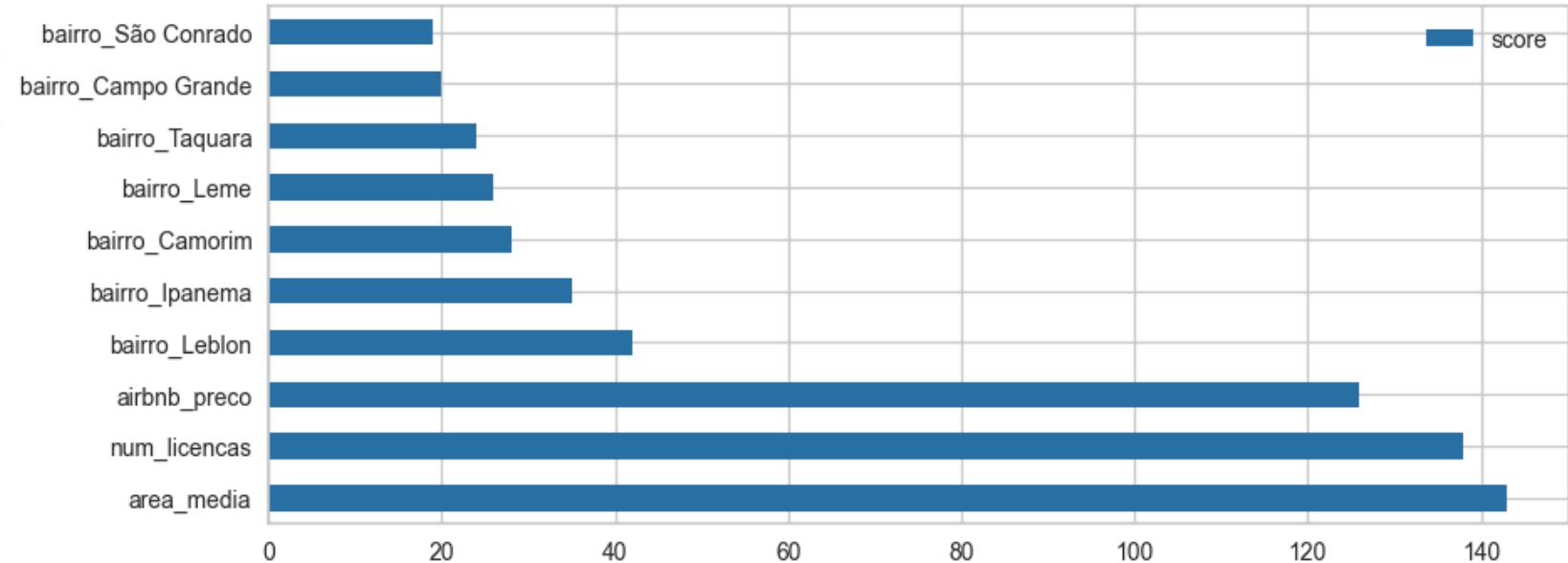
Feature Importance Graph

Most Relevant Features:

Average Property Area

Number of Licenses

Airbnb Price

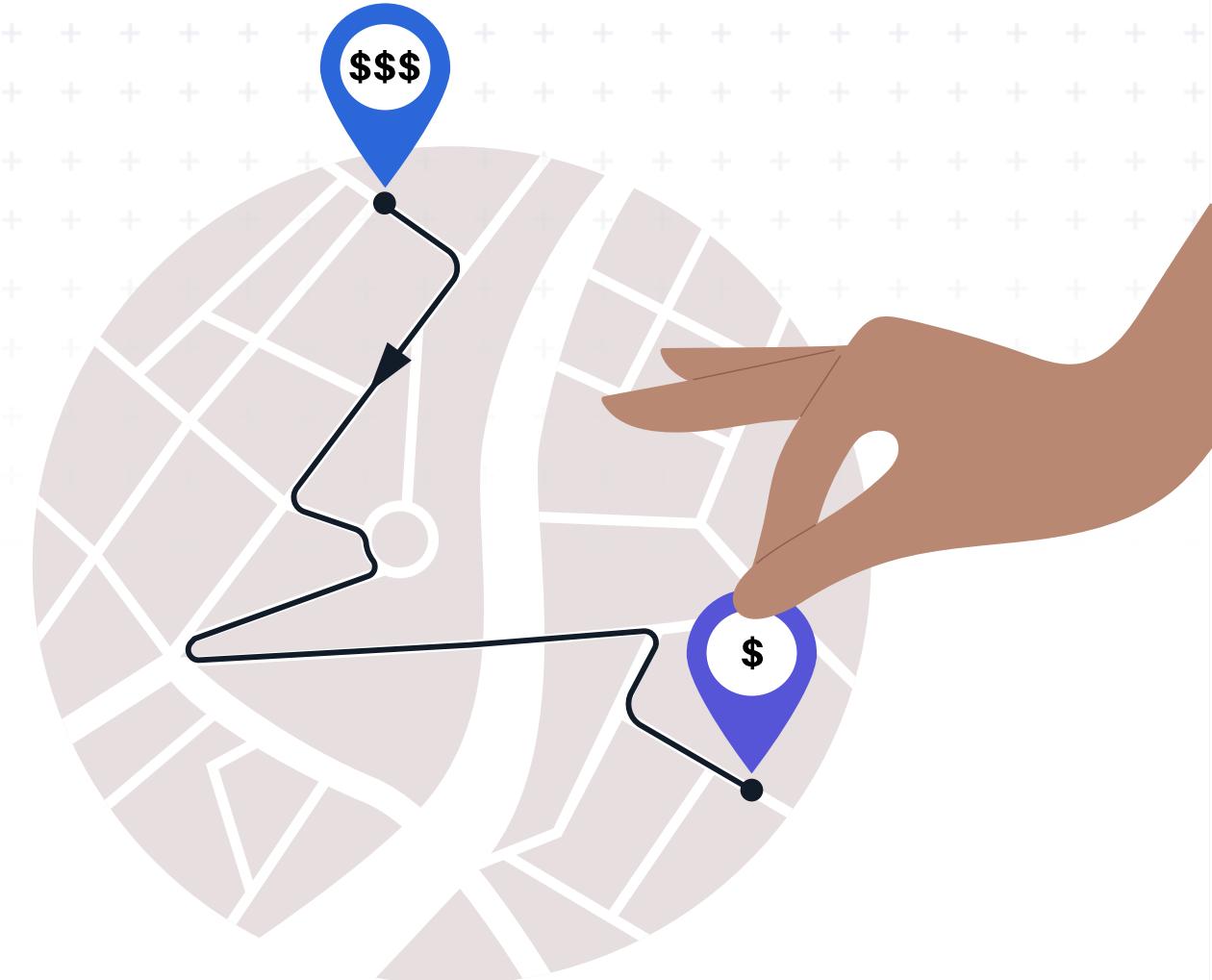


CONCLUSION

The increase in the number of Airbnb licenses may be correlated with a decrease in the supply of permanent housing, resulting in an increase in rental prices.

Furthermore, the rise in the average price of accommodations listed on Airbnb may indicate a high demand for lodging in the region, which, in turn, can create the perception of an area's appreciation.

This appreciation, in turn, contributes to the increase in rental prices in the area.



FINAL CONSIDERATIONS

The results showed a relationship between the number of licensed properties and rental values, as well as positive spatial autocorrelation between average long and short-term rental values.

Previous studies in cities like New York, Paris, and Lisbon have shown similar results, highlighting the impact of Airbnb on real estate markets.

Limitations include a scarcity of detailed demographic data and challenges in analyzing gentrification due to the complex and subjective nature of the phenomenon.

The importance of Airbnb regulation is emphasized to promote sustainable growth and protect local communities.

RECOMMENDATIONS



Regulation of Airbnb

Emphasizing the importance of regulation to foster sustainable growth and protect local communities.



Public Education

It is crucial to educate society about the pros and cons of the Airbnb phenomenon and its implications for real estate markets and communities.