Business Intelligence

Part 2 - Data Mining

AIRBNB
LISBON

Belong Anywhere

Presented by: Ricardo Santiago
Ricardo Silva

Data Preparation

Dataset used

Lisbon, Lisbon, Portugal

17 December, 2023 (Explore)

Country/City	File Name	Description
Lisbon	listings.csv.gz	Detailed Listings data
Lisbon	calendar.csv.gz	Detailed Calendar Data
Lisbon	reviews.csv.gz	Detailed Review Data

http://insideairbnb.com/get-the-data

Software used

Pentaho

ETL Process

PostgreSQL (pgAdmin 4)

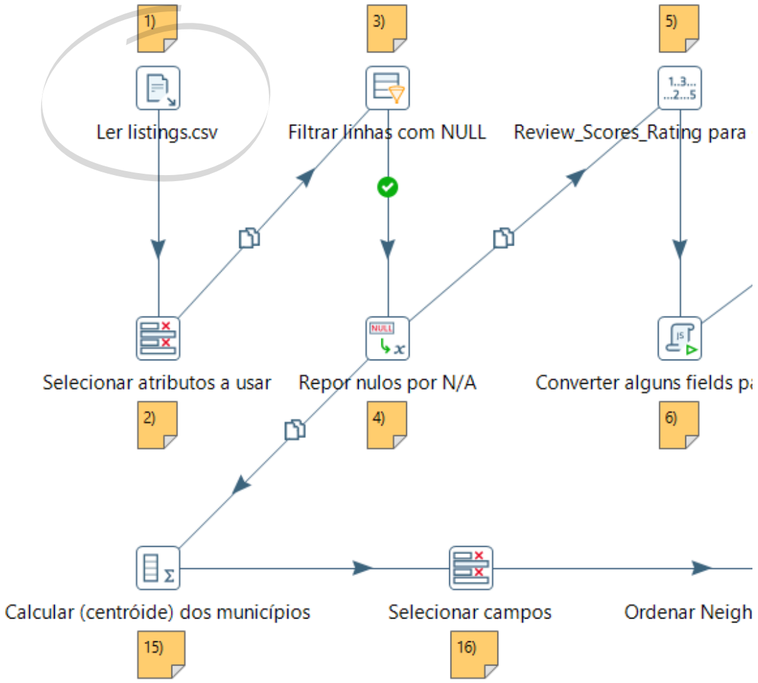
Data Storage

Python

Data Preparation
Data Mining

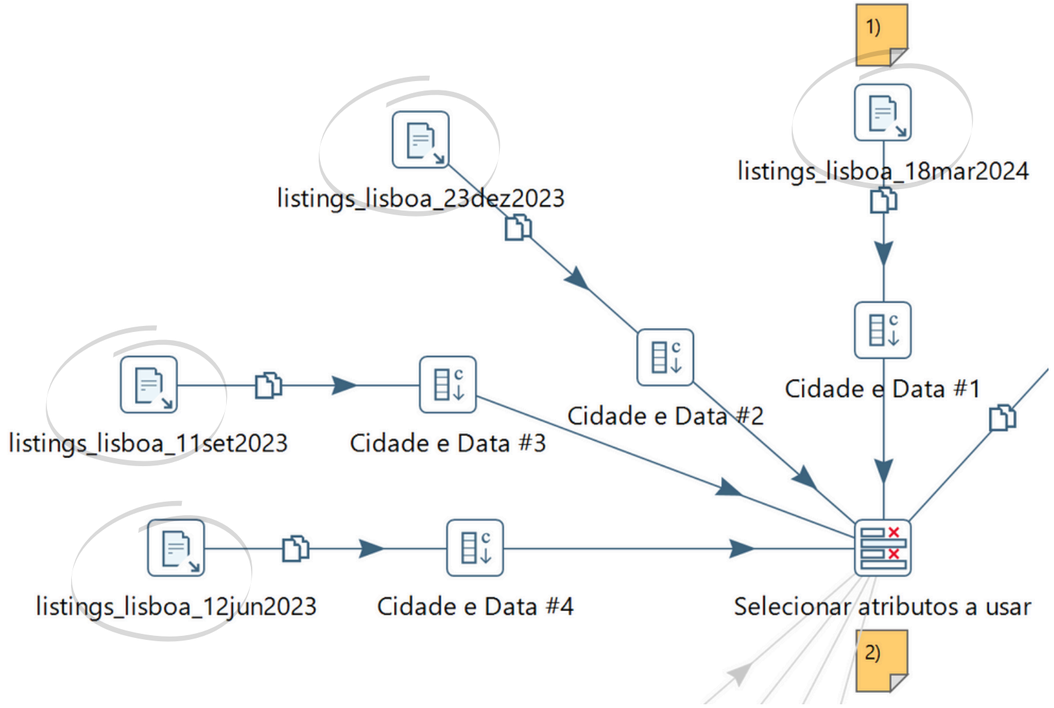
Change in ETL Process Pentaho

The file about the **most recent** update



Before

After



Files about the most recent **four** data updates

Price Recommendation (Rating Study)

Goal

Give a price recommendation for accommodation taking into account all its initial characteristics

Features Used

latitude
longitude
minimum_nights
maximum_nights
has_availability_bool
instant_bookable_bool
accommodates
bathrooms
bedrooms
beds

Algorithms Testing

Tipo de Algoritmo	Algoritmo	Train Accuracy	Test Accuracy	Precision	Recall	F1-Score
Simple Classificator	Decision Trees	0.983	0.845	0.843	0.842	0.842
	KNN	0.980	0.756	0.755	0.754	0.755
Ensembles	RandomForests	0.983	0.840	0.838	0.837	0.837
	AdaBoost	0.493	0.497	0.504	0.486	0.492

Testing Process

1- Hyperparameter search/choice

Done with grid_search.

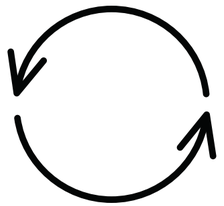
2- Test with X price categories (baseline is X=4)

Testing metrics: Train Accuracy, Test Accuracy, Precision, Recall and F1-Score.

(Also looking at confusion_matrix and classification_report!)

3- Check if metrics threshold is reached (never bellow 0.80)

4- If not increase categories and repeat 1-3



Results:

Lisbon with 10 price categories

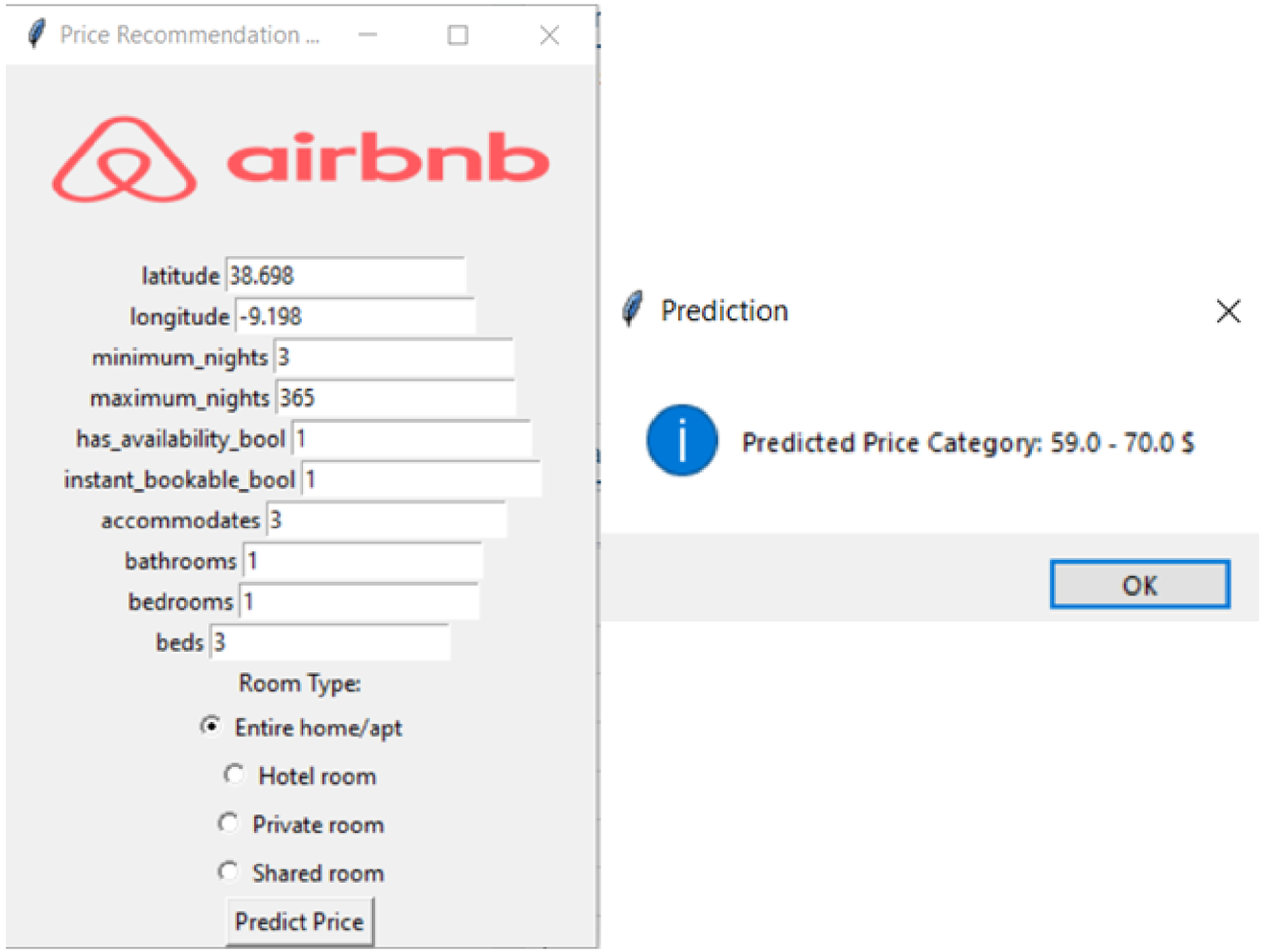
Tipo de Algoritmo	Algoritmo	Train Accuracy	Test Accuracy	Precision	Recall	F1-Score
Simple Classificator	Decision Trees	0.969	0.800	0.800	0.799	0.800

Porto with 6 price categories

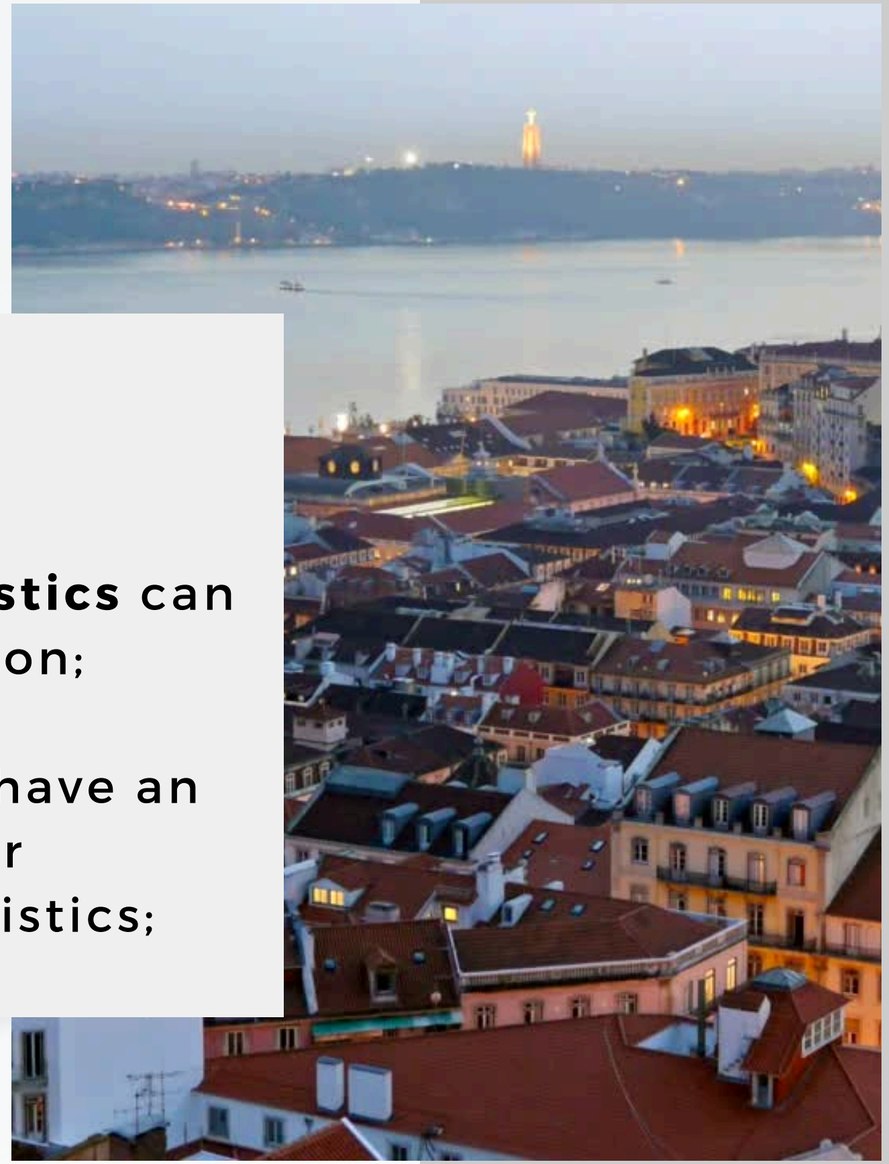
Tipo de Algoritmo	Algoritmo	Train Accuracy	Test Accuracy	Precision	Recall	F1-Score
Simple Classificator	Decision Trees	0.930	0.701	0.699	0.698	0.698

Live Demo

Airbnb listing price recomendation



VALUE PROPOSITION

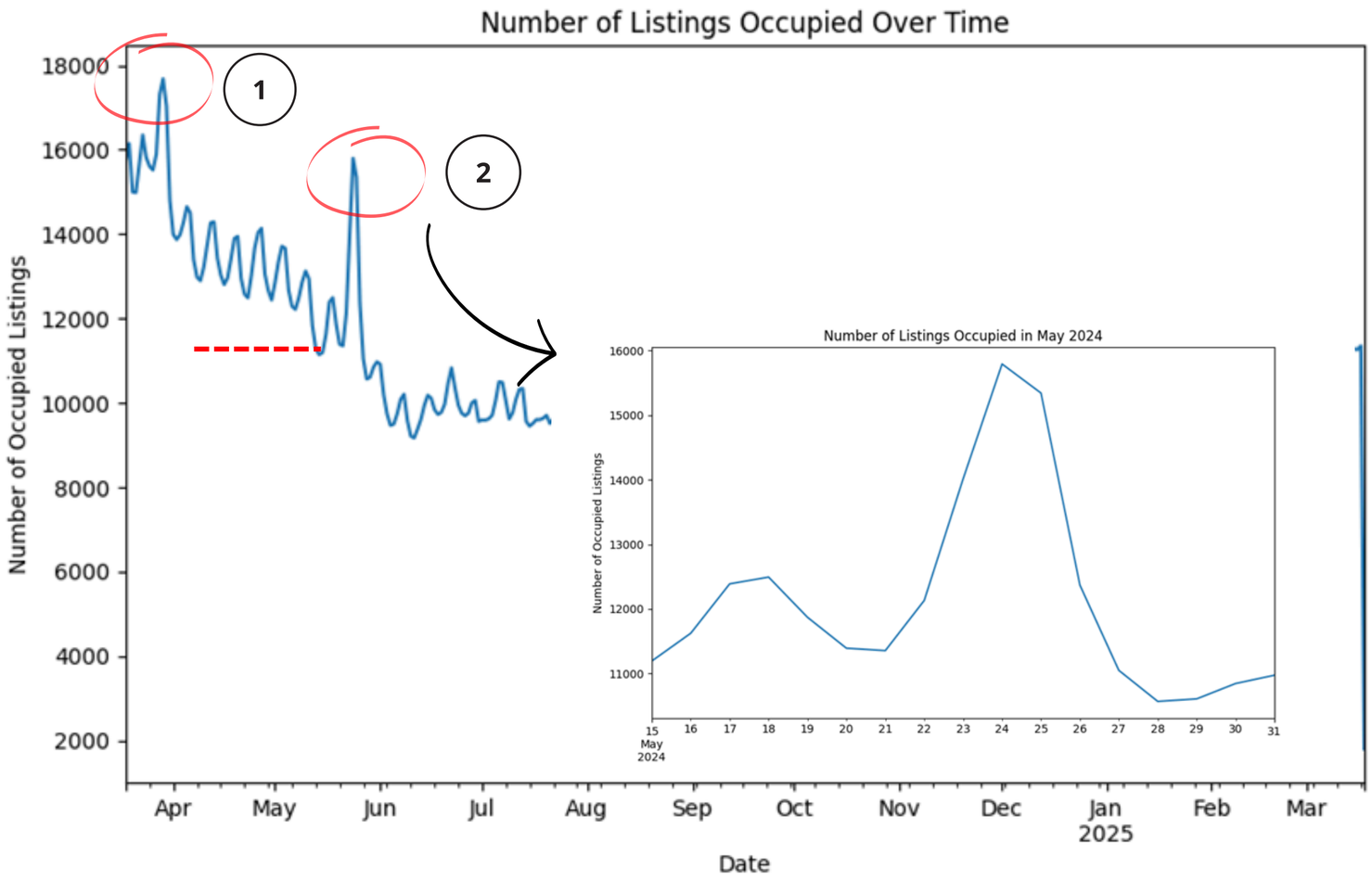


For the Hosts:

Understand how **different characteristics** can affect the price of their accommodation;

Estimate **potential earnings**, as they have an idea of the price charged per night for accommodation with those characteristics;

Time series analysis



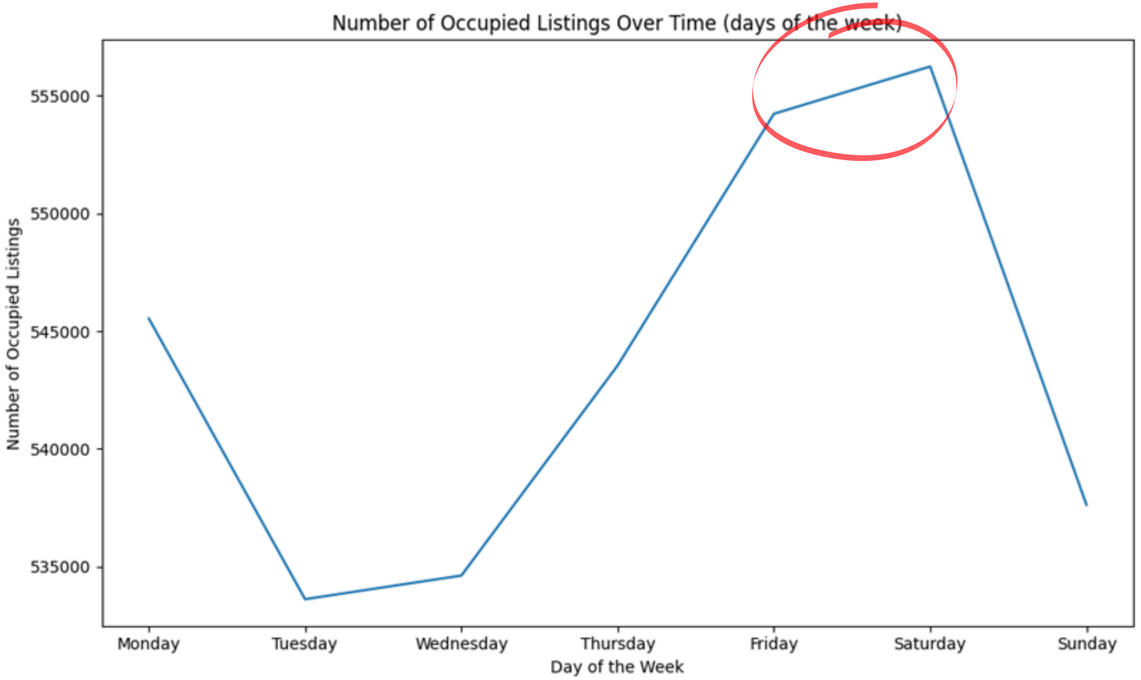
1

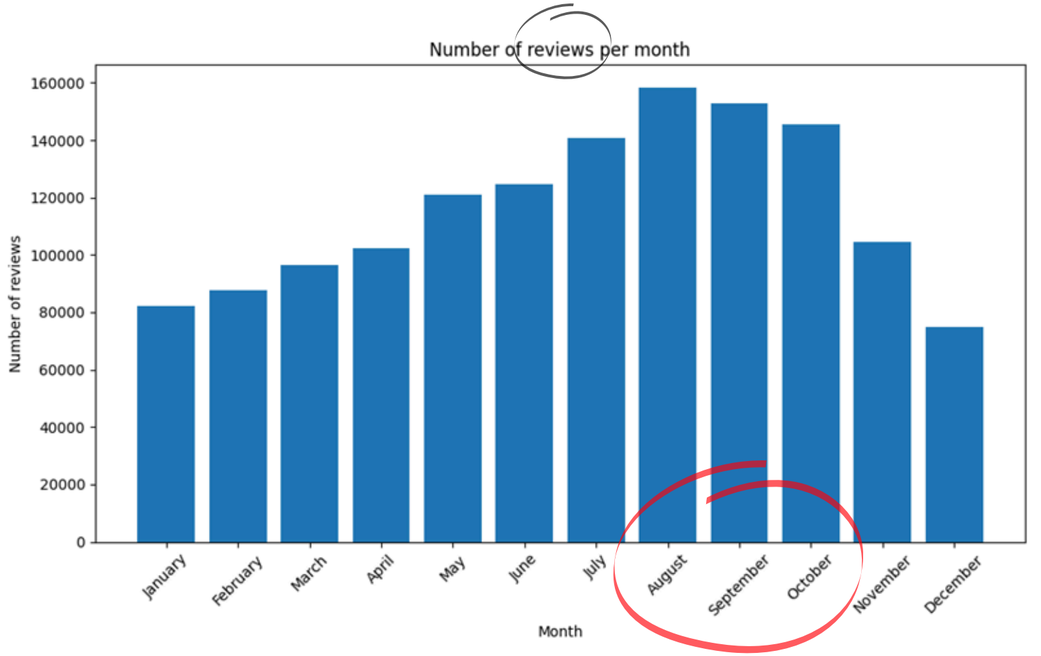
Holiday (Sexta-Feira Santa) followed by the weekend related to Easter

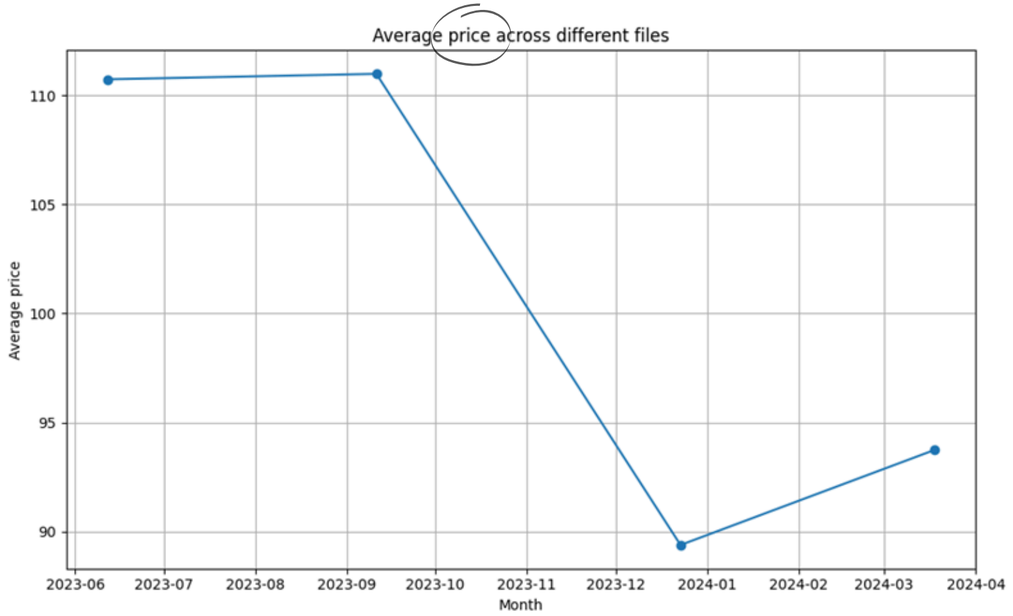
(Possibility of **three consecutive days** off work)

2

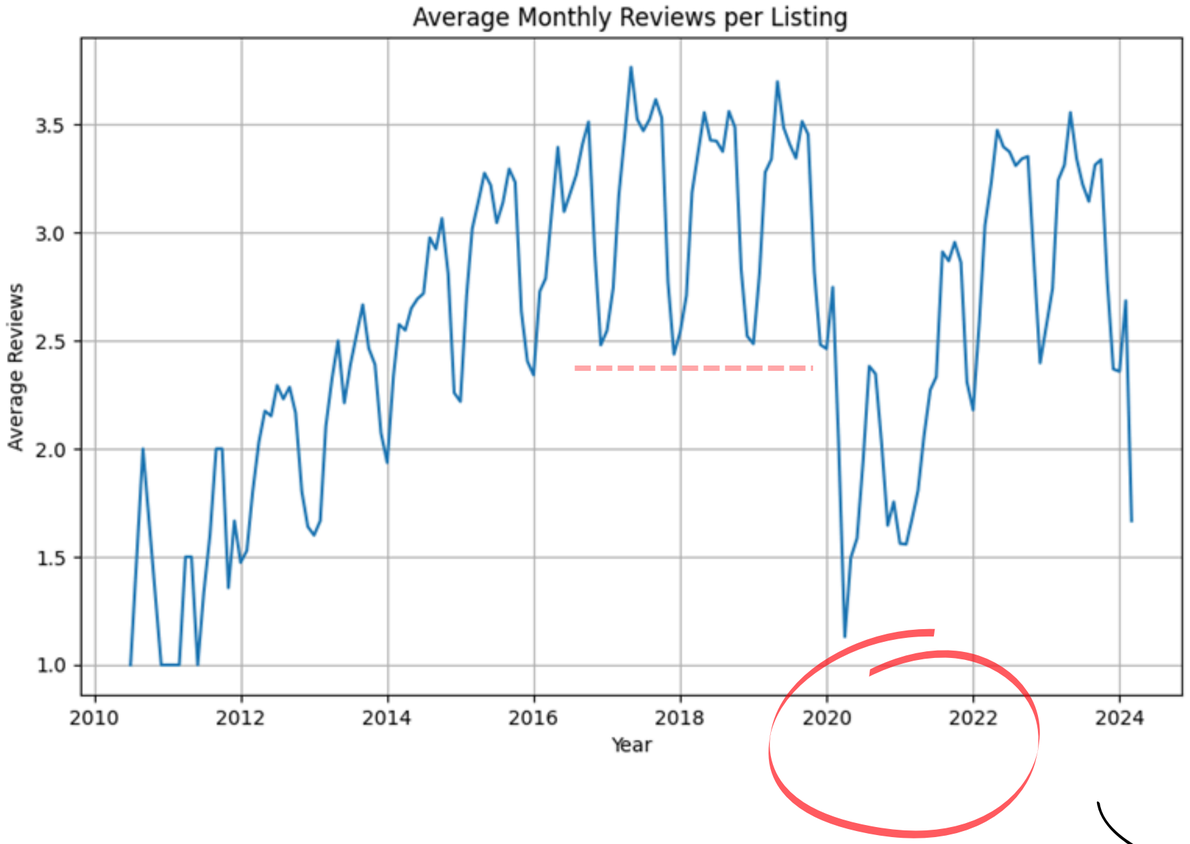
Time series analysis







Time series analysis



ECONOMY MARKETS COMPANIES BANK WORK AND EMPLOYMENT SITUATION PUBLIC FINANCES INTERNATIONAL

COVID-19

Pandemic took 16.5 billion from Portuguese tourism in 2020

The drop in tourist demand, which includes consumption by foreigners and Portuguese, shows the "particularly harmful impacts of the pandemic" on this economic activity, highlights the INE.

Luis Villalobos

May 14, 2021, 11:57 (updated on May 14, 2021, 12:32)

Occupancy prediction (Time series analysis)

Goal

Getting an idea of what to expect from the demand for accommodation throughout the different times of the year

Features Used

(from reviews.csv)

id
listing_id
date

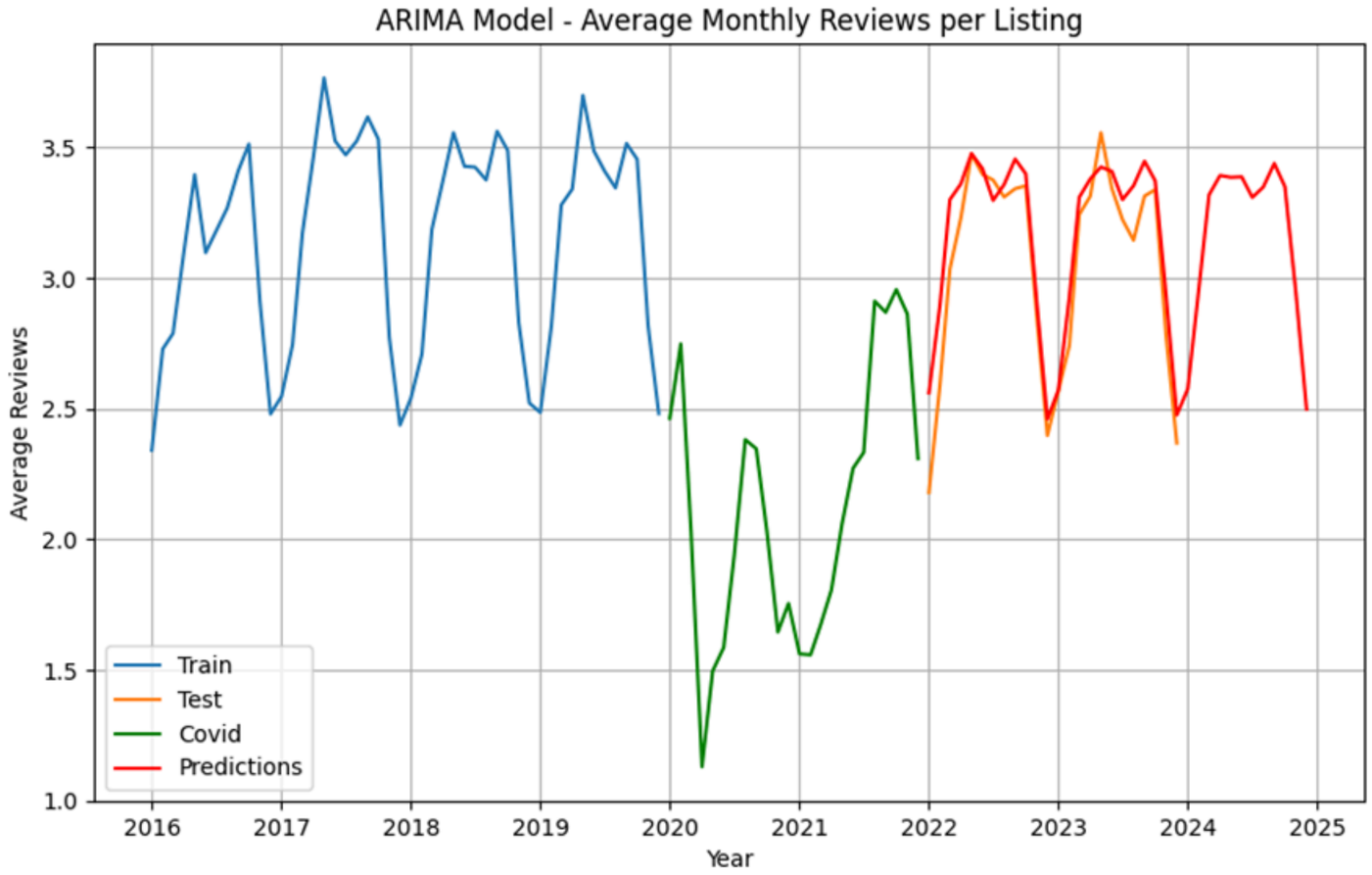
Algorithm - ARIMA

Statistical analysis model that uses time series data to better understand the dataset and to predict future trends.

Uses a standard notation with p, d, and q for the parameters to indicate the type of ARIMA model used.

- **p**: the number of lag observations in the model;
- **d**: the number of times the raw observations are differenced;
- **q**: the size of the moving average window.

Occupancy prediction (Time series analysis)



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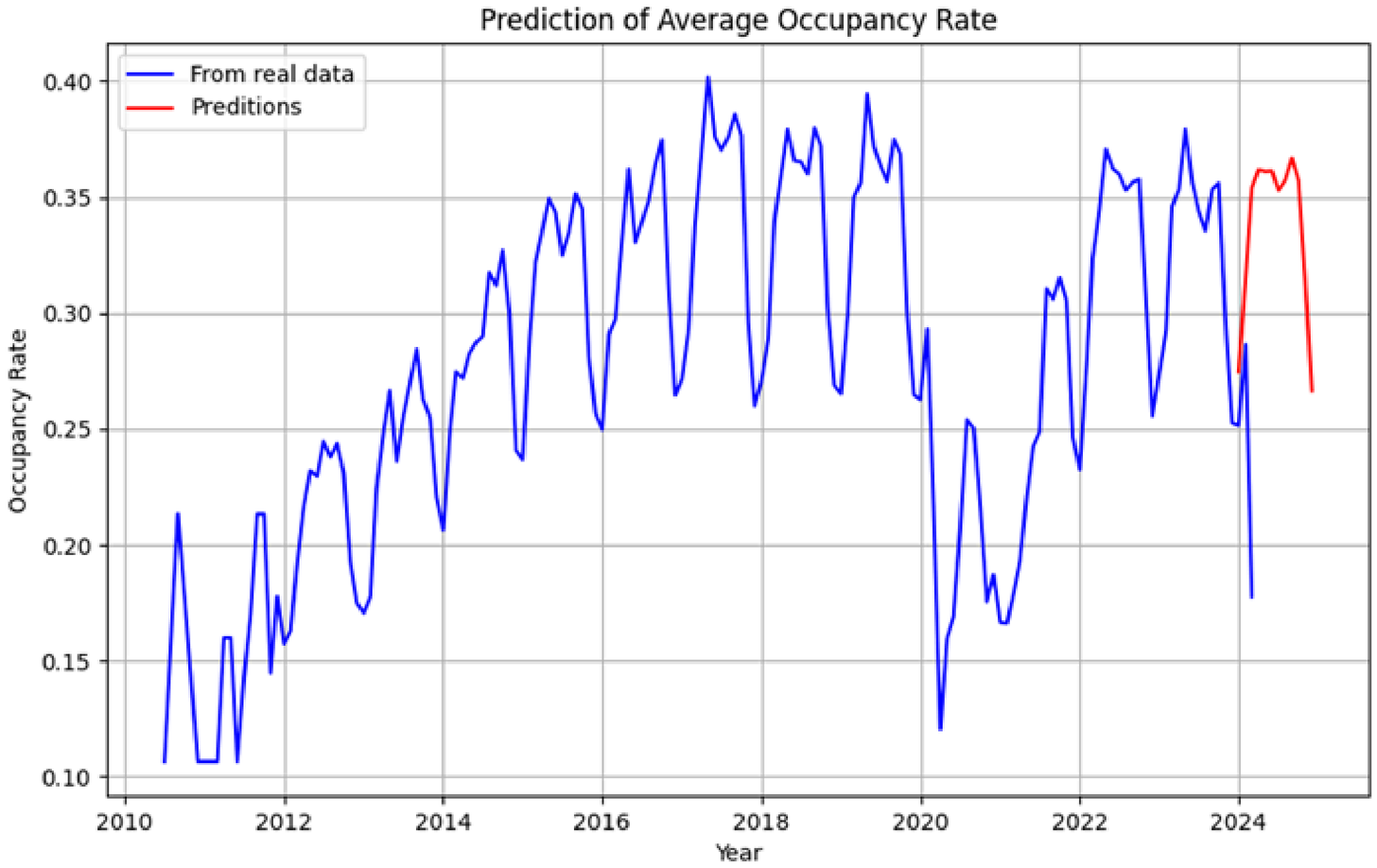
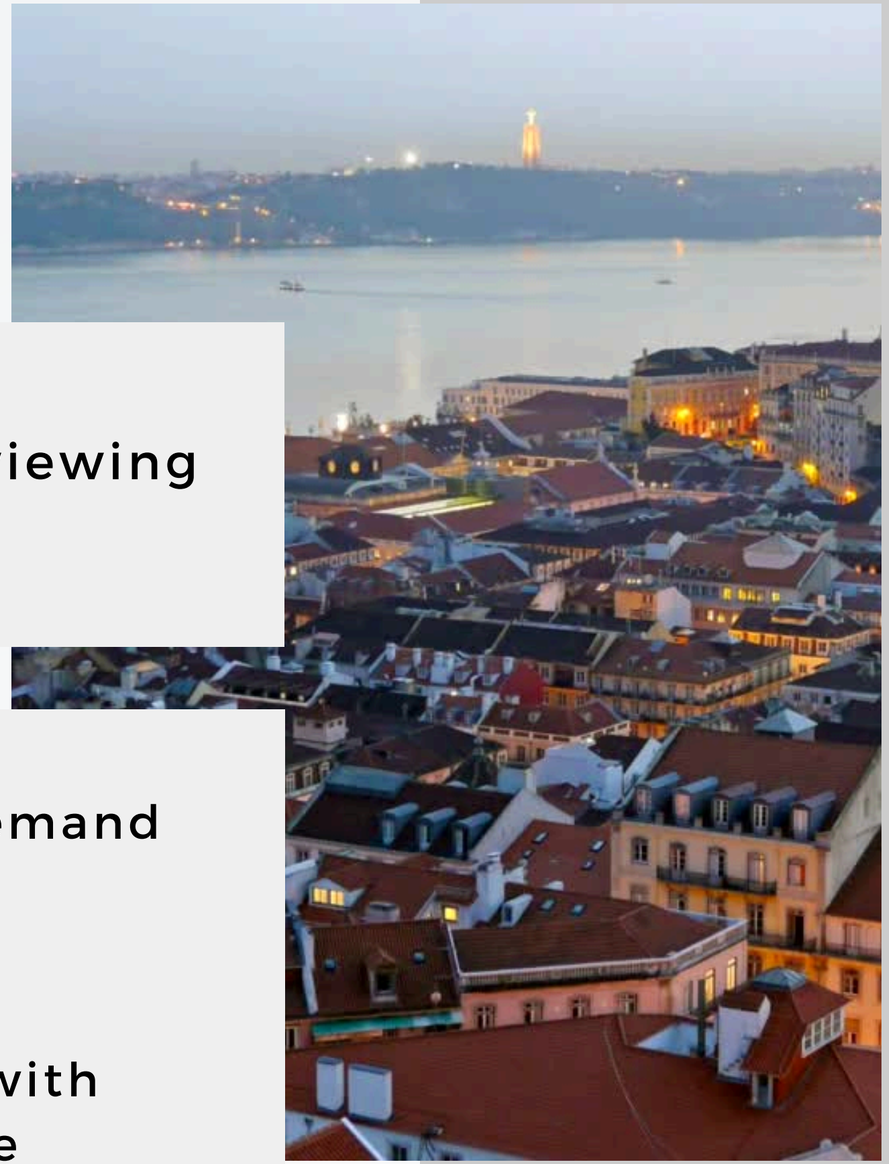


Assumptions

- Each review corresponded directly to a stay at the accommodation.
- The average length of stay in the city of Lisbon is around 3.2 nights.

VALUE PROPOSITION



For the Airbnb:
Obtaining statistical data and previewing brand promoting events.

For the Hosts:
Adaptation of services to seasonal demand variation trends;

Get an idea of the state of your their business by comparing their results with the average statistics obtained by the other hosts.

Q&A

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