

Airbnb Amsterdam Case Study



Ji Zhang

Contents

1. Data Preprocessing
2. Data Exploration
3. Recommendation

Contents

1. Data Preprocessing

1.1 Data Inspect

1.2 Missing Values

1.3 Duplicated Records

1.4 Data Transformation

1.1 Data Inspect

In [5]:

```
df.head()
```

Out[5]:

	id	name	host_id	host_name	neighbourhood_group	neighbourhood	latitude	longitude	room_type	price	minimum_nights	number_of_reviews
0	9784567	nice Room in Amsterdam	27280608	Petra	NaN	Bijlmer-Oost	52.323369	4.977730	Private room	95		1
1	13163805	Best cost benefit room near a metro station	35491461	Phillip	NaN	Bijlmer-Oost	52.315635	4.978166	Private room	60		1
2	3719167	Nice room in A'dam SE near nature & heart centre	18991270	Maria	NaN	Bijlmer-Oost	52.316711	4.986618	Private room	45		5
3	13188367	Private room 15min metro ride from city center	73797940	Diana	NaN	Bijlmer-Oost	52.321204	4.976630	Private room	35		1
4	4831606	Room in Amsterdam in a new house!! Free Bicycle	24314617	Jorim	NaN	Bijlmer-Oost	52.327270	4.967352	Private room	39		14

In [6]:

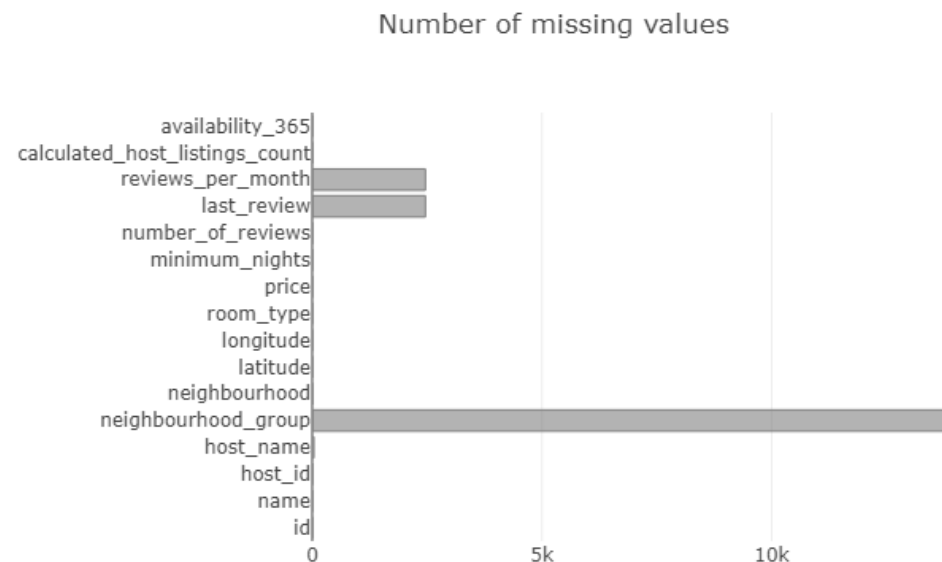
```
# data type
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 13849 entries, 0 to 13848
Data columns (total 16 columns):
id                                13849 non-null int64
name                             13849 non-null object
host_id                          13849 non-null int64
host_name                        13813 non-null object
neighbourhood_group              0 non-null float64
neighbourhood                    13849 non-null object
latitude                         13849 non-null float64
longitude                        13849 non-null float64
room_type                        13849 non-null object
price                            13849 non-null int64
minimum_nights                   13849 non-null int64
number_of_reviews                13849 non-null int64
last_review                      11386 non-null object
reviews_per_month                11386 non-null float64
calculated_host_listings_count  13849 non-null int64
availability_365                 13849 non-null int64
dtypes: float64(4), int64(7), object(5)
memory usage: 1.7+ MB
```

1.2 Missing Values

```
print(missing_count)
```

```
id                0
name              0
host_id           0
host_name         36
neighbourhood_group 13849
neighbourhood     0
latitude          0
longitude         0
room_type         0
price            0
minimum_nights   0
number_of_reviews 0
last_review      2463
reviews_per_month 2463
calculated_host_listings_count 0
availability_365  0
dtype: int64
```



drop feature 'neighbourhood_group'

1.3 Duplicated Records

1.3 Detect duplicated

```
In [11]: if df.duplicated().any():  
          print("Duplicated rows detected!")  
        else:  
          print("No duplicated rows detected.")
```

No duplicated rows detected.

no duplicated records detected

1.4 Data Transformation

Contents

2. Data Exploration

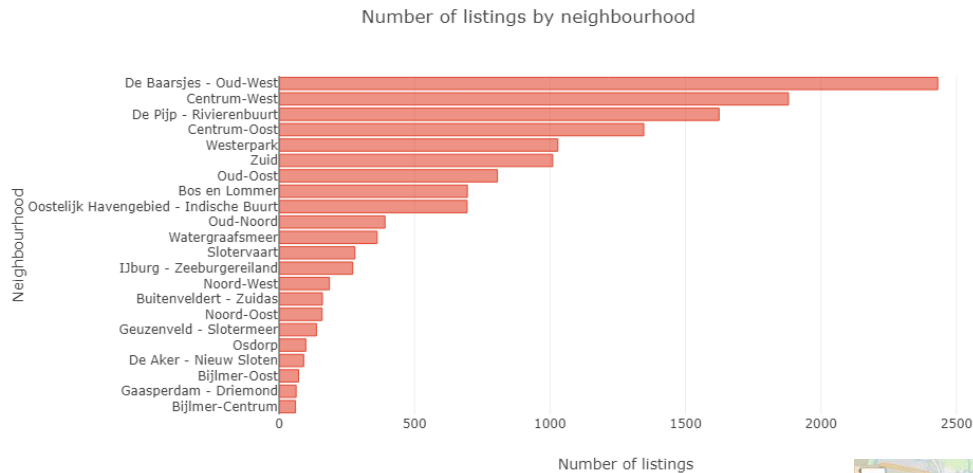
2.1 Listings Distribution and Availability

2.2 Price

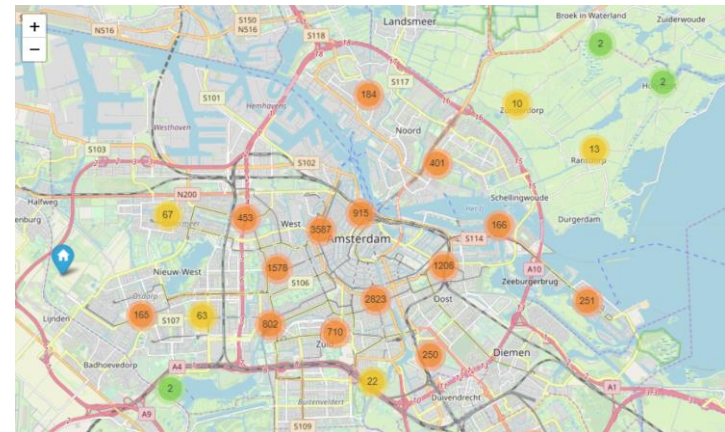
2.3 Number of Reviews

2.4 Host

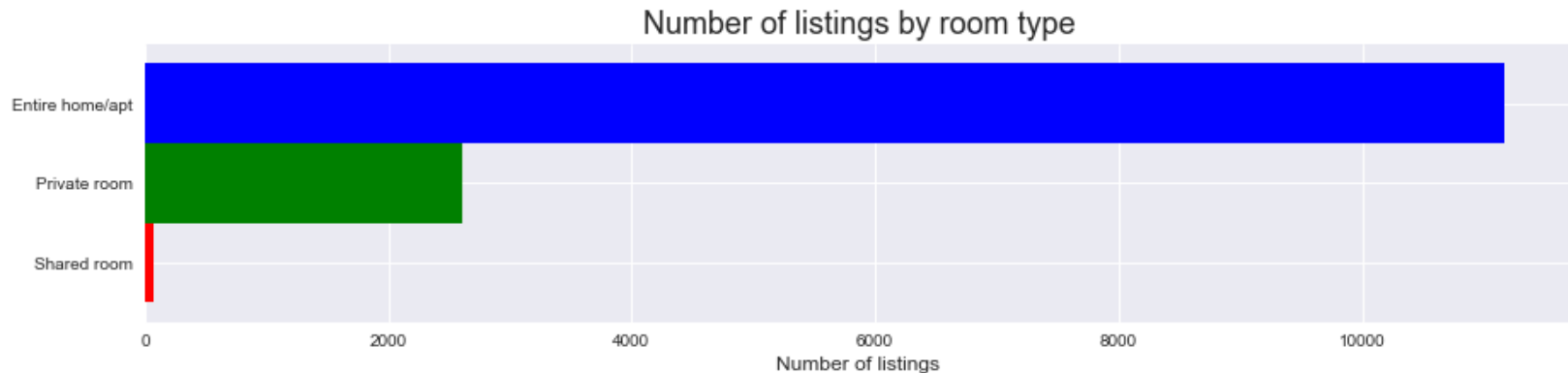
2.1 Listings Distribution and Availability



Number of listings by neighbourhood

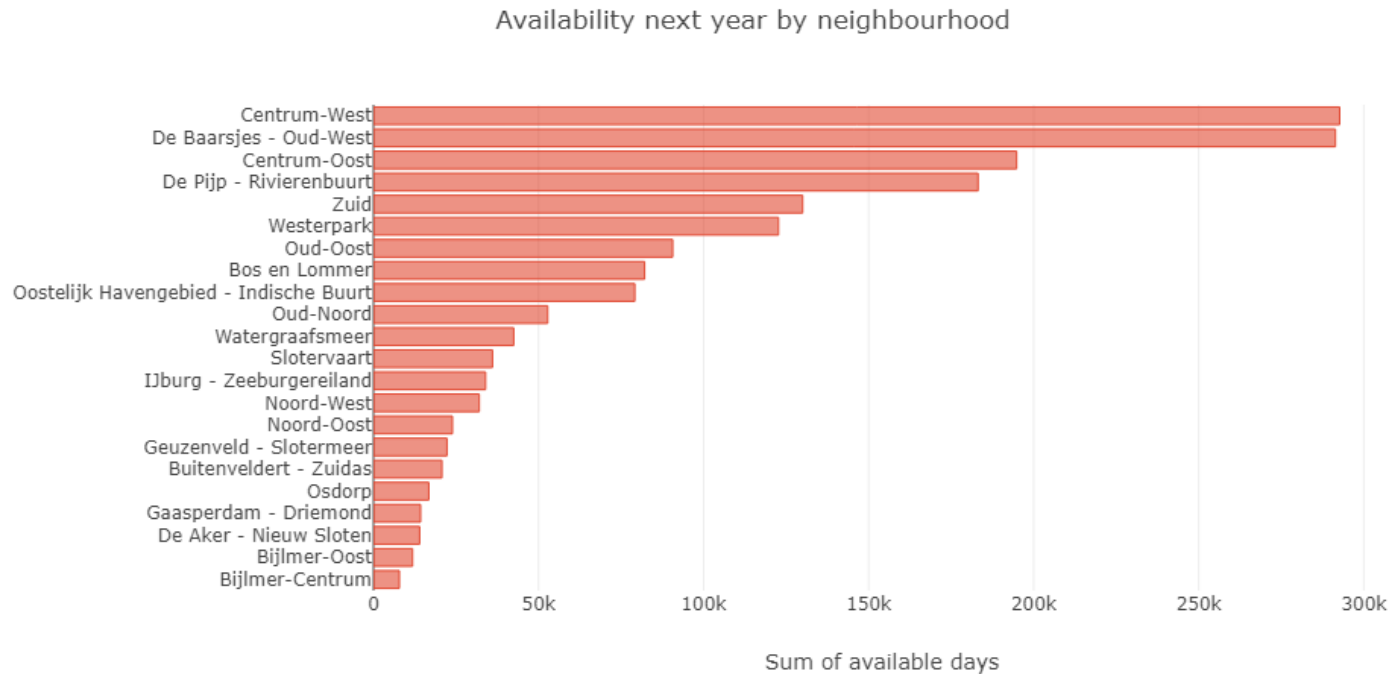


2.1 Listings Distribution and Availability



Number of listings by room type

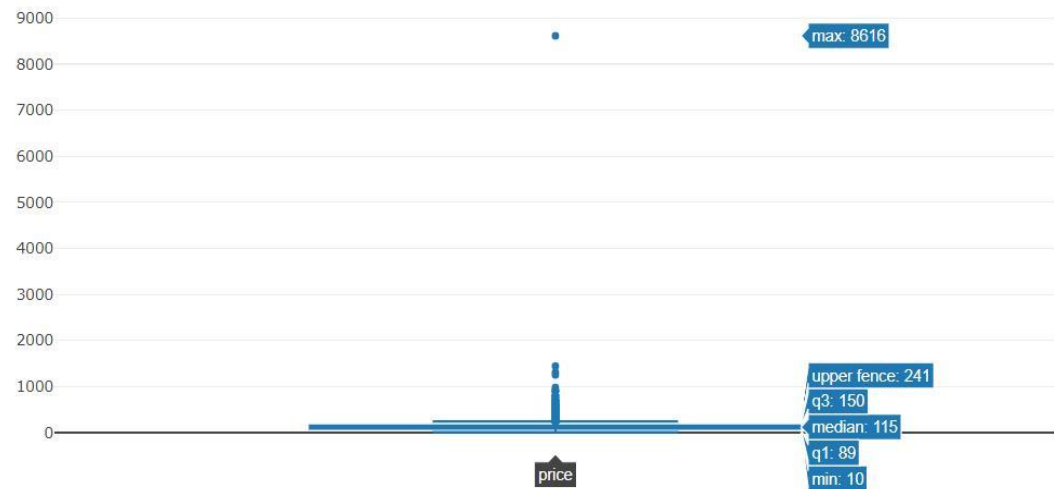
2.1 Listings Distribution and Availability



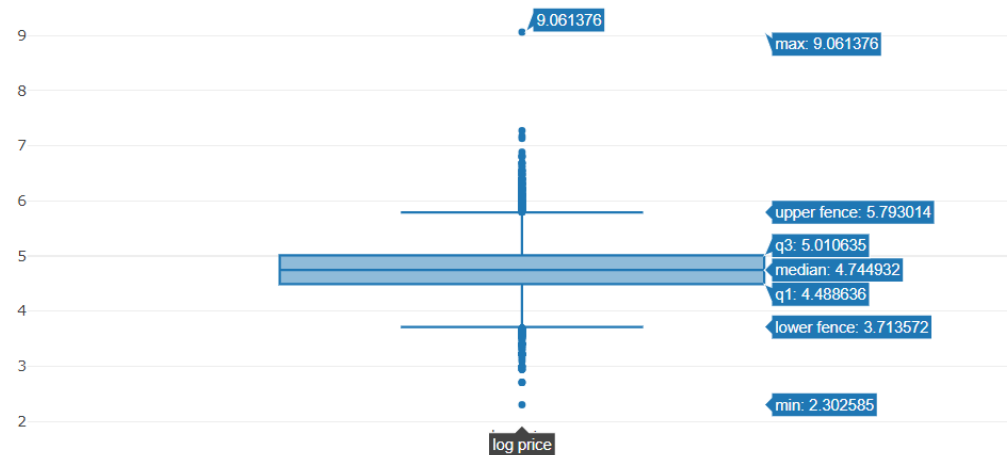
Availability next year

2.2 Price

Price Boxplot



Log Price Boxplot



2.2 Price

	id	name	host_id	host_name	neighbourhood	latitude	longitude	room_type	price
9395	12793635	Museum plein/van Gogh/Rijks	69667343	Maurits	Zuid	52.3591	4.87871	Entire home/apt	8616
3266	4673471	Sailingship Succes in Amsterdam	24174723	Naupar	Oostelijk Havengebied - Indische Buurt	52.3802	4.92561	Entire home/apt	1442
642	5587500	Faralda Crane Hotel Amsterdam	21831151	Faralda	Oud-Noord	52.3995	4.89468	Entire home/apt	1307
1352	785244	Vila Catedralus - whole house	4139821	David	Centrum-West	52.3773	4.8919	Entire home/apt	1253
9843	4394074	Schitterend Herenhuis op A-locatie!	22806302	Danielle	Zuid	52.3547	4.87198	Entire home/apt	977
2705	529174	LUXURY GROUP HOUSE D	8003829	Christian	Centrum-West	52.3691		Entire	
13308	6913671	Woning te huur voor 6 maanden!	36231152	Nilay	Geuzenveld - Sloterveer	52.3723			

Price Outliers



[Details](#) · [Evaluation](#) · [Date available](#) · [position](#) · [Notice](#) · [landlord](#)

AMSTERDAM · ENTIRE APARTMENT

Great CENTRAL apartment De Pijp

1 bedroom 1 bed 1 bathroom Up to 4 people



Host: Peter [Contact the landlord](#)
Received 20 reviews

€8,000 per night
★★★★ 8

date

Check-in date → Check-out date

Number of people

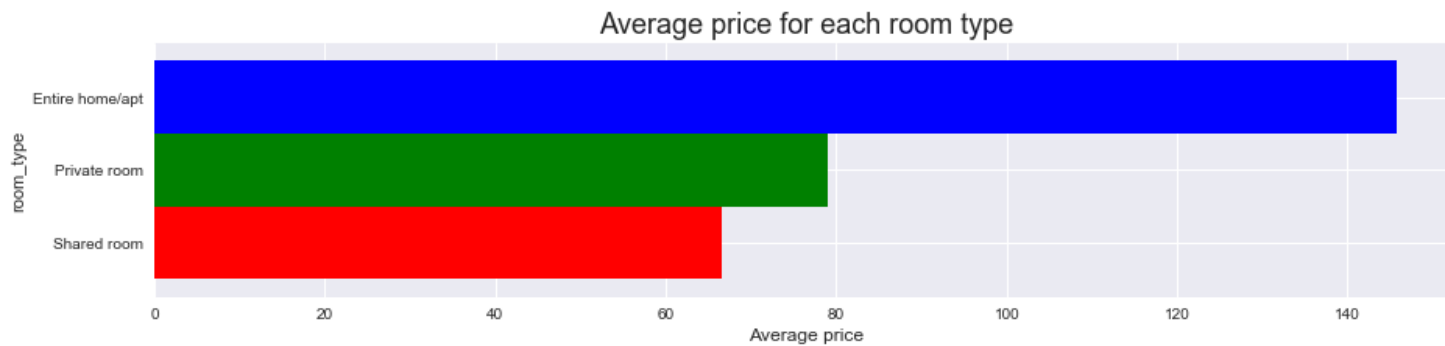
1 person

2.2 Price



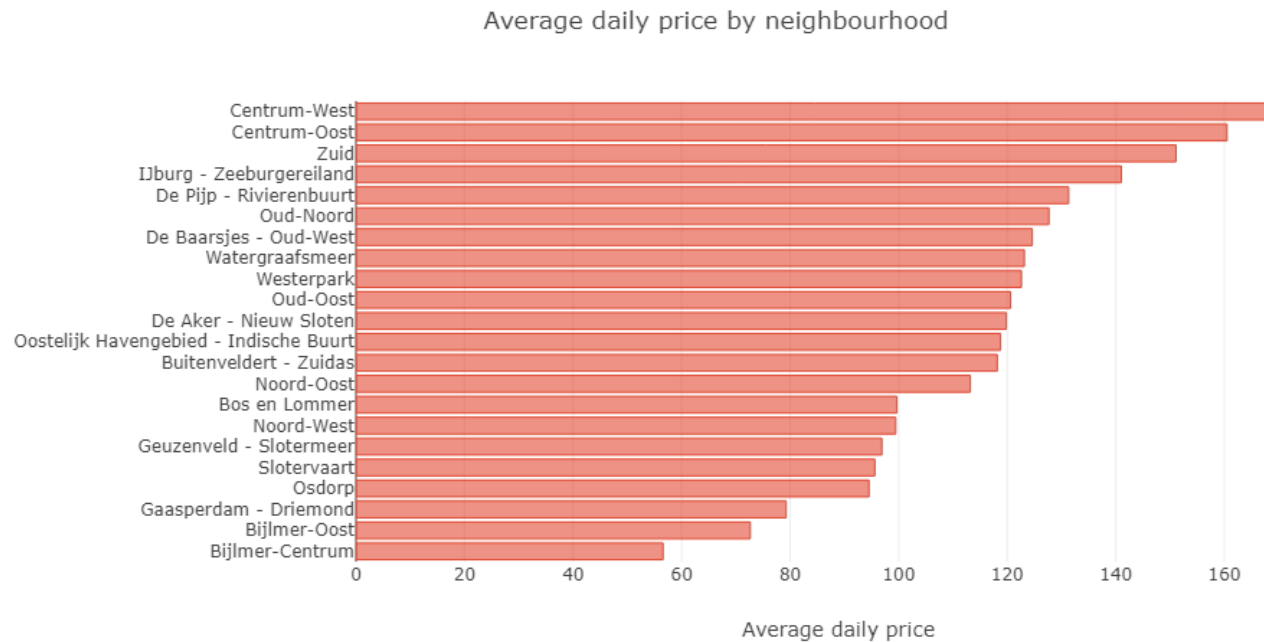
Important features to price

2.2 Price



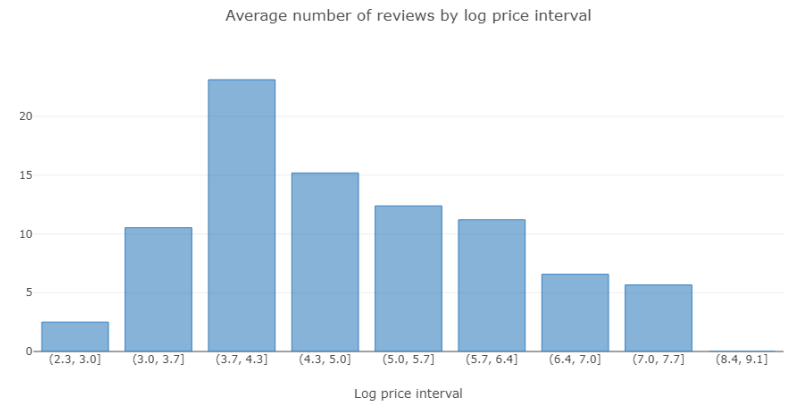
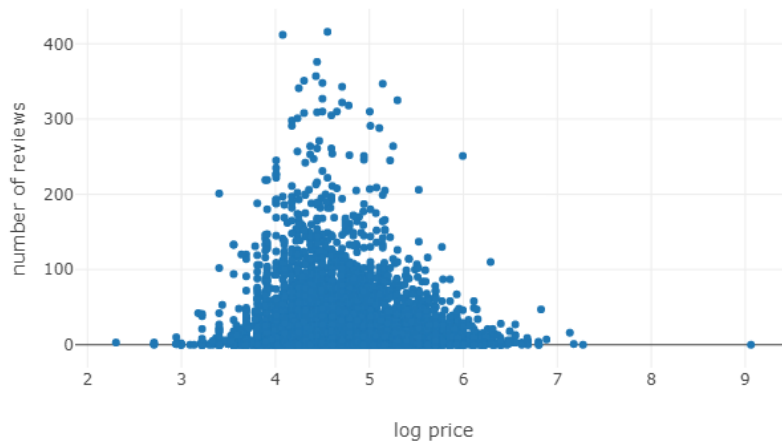
price and room type

2.2 Price



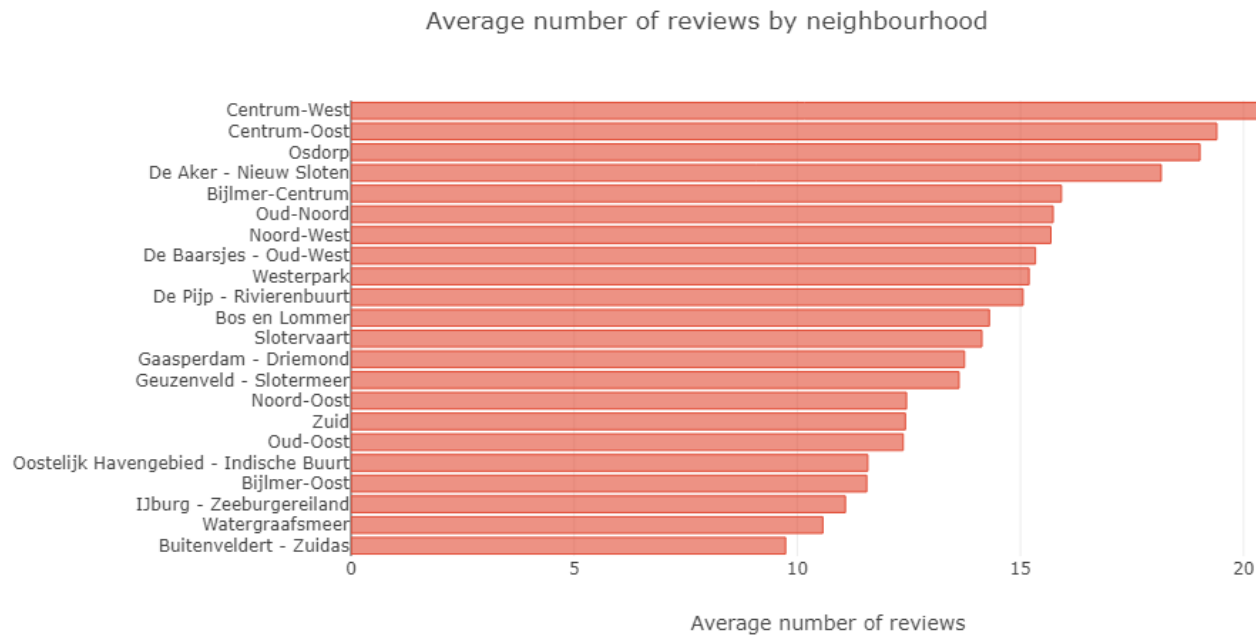
price and neighbourhood

2.3 Number of Reviews



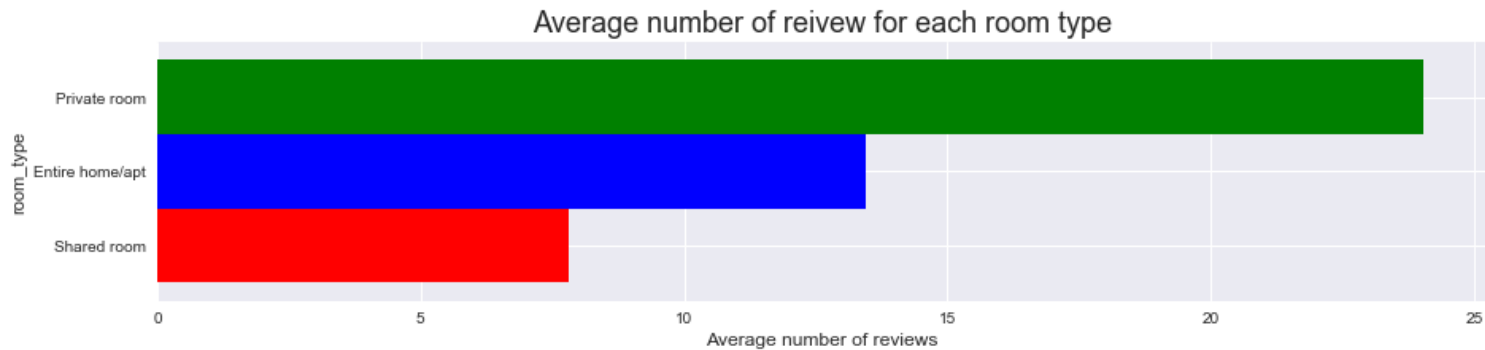
number of reviews and price

2.3 Number of Reviews



number of reviews and neighbourhood

2.3 Number of Reviews



number of reviews and room type

2.4 Hosts

```
df_popular_hosts
```

host_id	
186729	416.0
2182947	412.0
1979865	341.0
7867565	310.0
2331953	310.0
3556421	309.0
935742	305.0
1232843	305.0
1849988	291.0
276068	288.0
2586026	285.5
732783	278.0
1672823	273.0
935723	267.2

average number of reviews for each host

2.4 Hosts

	host_id	host_name	calculated_host_listings_count
938	669178	Sammy	156
2467	6999042	Douwe&Niki	128
11346	1464510	Michiel And Jane	98
11545	48703385	Tillan	71
6633	7002898	Twan	57
4280	4979621	Jorrit&Dirk	46
13837	517215	Niels En Viv	35
10463	1266717	Team Key-BnB	34
2474	8558897	Alexander	33
11338	8543234	Priscilla	28

number of listings owned by each host

Contents

3. Recommendation

- Municipality
- Tourists
- Landlords

3.1 Municipality

Q1. Which violations of Amsterdam rentals rules exist in the data? (illegal Airbnbs)

The rules stipulate short-stays can only be conducted if the following requirements are met:

- The resident owns the property
- A maximum of four guests at any one time
- The owner pays 5.5 per cent tourist tax
- The body corporate (VVE) must approve
- Guests must not cause any disturbance
- The total rental period is no more than 60 days a year
- The property must comply with fire safety regulations

Fines

DutchNews.nl

People caught breaking the rules can be fined €6,000 for a first offence, mounting to €20,000 for repeated illegal rentals. City officials handed out 148 fines in the first six months of this year and closed 61 apartments which were being rented out illegally to too many people.

3.1 Municipality

- The total rental period is no more than 60 days a year
- Entire home/apt
- Reviews per month > 5
- Number of reviews > 60 (only consider old houses)

3.1 Municipality

- The total rental period is no more than 60 days a year

	name	room_type	price	number_of_reviews	reviews_per_month
482	charming dikehouse / green view	Entire home/apt	125	94	7.56
589	Modern Loft, near the city centre	Entire home/apt	55	169	5.06
965	Modern Houseboat/Large Roof Terrace	Entire home/apt	85	142	6.26
1103	Boat in the heart of the centre	Entire home/apt	65	78	5.84
1299	Singel Canal Apartment	Entire home/apt	273	68	5.15
1326	City View Apart. 3 in Center A'Dam!	Entire home/apt	136	76	5.07
1451	Stylish apartment in the citycenter	Entire home/apt	99	192	6.85
1454	Cosy little studio in a houseboat.	Entire home/apt	100	86	5.33
1500	nicely renovated Jordaan apartment	Entire home/apt	99	197	6.59
1598	9 Streets City Centre Apartment	Entire home/apt	140	129	8.96
1681	Central - 2bathroom, canalhouse!	Entire home/apt	200	75	6.50
1851	HISTORICAL DOWNTOWN AMSTERDAM	Entire home/apt	100	68	6.09
2002	Luxurious spacious suite Jordaan	Entire home/apt	149	81	6.08
2124	The Backroom - Central private appt	Entire home/apt	95	416	6.77

3.1 Municipality

- The total rental period is no more than 60 days a year
extra income:

	name	room_type	price	number_of_reviews	reviews_per_month	extra_days_per_year	estimated_extra_income
482	charming dikehouse / green view	Entire home/apt	125	94	7.56	30.72	3072.000
589	Modern Loft, near the city centre	Entire home/apt	55	169	5.06	0.72	31.680
965	Modern Houseboat/Large Roof Terrace	Entire home/apt	85	142	6.26	15.12	1028.160
1103	Boat in the heart of the centre	Entire home/apt	65	78	5.84	10.08	524.160
1299	Singel Canal Apartment	Entire home/apt	273	68	5.15	1.80	393.120
1326	City View Apart. 3 in Center A'Dam!	Entire home/apt	136	76	5.07	0.84	91.392
1451	Stylish apartment in the citycenter	Entire home/apt	99	192	6.85	22.20	1758.240
1454	Cosy little studio in a houseboat.	Entire home/apt	100	86	5.33	3.96	316.800
1500	nicely renovated Jordaan apartment	Entire home/apt	99	197	6.59	19.08	1511.136
1598	9 Streets City Centre Apartment	Entire home/apt	140	129	8.96	47.52	5322.240
1681	Central - 2bathroom, canalhouse!	Entire home/apt	200	75	6.50	18.00	2880.000

3.1 Municipality

- The residents owns the apartment (subletting is not allowed)

	id	name	host_id	host_name	neighbourhood	latitude	longitude	room_type	price	minimum_nights	number_of_reviews	I
41	13779421	Short stay room in Amsterdam (in student house)	80899279	Ruben	Bijlmer-Oost	52.326430	4.982602	Private room	27	1	0	
803	12255457	studenten kamer verhuur, 2 weken	65991515	Niene	Oud-Noord	52.393074	4.912842	Private room	30	22	0	
9159	13757750	Large rooftop room for Jewish travelers or stu...	16980515	Viktor	Zuid	52.348111	4.879821	Private room	70	2	0	
13414	13760191	Cozy student room with access to a balcony	80637547	Vera	Slotervaart	52.356102	4.824416	Private room	39	2	0	
13420	7730221	Cozy student room	40620686	Belen	Slotervaart	52.350677	4.844827	Private room	50	1	10	

3.1 Municipality

- The residents owns the apartment (subletting is not allowed)

extra income:

all the income in this case are illegal

3.1 Municipality

- A maximum of four guests at any one time.

	id	name	host_id	host_name	neighbourhood	latitude	longitude	room_type	price	n
838	11000373	Familyhouse 4-6 pers - Free Parking	56942995	Erika	IJburg - Zeeburgereiland	52.356417	4.998723	Entire home/apt	200	
1004	6826794	Deluxe waterfront villa, 4-8 pers.	28640347	Marc & Ellen	IJburg - Zeeburgereiland	52.353439	4.993091	Entire home/apt	165	
1432	11367985	8 person apartment centre Amsterdam	51988897	Joep	Centrum-West	52.373002	4.887134	Entire home/apt	651	
2468	9840461	Redlight District! app. (6/7 pers.)	17957337	Elmer	Centrum-West	52.372130	4.899411	Entire home/apt	496	
3183	11263224	Spacious apartment 4- 6 persons	58798486	Owner	Oostelijk Havengebied - Indische Buurt	52.377594	4.926632	Entire home/apt	200	
3292	3885680	Room for max 5 persons	20004778	Saab	Oostelijk Havengebied - Indische Buurt	52.376463	4.935279	Private room	120	
3387	10877893	Room for max 7 persons on Java/KNSM	56354281	Sem	Oostelijk Havengebied - Indische Buurt	52.377957	4.935609	Entire home/apt	120	

3.1 Municipality

- A maximum of four guests at any one time.

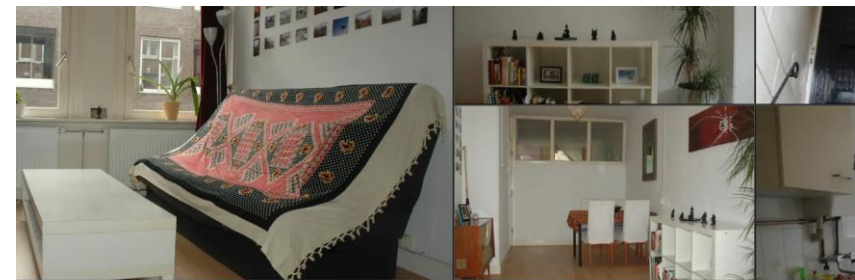
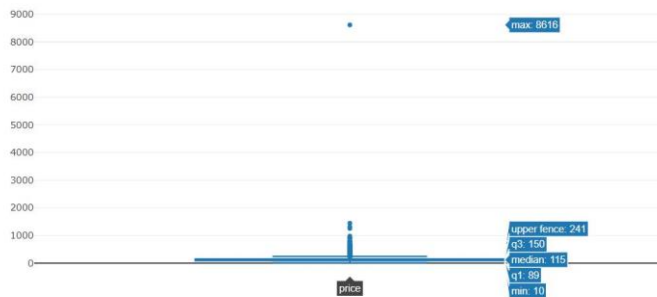
extra income:

Depends on whether the landlord charges the extra guests
if not, no extra income, otherwise that part of income is illegal,
and also need to be fined

3.1 Municipality

Q2. What are the potential problems in Airbnb?

➤ Extreme high price



[Details](#) · [Evaluation](#) · [Date available](#) · [position](#) · [Notice](#) · [landlord](#)

AMSTERDAM · ENTIRE APARTMENT

Great CENTRAL apartment De Pijp

1 bedroom · 1 bed · 1 bathroom · Up to 4 people



Host: Peter [Contact the landlord](#)
Received 20 reviews

€8,000 per night
★★★★ 8

date

Check-in date → Check-out date

Number of people

1 person

	id	name	host_id	host_name	neighbourhood	latitude	longitude	room_type	price	minimum_nights	number_of_reviews
9395	12793635	Museum plein/van Gogh/Rijks	69667343	Maurits	Zuid	52.3591	4.87871	Entire home/apt	8616	1	0
3266	4673471	Sailingship Succes in Amsterdam	24174723	Naupar	Oostelijk Havengebied - Indische Buurt	52.3802	4.92561	Entire home/apt	1442	2	0
642	5587500	Faralda Crane Hotel Amsterdam	21831151	Faralda	Oud-Noord	52.3995	4.89468	Entire home/apt	1307	1	1

Vila Cathedral - whole

Entire

3.1 Municipality

➤ Hosting on a commercial basis

	host_id	host_name	calculated_host_listings_count
938	669178	Sammy	156
2467	6999042	Douwe&Niki	128
11346	1464510	Michiel And Jane	98
11545	48703385	Tillan	71
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3.1 Municipality

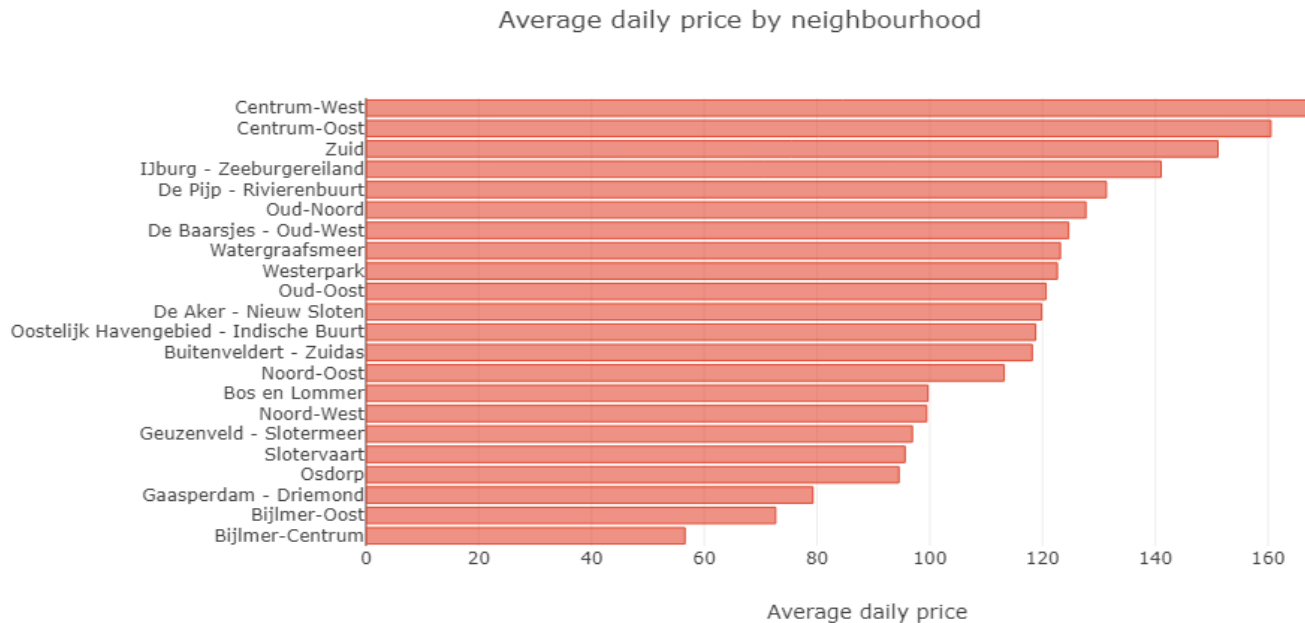
➤ Hosting on a commercial basis

108	13630140	COZY holiday apt. located trendy north + garden!	669178	Sammy	Noord-Oost	52.392942	4.950952	Entire home/apt	79	2
139	13646589	STUNNING family apt with balcony!	669178	Sammy	Noord-Oost	52.395972	4.939867	Entire home/apt	149	2
160	13324378	GREAT family apt. with a big garden + trampoline!	669178	Sammy	Noord-Oost	52.390396	4.957286	Entire home/apt	149	2
258	13288525	COZY apt. with terrace, vibrant trendy north!	669178	Sammy	Noord-West	52.402611	4.917184	Entire home/apt	79	2
310	12635696	STUNNING family home + terrace!	669178	Sammy	Noord-West	52.406062	4.899825	Entire home/apt	149	2
328	13090802	Spacious house with 2 bedrooms + garden!	669178	Sammy	Noord-West	52.409222	4.901337	Entire home/apt	149	2
330	13680265	LOVELY family home with sunny garden!	669178	Sammy	Noord-West	52.408937	4.900773	Entire home/apt	149	2
662	13646226	LOVELY family home with garden!	669178	Sammy	Oud-Noord	52.393070	4.915250	Entire home/apt	149	2
699	13183470	LOVELY apt. with garden, 2 bedrooms! Vibrant N...	669178	Sammy	Oud-Noord	52.388102	4.920634	Entire home/apt	149	2
828	13630849	GORGEOUS studio with great view!	669178	Sammy	IJburg - Zeeburgerreiland	52.348476	5.005751	Entire home/apt	69	2

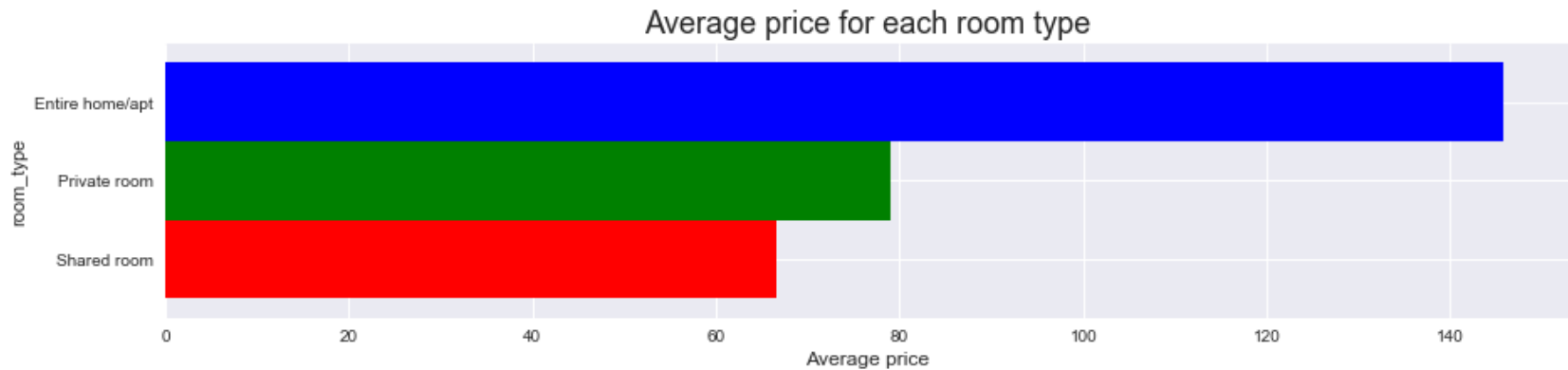
Municipality may consider setting a maximum number of listings per host that is allowed in Amsterdam

3.2 Tourists

Q1. Where to live if with a limited budget?



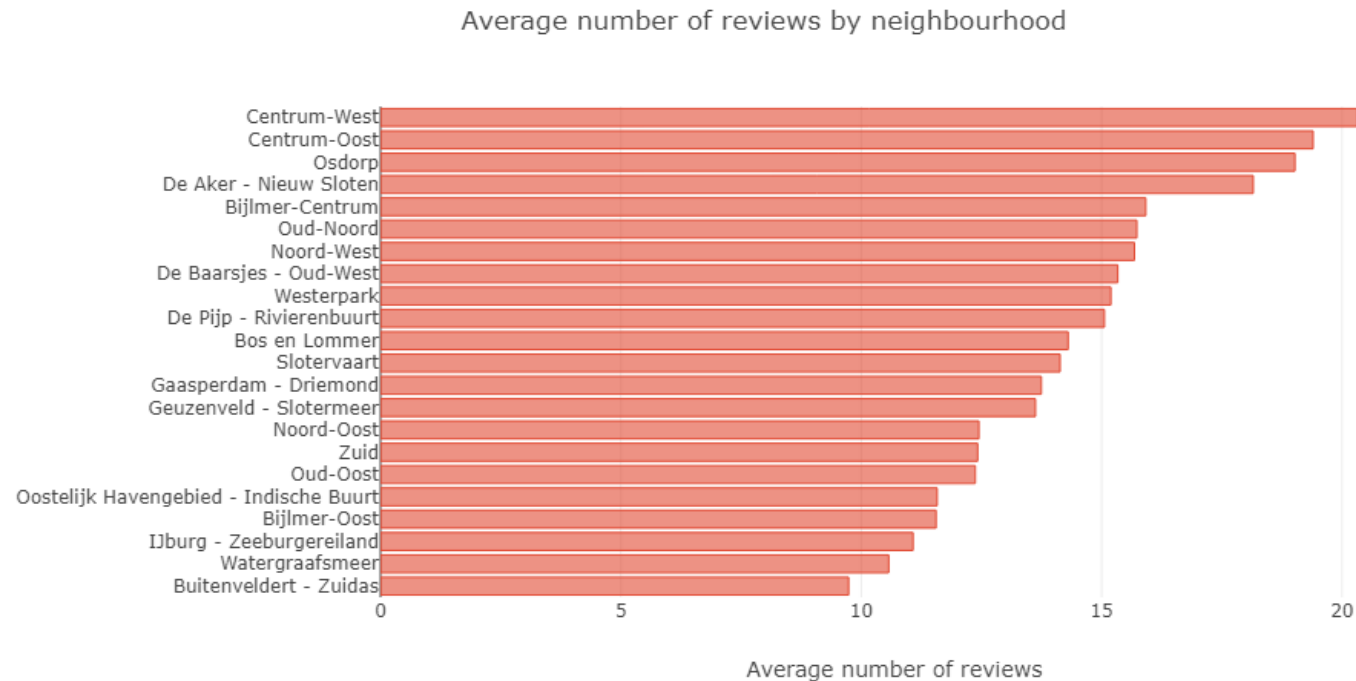
3.2 Tourists



Private rooms are more cost effective

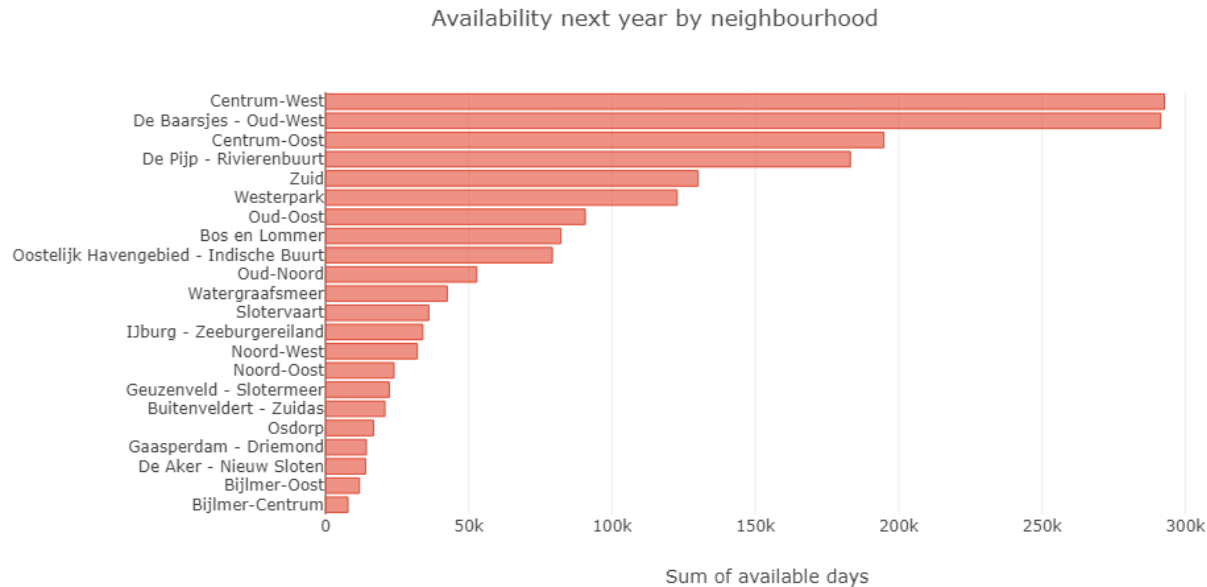
3.2 Tourists

Q2. Which neighbourhoods are popular?



3.2 Tourists

Q3. Which neighbourhood has the most available listings next year?



3.2 Tourists

Q4. Which hosts are popular?

```
df_popular_hosts
```

host_id	
186729	416.0
2182947	412.0
1979865	341.0
7867565	310.0
2331953	310.0
3556421	309.0
935742	305.0
1232843	305.0
1849988	291.0
276068	288.0

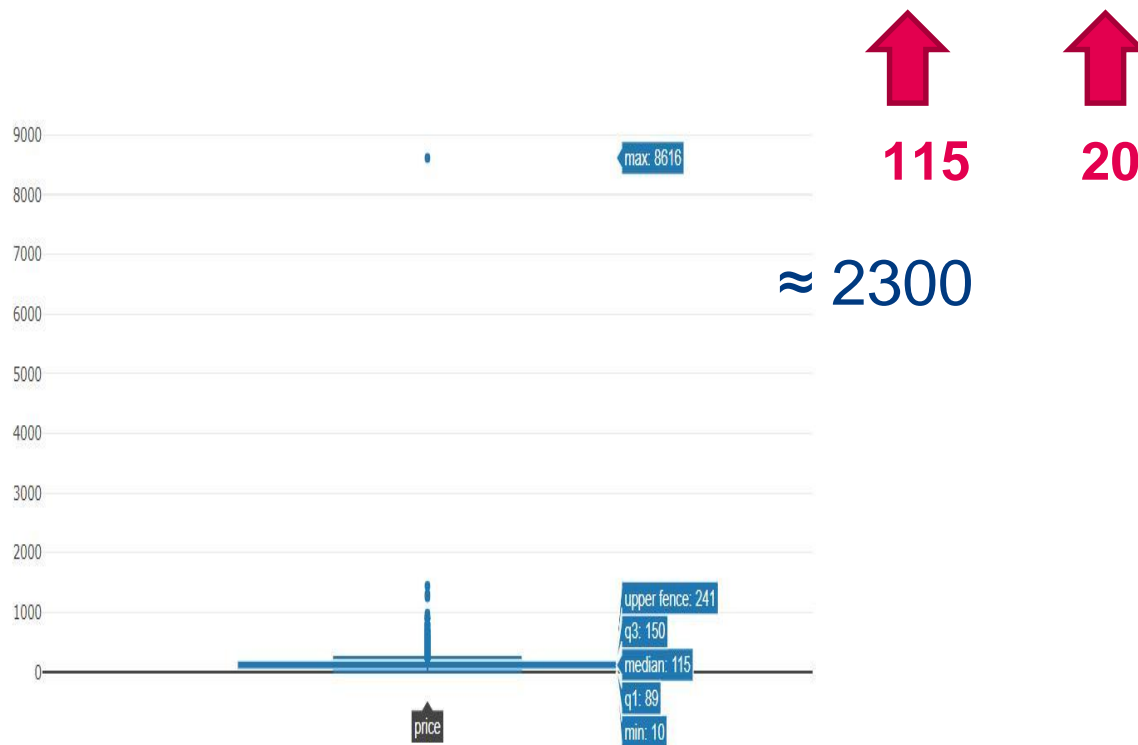
3.3 Landlords

Q1. What is the return on investment (ROI) of a house that is permanently let through Airbnb?

$$\text{ROI} = (\text{Current Value of Investment} - \text{Cost of Investment}) / \text{Cost of Investment}$$

3.3 Landlords

current value per month = price * days



3.3 Landlords

cost per month = house price + tax + other

Amsterdam TIPS

The **median price** for a house/apartment in Amsterdam is currently around **€450,000**, compared to €300,000 in the Netherlands as a whole.

House Price:

This is the house price in 2019, considering the increase of house prices, we assume the median price for a house / apartment in Amsterdam is € 400,000.

You need

Mortgage	€ 400.000,-
Own capital	€ 11.865,-



Monthly cost

Gross	€ 1.371,-
Net	€ 1.272,-



3.3 Landlords

cost per month = house price + tax + other

house price ≈ 1272

tax $\approx 115 * 20 * 0.3 = 690$

other ≈ 50

cost per month = $1272 + 690 + 50 = 2012$

current value per month = 2300

ROI = $(2300 - 2012) / 2012 = 14.3\%$

Landlords

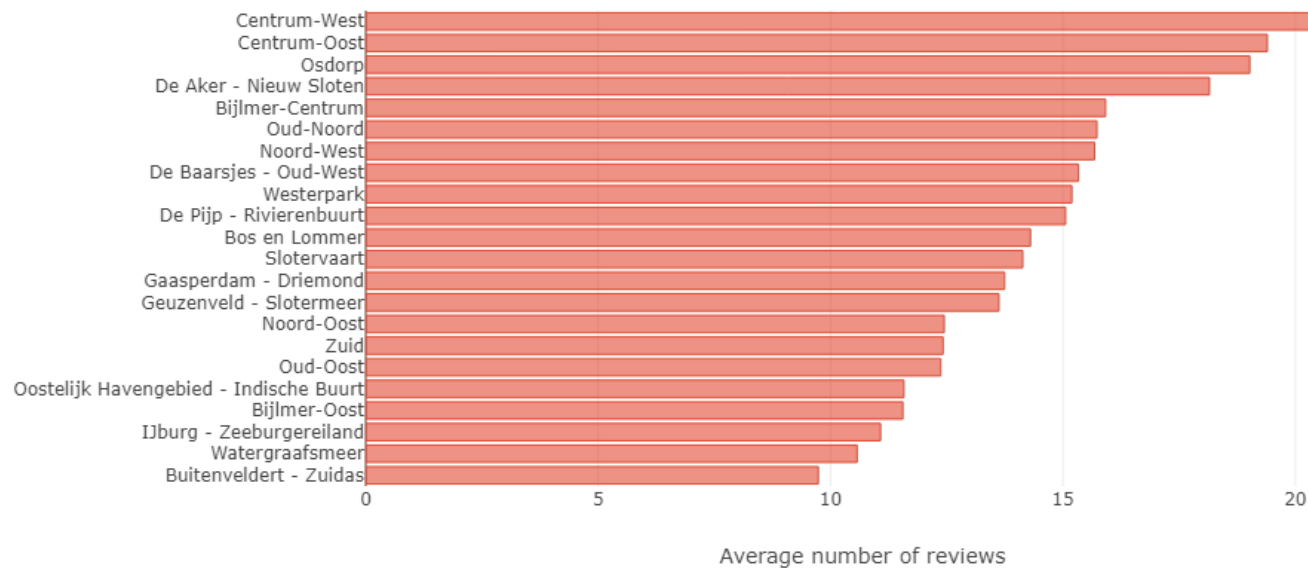
Q2. How to make your Airbnb popular?

- Popular Neighborhoods
- Popular Room Types
- Pricing Strategy

Landlords

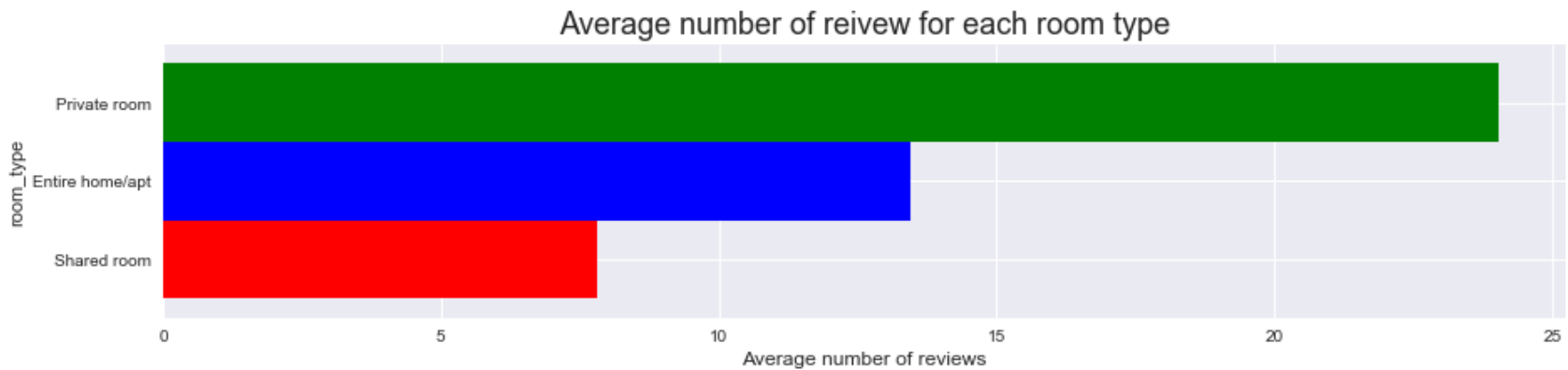
- Popular Neighborhoods

Average number of reviews by neighbourhood



Landlords

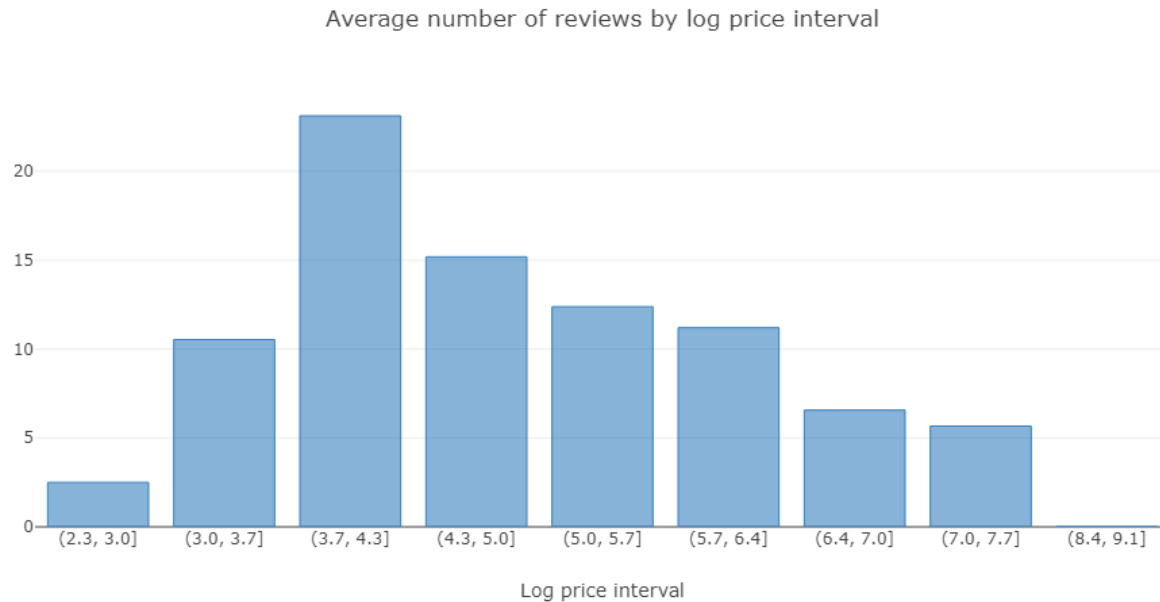
- Popular Room Types



Private room most popular

Landlords

- Pricing Strategy



Most Popular Price €40 ~ €74 per night

3.3 Landlords

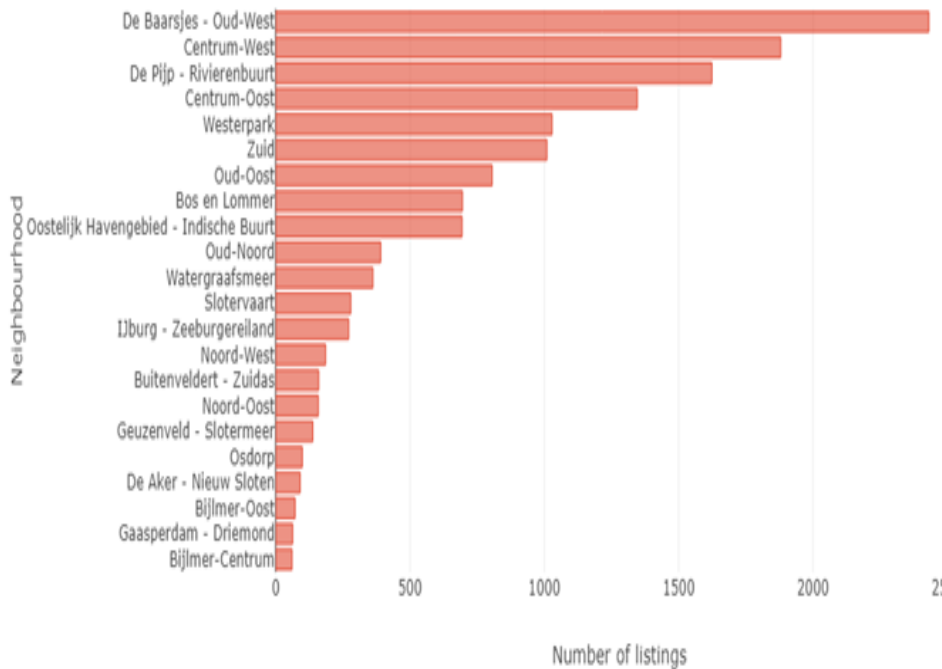
Q3. Which neighborhood is a good choice to let airbnbs?

Neighborhoods where listings are popular.

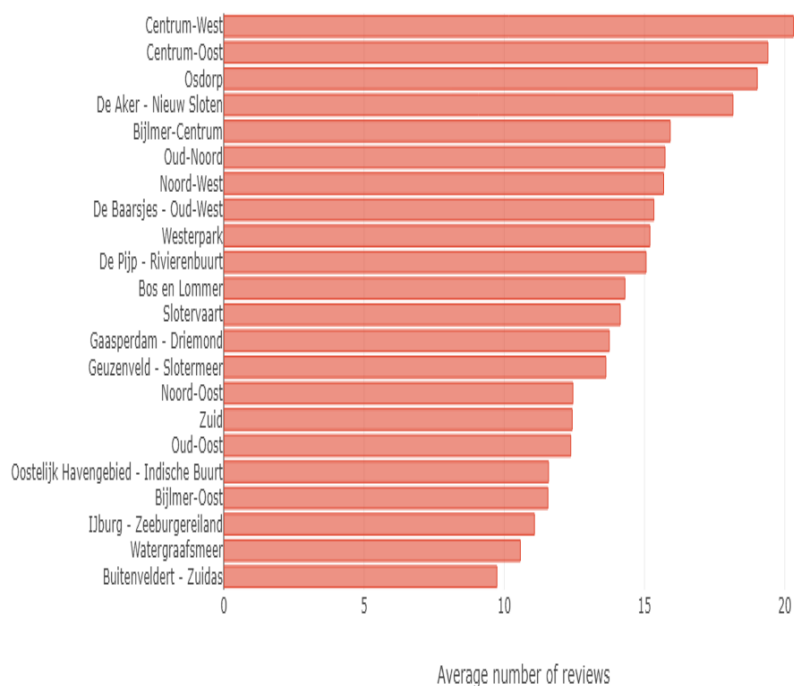
Neighborhoods where listings are in demand.

3.3 Landlords

Number of listings by neighbourhood



Average number of reviews by neighbourhood

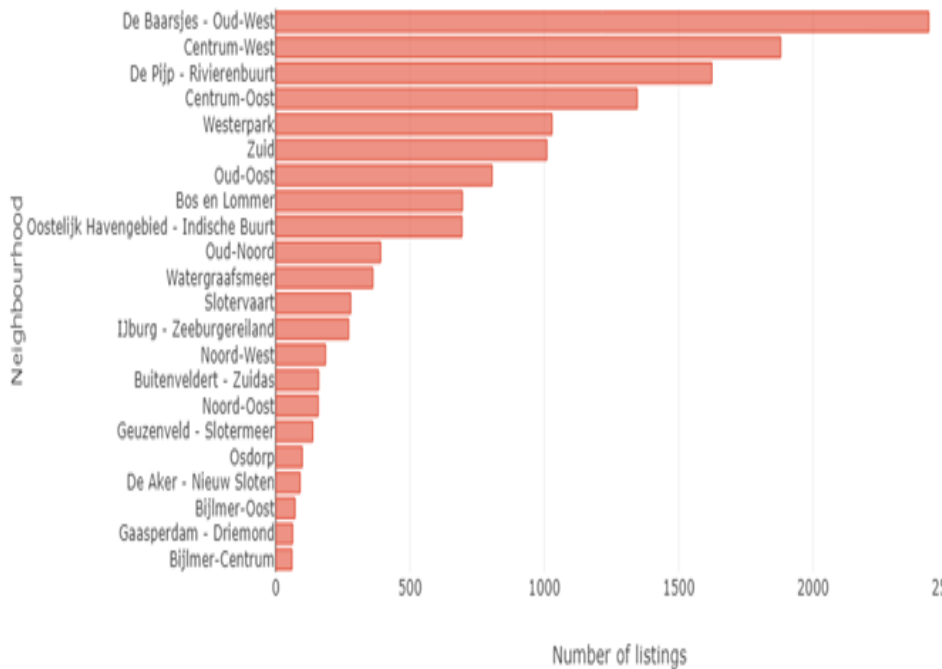


Good choices:

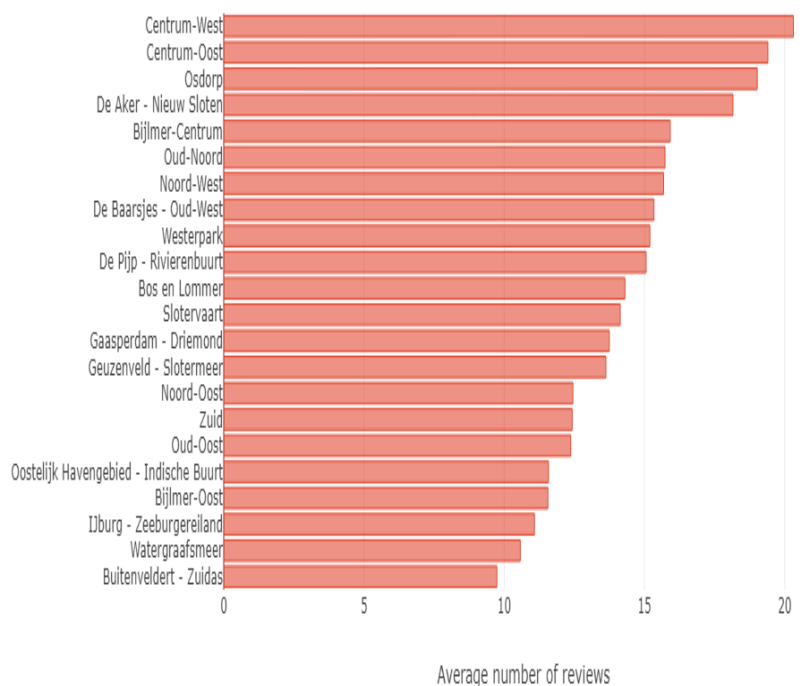
Bijlmer-Centrum, De Aker – Nieuw Sloten, Osdorp

3.3 Landlords

Number of listings by neighbourhood



Average number of reviews by neighbourhood



Avoid:
Zuid, Oud-Oost



Thank you
for your
attention