

Amsterdam city – Best Restaurant location

Amsterdam is the commercial capital of the Netherlands and one of the top financial centers in Europe. Many International Corporates have established their European headquarters in Amsterdam.

Amsterdam city metropolitan area has been selected due to its unique position as the official capital city of The Netherlands, the vibrant city life, multinational demographics, and as well a very popular destination for tourists. Amsterdam metropolitan area has excellent public transport infrastructure, including its famous cycling paths. The city has a large variety of museums, clubs, natural, and sports centers, public markets and coffee-shops / restaurants.

Amsterdam is a relatively expensive city, very popular within the expat's community living and working in The Netherlands. Demographics will be addressed at the data section below.

Our company has to make an analytical project that will support decision making for the new restaurant location, considering the viable options discovered, and based on specific data and criteria discussed below.

The new restaurant is planned to be of a new concept of high-quality top international cuisine that is expected to compete well within the large diversity of restaurants. However, the exact restaurant type might change, after the full analysis provides more insights based on location, demographics and spending power. The main problem to be resolved is to find the optimal location in Amsterdam city and surroundings that would allow the business to be quickly deployed – the untapped locations.

Data for this project

The data used for acquisition and preprocessing in this project will be open public data available from Wikipedia on Amsterdam and its Boroughs, Open-Data portal of the city, and European Data Portal.

We will be using Foursquare API and geopy data together with available data from Amsterdam open data portal to retrieve venues information in Amsterdam Boroughs and process them using location clustering and filter / count relevant information (we are interested in restaurants locations).

The data used for the analysis will include:

- Amsterdam boroughs
- Venue type and locations (Foursquare API)
- Boroughs segmentation
- Geolocation data
- Demographics
- Cuisine types (optional) as Amsterdam is mixed international cuisine
- Supply chain availability (fresh products direct from producers)

We are acquiring the following data and consolidate it in one table:

1. Amsterdam Boroughs names, geolocation and population data.
2. Using Foursquare API we retrieve from Boroughs the venue information using filtering to 'Restaurant' venue type.

3. Map all data acquired in one Analytical Base Table on Amsterdam Borough names.

Initial Data on Boroughs, Population and Geographical coordinates:

	Borough	Population	Latitude	Longitude
0	Centrum	86422	52.369985	4.898014
1	Noord	94766	52.391111	4.918306
2	Nieuw-West	151677	52.363742	4.806862
3	Oost	135767	52.352778	4.930556
4	West	143842	52.383025	4.852867
5	Zuid	144432	52.346389	4.858611
6	Zuidoost	87854	52.310556	4.973333

Note: we removed for the main table the Borough Westpoort since it is an industrial area (main harbor), and it has a population under 200 residents, we focus on the other 7 Boroughs.

Data exploration and visualization

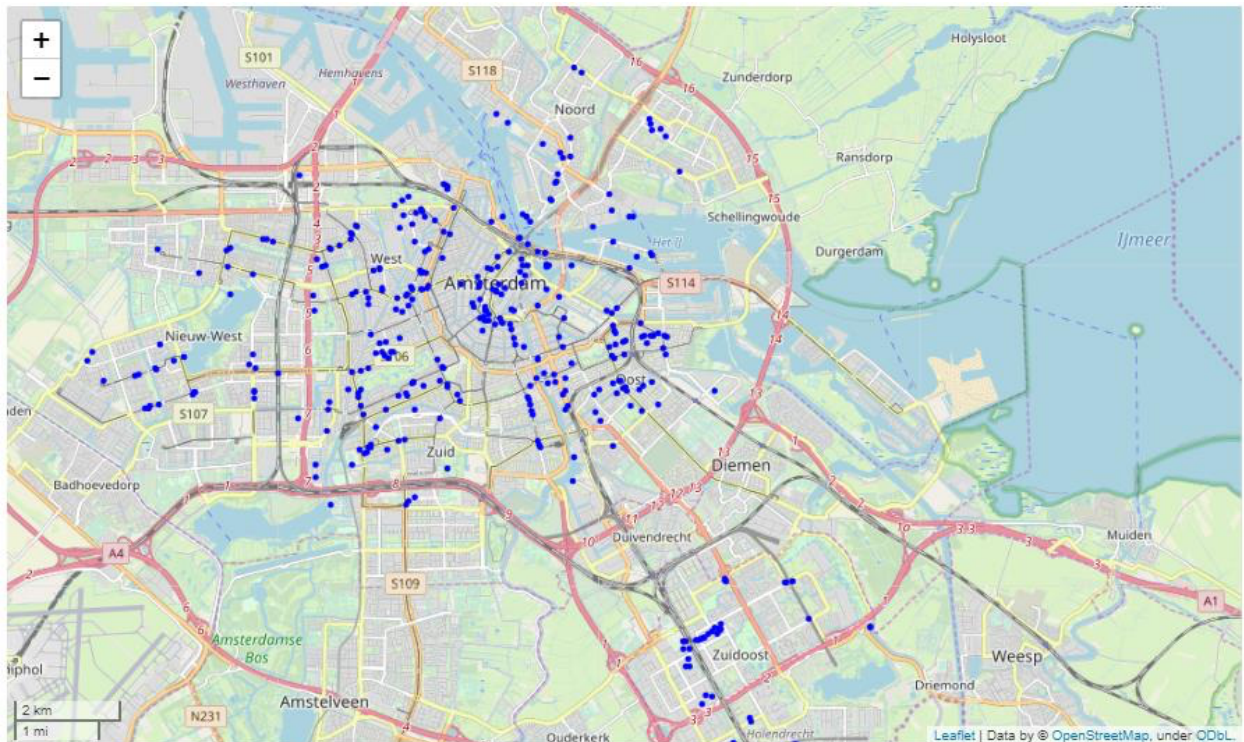
We explore the table created and we perform additional filtering of the venues since the Foursquare API retrieved all the venues related to Fast Food, Snack-Bar, Bakery (&etc.) type of locations.

We will be retaining in the table only venues clearly having Restaurant profile reducing the data as well from 75 categories (all initial venues) to 47 (Restaurant only venues).

We have identified 367 locations of Restaurant type. Sample below.

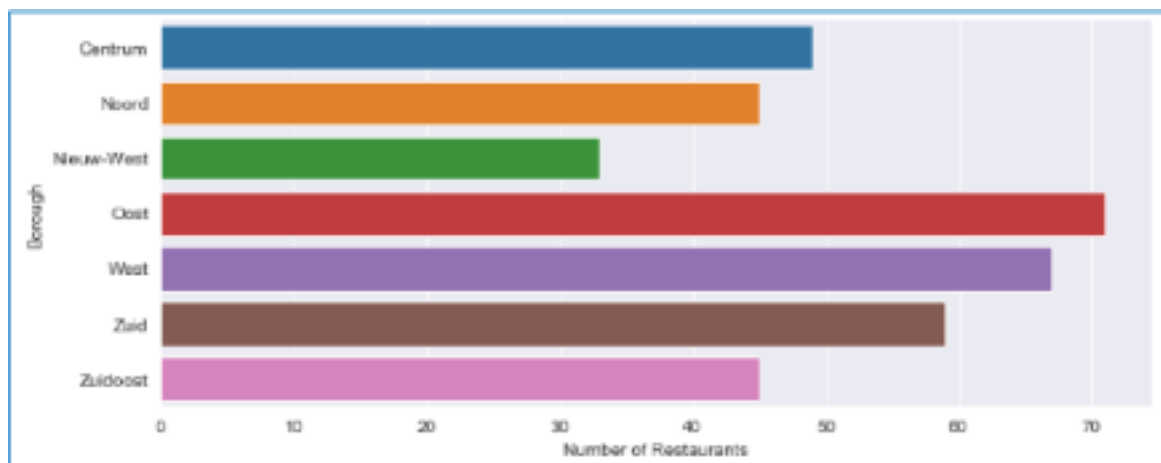
	Borough	Borough Lat	Borough Lng	Venue	Venue Lat	Venue Lng	Venue Category
0	Centrum	52.369985	4.898014	The Lobby	52.371159	4.893661	Restaurant
1	Centrum	52.369985	4.898014	"Krua Thai" Classic	52.368207	4.898012	Thai Restaurant
2	Centrum	52.369985	4.898014	Puccini EspressoBar	52.368126	4.898638	Italian Restaurant
5	Centrum	52.369985	4.898014	Café van Kerkwijk	52.371494	4.893658	Restaurant
7	Centrum	52.369985	4.898014	Bridges Restaurant	52.370818	4.895087	Seafood Restaurant
11	Centrum	52.369985	4.898014	Pho King	52.368789	4.894902	Vietnamese Restaurant
12	Centrum	52.369985	4.898014	CAU	52.372368	4.894503	Argentinian Restaurant
13	Centrum	52.369985	4.898014	Ealmosfera	52.366115	4.895121	Italian Restaurant
15	Centrum	52.369985	4.898014	The Seafood Bar	52.368730	4.890600	Seafood Restaurant
16	Centrum	52.369985	4.898014	Bhatti Pasal	52.368055	4.890838	Restaurant

Visualizing on map all the Restaurant positions we identified.



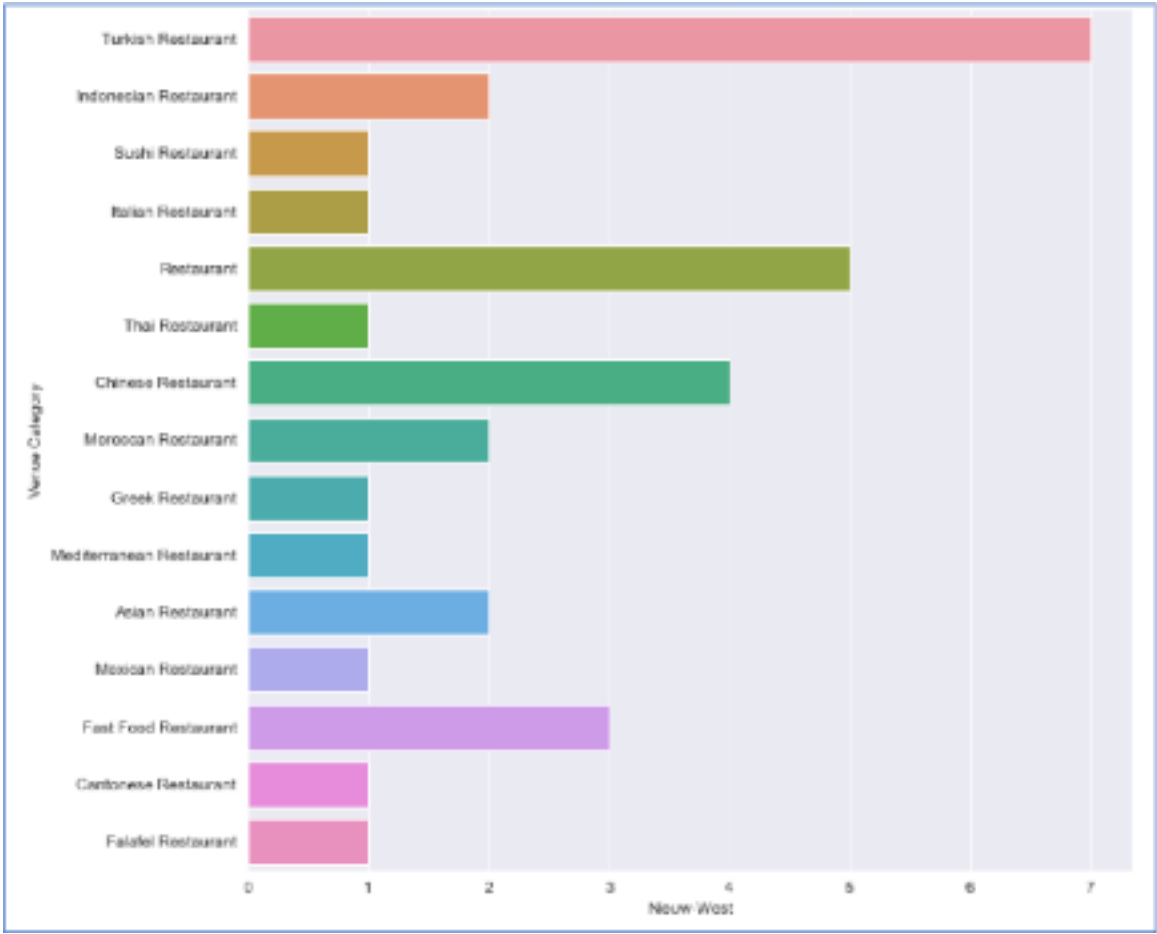
Patterns in the Data

We also can visualize Restaurant total counts per Borough:



A sample focused for the Nieuw -West Borough area for which we clearly observe a lower density of Restaurants with a high number of national specific cuisine.

All the Boroughs graphs and relevant summary data are added in the **Report appendix**.



Comparison based on **total restaurants per Borough** reveals as well **Nieuw-West** lower Restaurant capacity

Borough	Borough Lat	Borough Lng	Venue	Venue Lat	Venue Lng	Venue Category
Centrum	49	49	49	49	49	49
Nieuw-West	33	33	33	33	33	33
Noord	45	45	45	45	45	45
Oost	71	71	71	71	71	71
West	67	67	67	67	67	67
Zuid	59	59	59	59	59	59
Zuidoost	45	45	45	45	45	45

Overview of **Top 10 Restaurant types** per Borough:

	Borough	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Centrum	Restaurant	French Restaurant	Italian Restaurant	Thai Restaurant	Mediterranean Restaurant	Chinese Restaurant	Seafood Restaurant	Lebanese Restaurant	Vietnamese Restaurant	American Restaurant
1	Nieuw-West	Turkish Restaurant	Restaurant	Chinese Restaurant	Fast Food Restaurant	Moroccan Restaurant	Indonesian Restaurant	Asian Restaurant	Pakistani Restaurant	Caribbean Restaurant	Greek Restaurant
2	Noord	Restaurant	Turkish Restaurant	Chinese Restaurant	Italian Restaurant	Asian Restaurant	Seafood Restaurant	Japanese Restaurant	Modern European Restaurant	Indonesian Restaurant	Vegetarian / Vegan Restaurant
3	Oost	Restaurant	Italian Restaurant	French Restaurant	Vegetarian / Vegan Restaurant	Turkish Restaurant	Thai Restaurant	Indonesian Restaurant	Middle Eastern Restaurant	Modern European Restaurant	Indian Restaurant
4	West	Restaurant	Italian Restaurant	Turkish Restaurant	Mediterranean Restaurant	Vegetarian / Vegan Restaurant	Indonesian Restaurant	Seafood Restaurant	Caribbean Restaurant	Pakistani Restaurant	Middle Eastern Restaurant
5	Zuid	Restaurant	Italian Restaurant	French Restaurant	Ethiopian Restaurant	Seafood Restaurant	Indonesian Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Chinese Restaurant	Taiwan Restaurant
6	Zuidoost	Restaurant	Chinese Restaurant	Italian Restaurant	Turkish Restaurant	Asian Restaurant	South American Restaurant	Seafood Restaurant	Scandinavian Restaurant	Pakistani Restaurant	Mediterranean Restaurant

Feature selection, Data preparation, and Clustering

It is clear the features we are looking to use are the restaurant types for which we will perform clustering using K-Means to further identify how they position on Amsterdam map.

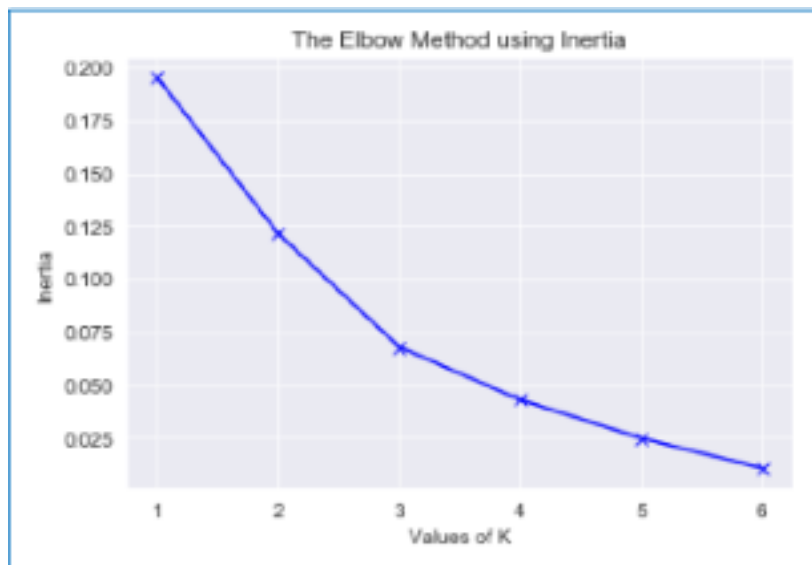
Before clustering we will be performing data encoding using one-hot method on the Venues Category using Pandas `pd.getdummies` method.

Then we take the mean of frequency of occurrence for Venue type per Borough and sum up per 'Restaurant' category.

We notice again Nieuw-West highlighted as low compared to other Boroughs.

Borough	Restaurant
Centrum	0.204082
Nieuw-West	0.151515
Noord	0.400000
Oost	0.211268
West	0.268657
Zuid	0.389831
Zuidoost	0.288889

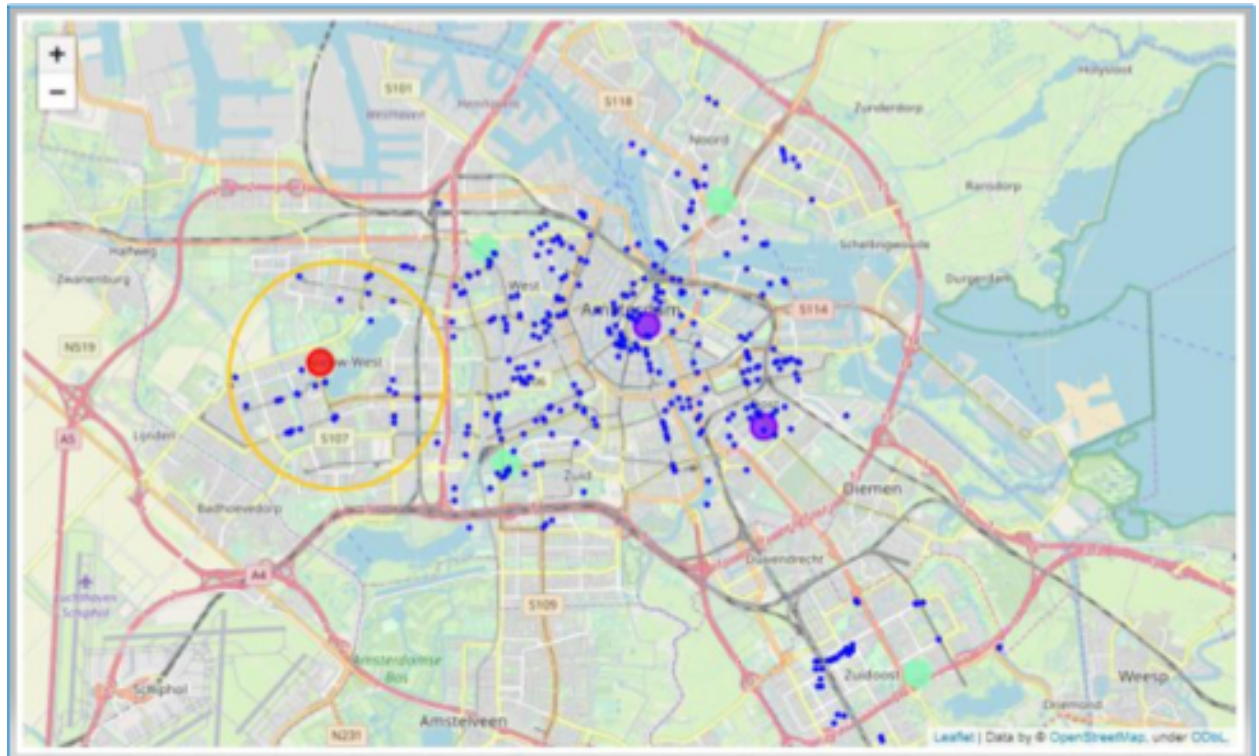
Before starting clustering using K-Means, we need to select optimal k (number of clusters). We use the elbow method. Based on below graph of inertia, the optimal K cluster numbers will be 3:



We perform the clustering, adding the clustering labels to the main table. We notice as well **Nieuw-West** has its own cluster label (0)

Borough	Population	Latitude	Longitude	Cluster_Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue
0	Centrum	52.368805	4.88014	1	Restaurant	French Restaurant	Italian Restaurant	Thai Restaurant	Mediterranean Restaurant	Chinese Restaurant	Seafood Restaurant
1	Noord	52.381111	4.810306	2	Restaurant	Turkish Restaurant	Chinese Restaurant	Italian Restaurant	Asian Restaurant	Seafood Restaurant	Japanese Restaurant
2	Nieuw-West	52.363742	4.80662	0	Turkish Restaurant	Restaurant	Chinese Restaurant	Fast Food Restaurant	Moroccan Restaurant	Indonesian Restaurant	Asian Restaurant
3	Oost	52.352776	4.83656	1	Restaurant	Italian Restaurant	French Restaurant	Vegetarian / Vegan Restaurant	Turkish Restaurant	Thai Restaurant	Indonesian Restaurant
4	West	52.363025	4.85267	2	Restaurant	Italian Restaurant	Turkish Restaurant	Mediterranean Restaurant	Vegetarian / Vegan Restaurant	Indonesian Restaurant	Seafood Restaurant
5	Zuid	52.346389	4.85811	2	Restaurant	Italian Restaurant	French Restaurant	Ethiopian Restaurant	Seafood Restaurant	Indonesian Restaurant	Japanese Restaurant
6	Zuidoost	52.310596	4.873333	2	Restaurant	Chinese Restaurant	Italian Restaurant	Turkish Restaurant	Asian Restaurant	South American Restaurant	Seafood Restaurant

Next, we display the information in the table – 3 clusters and Restaurants positions on Amsterdam map using Folium, highlighting **Nieuw-West Cluster** and Restaurants in the area.



Discussion, Conclusions and Recommendation.

Based on the open data available for the project for Amsterdam city we can conclude there is a very good business opportunity to open a Restaurant in the area.

The city is well developed, has an excellent transport infrastructure, it is a popular residence location for expats, and is the most visited area by tourists.

Supply chain in Amsterdam is available 7 days a week directly from the producers, as farms deliver daily fresh products to the restaurants.

By exploring Amsterdam Boroughs, filtering, processing, aggregating all data in one main table, performing clustering, and visualizing it on Amsterdam map, we identified main untapped locations.

- Amsterdam **Nieuw-West** Borough which has a category type Restaurant (only) **mean 15%** and has a population of 151.677
- **Amsterdam Oost** Borough with a category type Restaurant (only) **mean 21%** and a population of 135.767

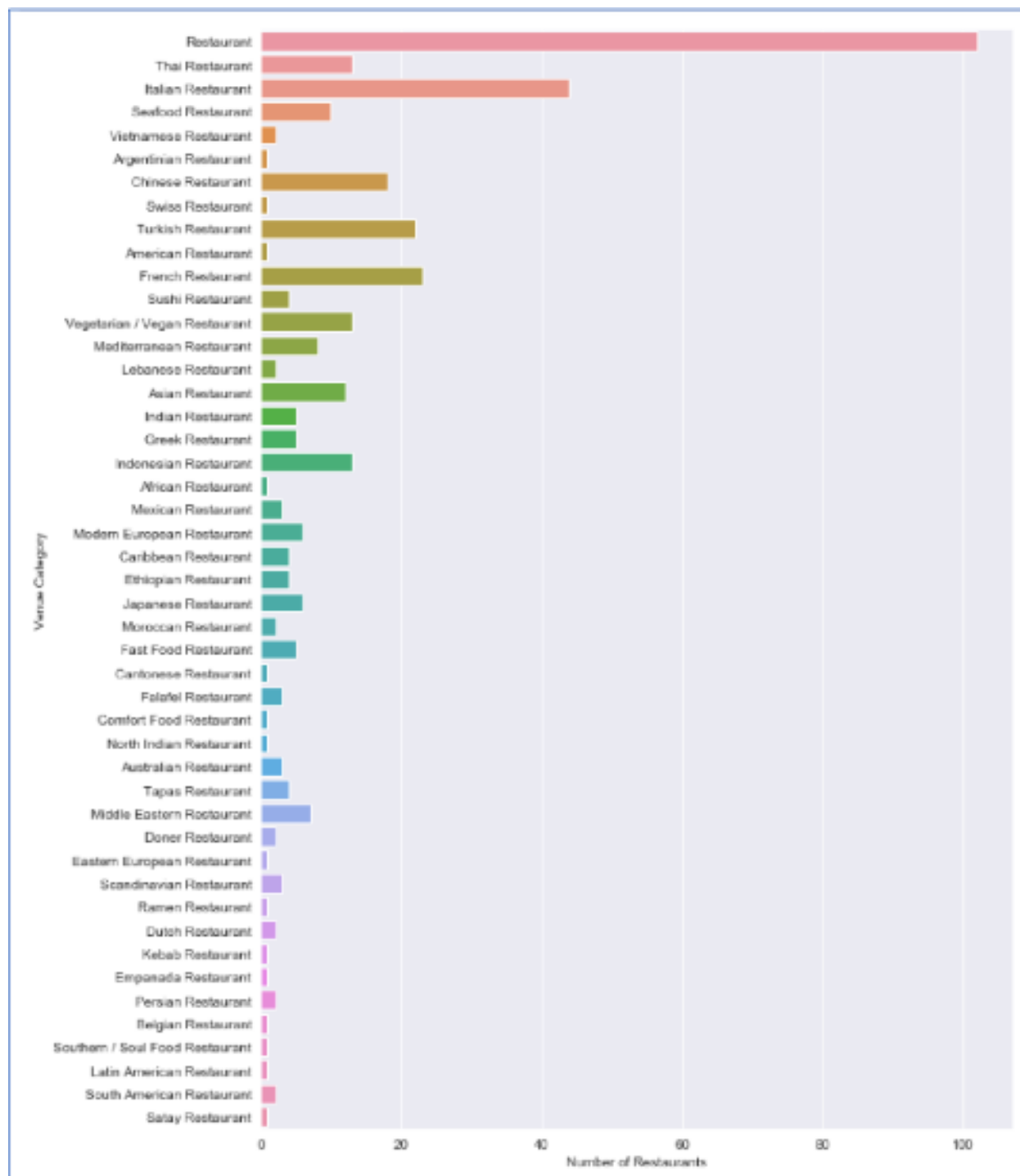
Our final recommendation for IFDR decision makers is to locate the new Restaurant in Amsterdam **Nieuw-West**.

Note in the appendix we have provided all visuals per Borough depicting Restaurant types and size in each area, for further IFDR stakeholder analysis.

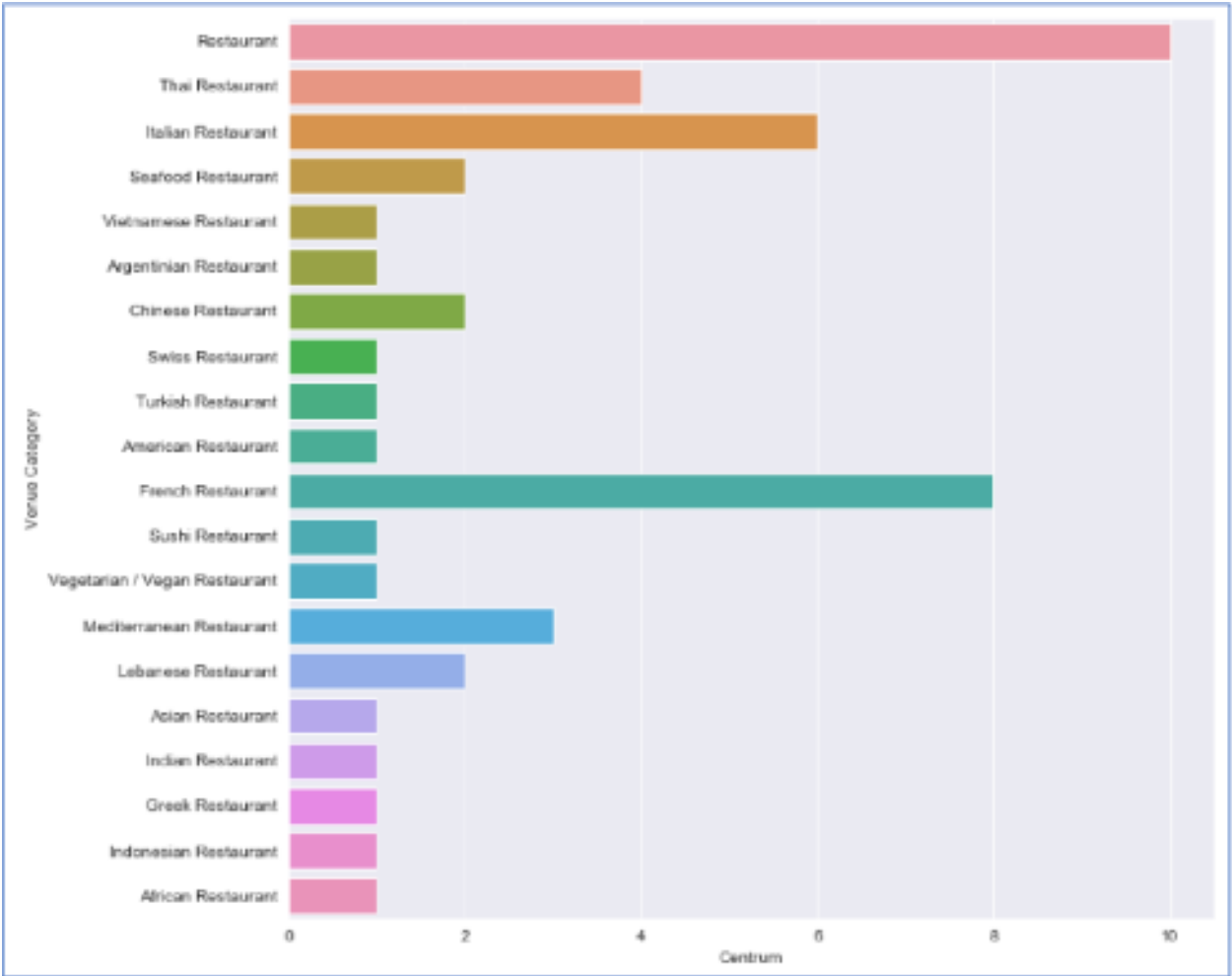
Appendix

Visual graphs summarizing Restaurant type – Totals, and per Borough in Amsterdam

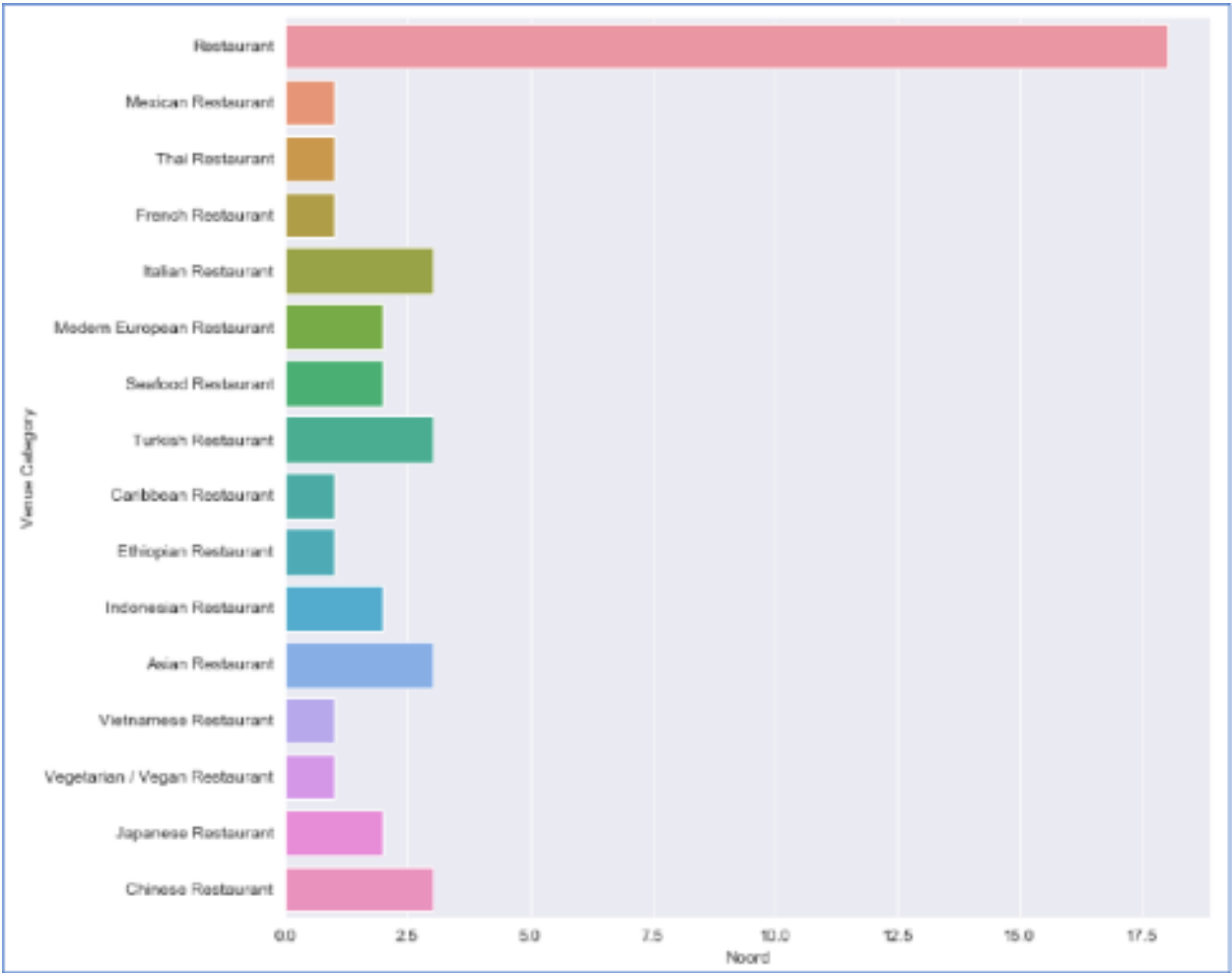
Totals (all Boroughs)



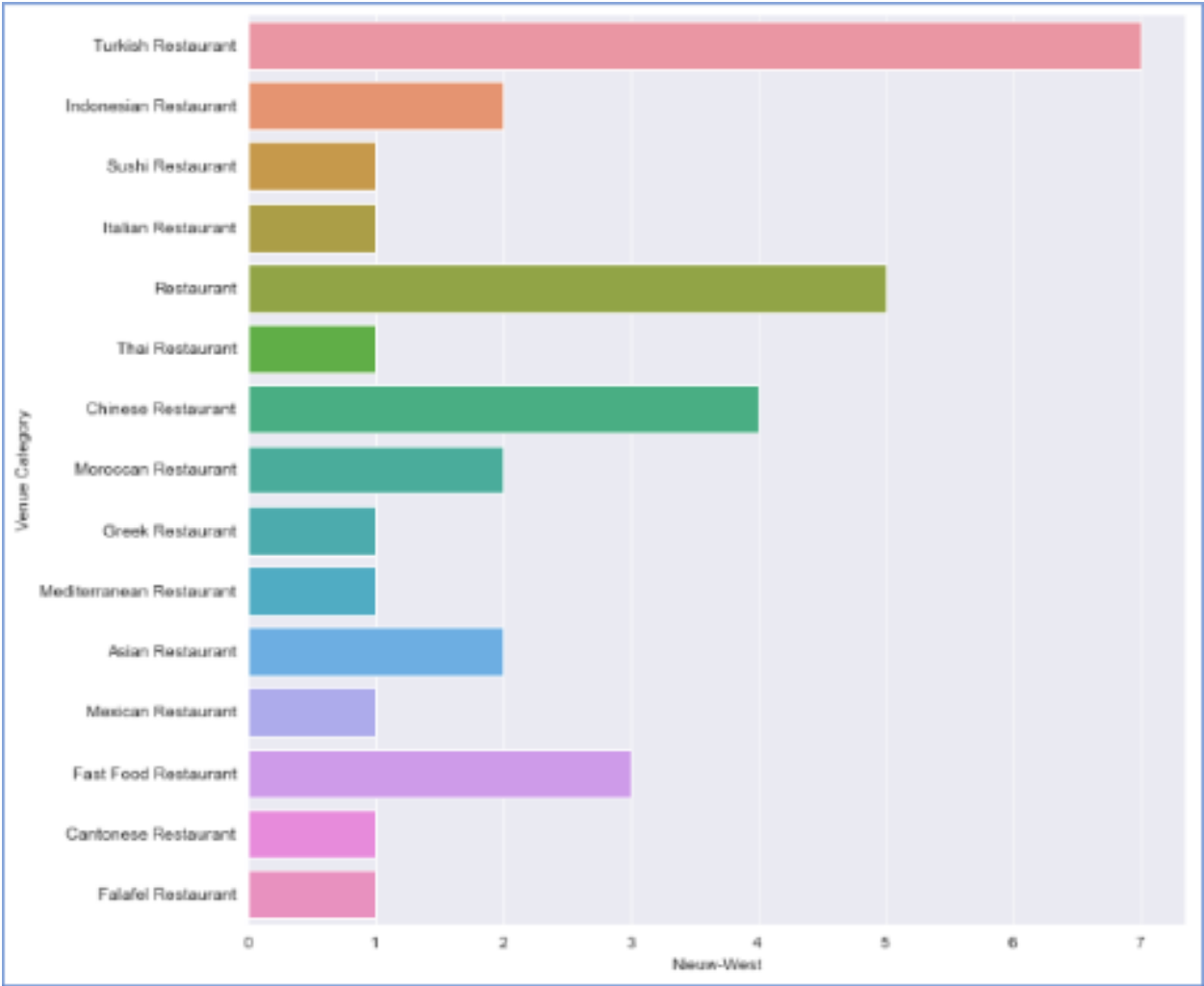
Centrum Borough



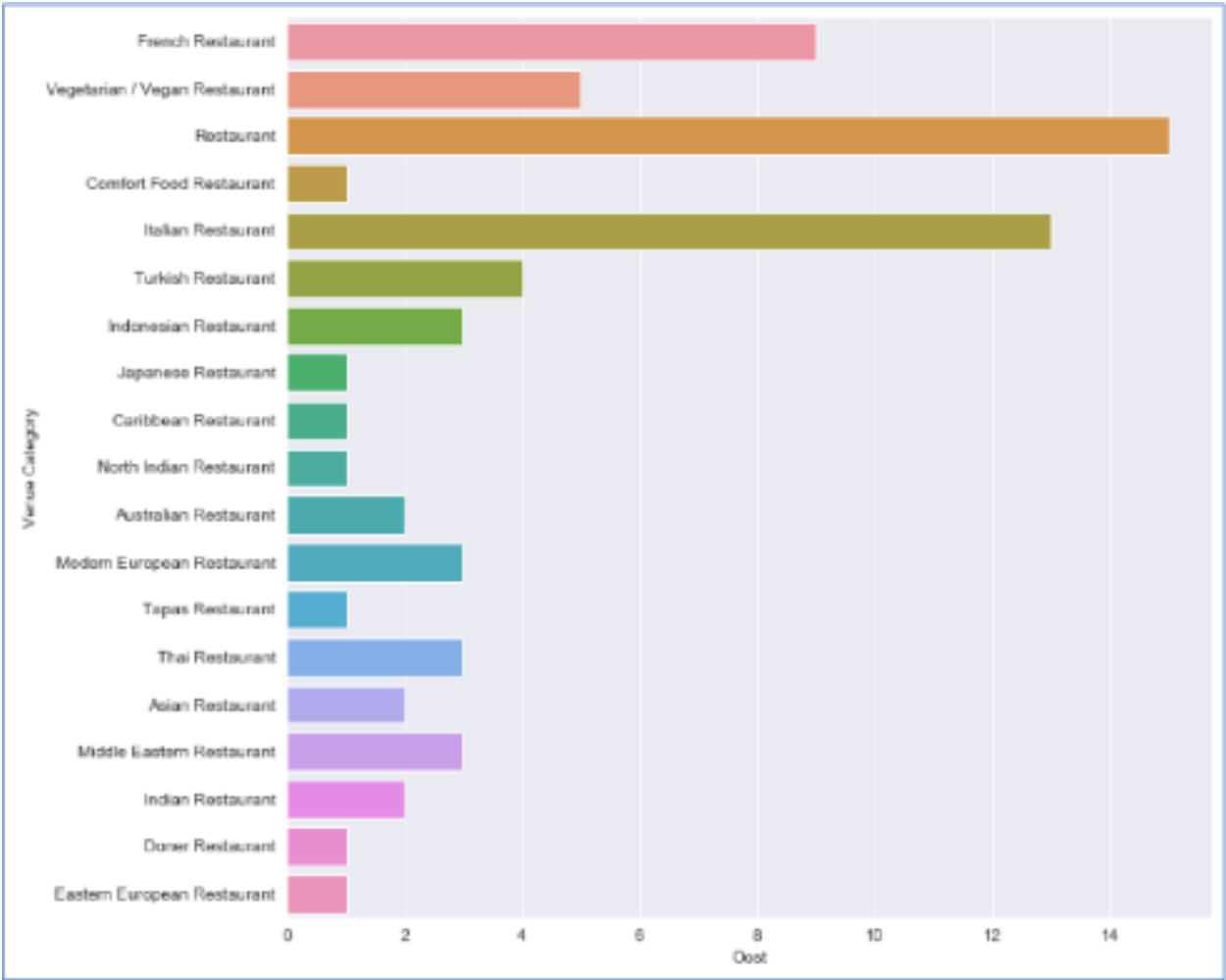
Noord Borough



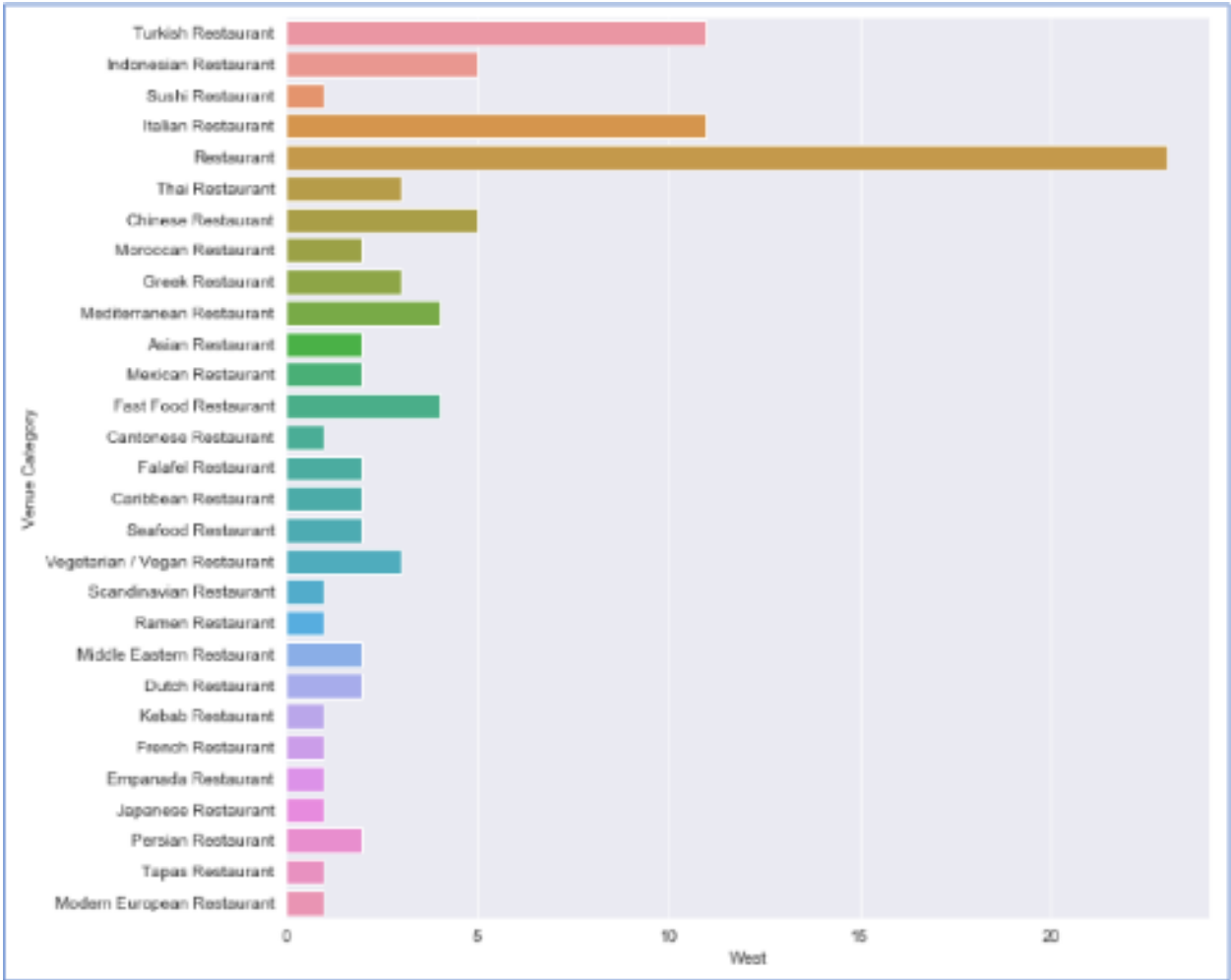
Nieuw-West Borough



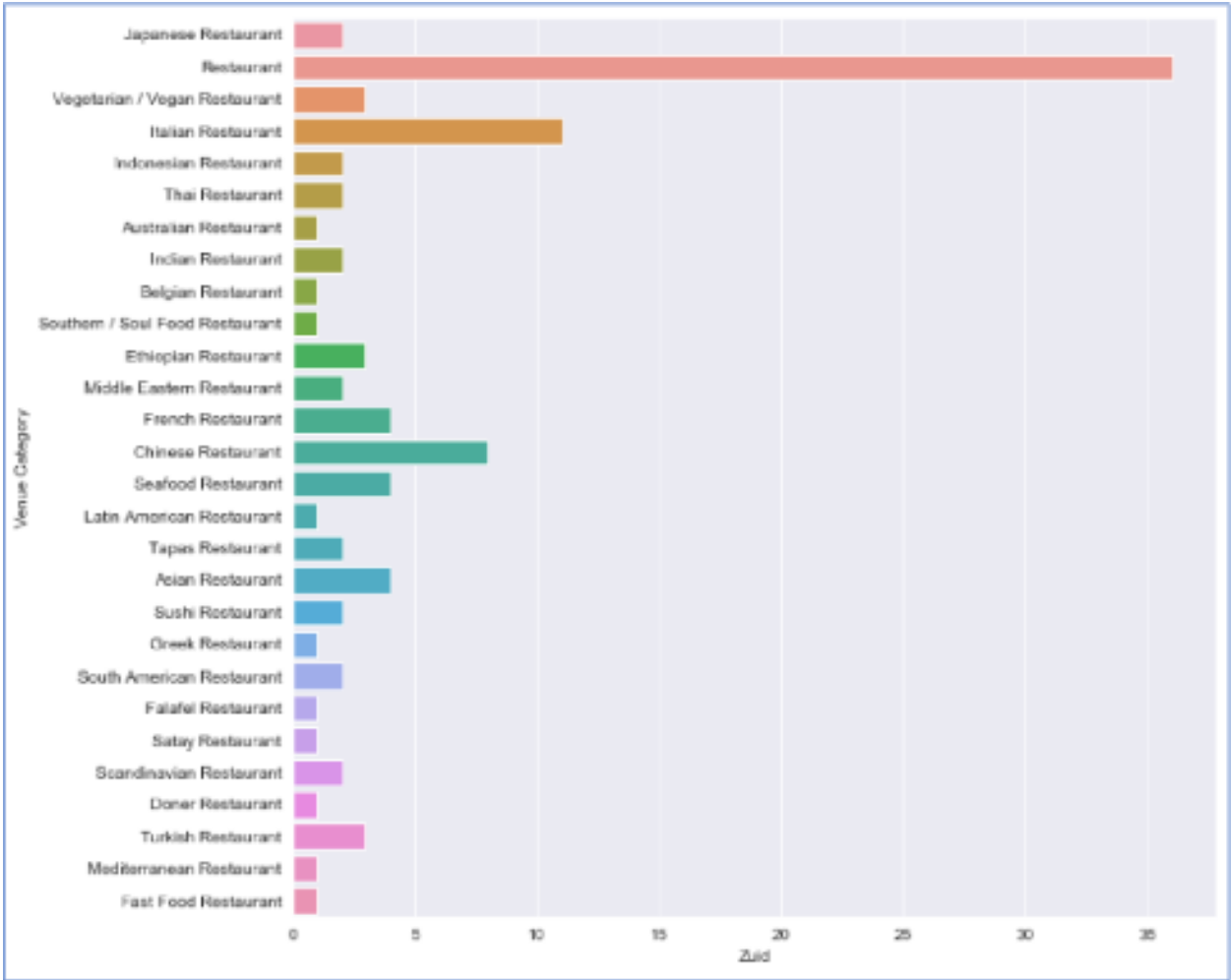
Oost Borough



West Borough



Zuid Borough



Zuid-Oost Borough

