

From Coffeeshop to Restaurant: Maximizing One's Amsterdam Experience

Coursera & IBM Applied Capstone Project

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Introduction and Problem Motivation

- Amsterdam, the capital of the Netherlands, is well-known for its **coffeeshop culture**, one of the greatest tourist attractions from all over the world.
- Marijuana consumption in a coffeeshop makes one hungry and requires going to a restaurant.
- This research is a short and simple guide on where to **smoke and eat** in Amsterdam based on Forsquare likes, restaurant category and geographical location data.
- We will also **cluster** all the restaurants of Amsterdam by their proximity to coffeeshops so that our user could easily determine what is the best duo of places of their interest.
- **This research is for:**
 1. **Tourists** planning their first experience as described above.
 2. Accomplished Amsterdam **visitors** or even locals looking for new ideas for their following from-coffeeshop-to-restaurant tour.
 3. **Tourists or locals** that, on the contrary, want to avoid dining at a place close to a coffeeshop.
 4. **Potential restaurant owners** that consider location proximity of their food venue to a coffeeshop as one of the important success factors.

Data Acquisition and Cleaning

- Foursquare API to pull the following location data on restaurants and coffeeshops in Amsterdam.
- .csv file with geographical and statistical data about all the neighbourhoods of Amsterdam from an official government website

Data came almost clean but have some extra columns which we kept.

	subject	region_name	regio_type	region_code	ninhabitants	nmen	nwomen	nage_0_to_15	nage_15_to_25	n
1	Burgwallen-Oude Zijde	Amsterdam	Wijk	WK036300	4280	2340	1935	255	675	2
2	Kop Zeedijk	Amsterdam	Buurt	BU03630000	1020	570	445	50	140	5
3	Oude Kerk e.o.	Amsterdam	Buurt	BU03630001	670	365	300	30	130	3
4	Burgwallen Oost	Amsterdam	Buurt	BU03630002	1610	880	730	120	250	7
5	Nes e.o.	Amsterdam	Buurt	BU03630003	370	185	180	25	70	1

Methodology

The geograpical coordinate of Amsterdam, Nederland 52.3745403, 4.89797550561798.

We grouped our neighbourhoods into 10 clusters by their lat and lon.

```
# group neighbourhoods by coordinates
n_clusters = 10
neighbourhoods_grouped = KMeans(n_clusters=n_clusters, random_state=0).fit(df_data_1[['lat', 'lon']])
neighbourhoods_grouped.cluster_centers_

array([[ 52.35418413,  4.8981259 ],
       [ 52.3656447 ,  4.99573439],
       [ 52.35477417,  4.81402566],
       [ 52.35873673,  4.93480968],
       [ 52.35146221,  4.86206048],
       [ 52.3084988 ,  4.97114465],
       [ 52.39572502,  4.93289053],
       [ 52.37687063,  4.84651167],
       [ 52.37696239,  4.78780509],
       [ 52.38700674,  4.88262484]])
```

Preview of top-30 coffeeshops df:

	id	score	category	name	address	postalcode	city	href	latitude	longitude	n_cluster
0	4a2705a4f964a52052881fe3	8.8	Аптека марихуаны	Grey Area Coffeeshop	Oude Leliestraat 2	1015 AW	Amsterdam	/v/grey-area-coffeeshop/4a2705a4f964a52052881fe3	52.374641	4.888839	10
1	4bffa50480eef3b4ffe9e7f	8.5	Аптека марихуаны	Coffeeshop IBIZA Amsterdam	Hemonystraat 16	1074 BP	Amsterdam	/v/coffeeshop-ibiza-amsterdam/4bffa50480eef3b...	52.357405	4.902060	1
2	4a270064f964a52051831fe3	8.9	Аптека марихуаны	De Dampkring	Handboogstraat 29	1012 XM	Amsterdam	/v/de-dampkring/4a270064f964a52051831fe3	52.367759	4.890478	1
3	4b78952df964a5205ed02ee3	8.4	Аптека марихуаны	Amnesia	Herengracht 133	1015 BG	Amsterdam	/v/amnesia/4b78952df964a5205ed02ee3	52.375631	4.888934	10
4	4a270344f964a520f3841fe3	8.3	Аптека марихуаны	Coffeeshop Easy Times	Prinsengracht 476	1017 KG	Amsterdam	/v/coffeeshop-easy-times/4a270344f964a520f3841fe3	52.364452	4.885096	1

Methodology

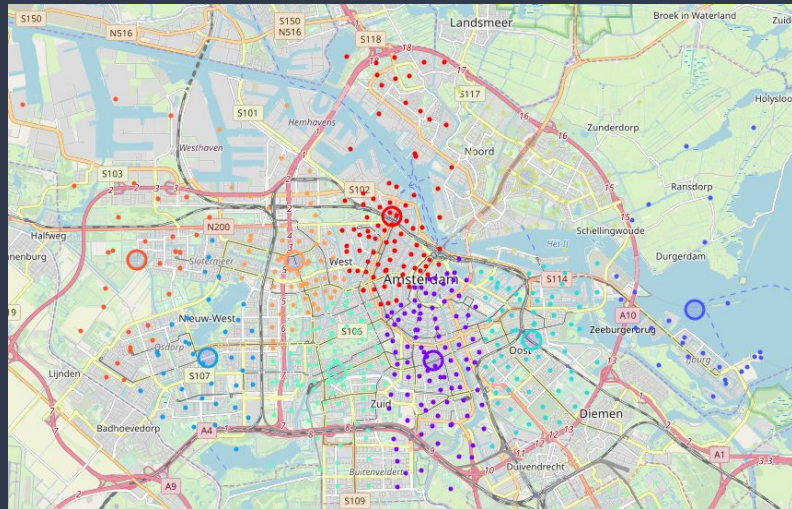
- Preview of top-ranked restaurants with radius = 500 and limit = 10 from top-30 coffeeshops:

	id	score	category	categoryID	name	address	postalcode	city	latitude	longitude	venue_name	venue_latitude	venue_longitude	n_cluster
0	5b910a04b0d11b002c3229e1	8.1	Italian Restaurants	4b5f5b0d04099b0d110941735	Cecconi's	210 Spuistraat	1012 VT	Amsterdam	52.372017	4.888873	Grey Area Coffeeshop	52.374641	4.888839	10
1	4a27db82f964a520359411e3	5.9	Fast Food Restaurants	4b5f5b0d04099b0d110941735	McDonald's	Nieuwendijk 212	1012 MX	Amsterdam	52.373864	4.892855	Grey Area Coffeeshop	52.374641	4.888839	10
2	4a27db82f964a520359411e3	5.6	Fast Food Restaurants	4b5f5b0d04099b0d110941735	McDonald's	Demrak 92	1012 LP	Amsterdam	52.373805	4.893692	Grey Area Coffeeshop	52.374641	4.888839	10
3	4a26ffc964a520128111e3	8.2	Creperies	52a61612bcb5711066b79f2	The Pancake Bakery	Prinsengracht 191	1015 DS	Amsterdam	52.377594	4.888235	Grey Area Coffeeshop	52.374641	4.888839	10
4	4a27db7ef964a5201e9411e3	6.5	Fried Chicken Joints	464ae60c7a707dea34424761	KFC	Demrak 87-88	1012 LP	Amsterdam	52.373967	4.894076	Grey Area Coffeeshop	52.374641	4.888839	10

- 74 of 188 restaurants were unique
- 20 of the top 30 coffeeshops/venues had > 5 restaurants nearby.
- Out of 42 unique restaurant categories, top-10 with the highest score were:

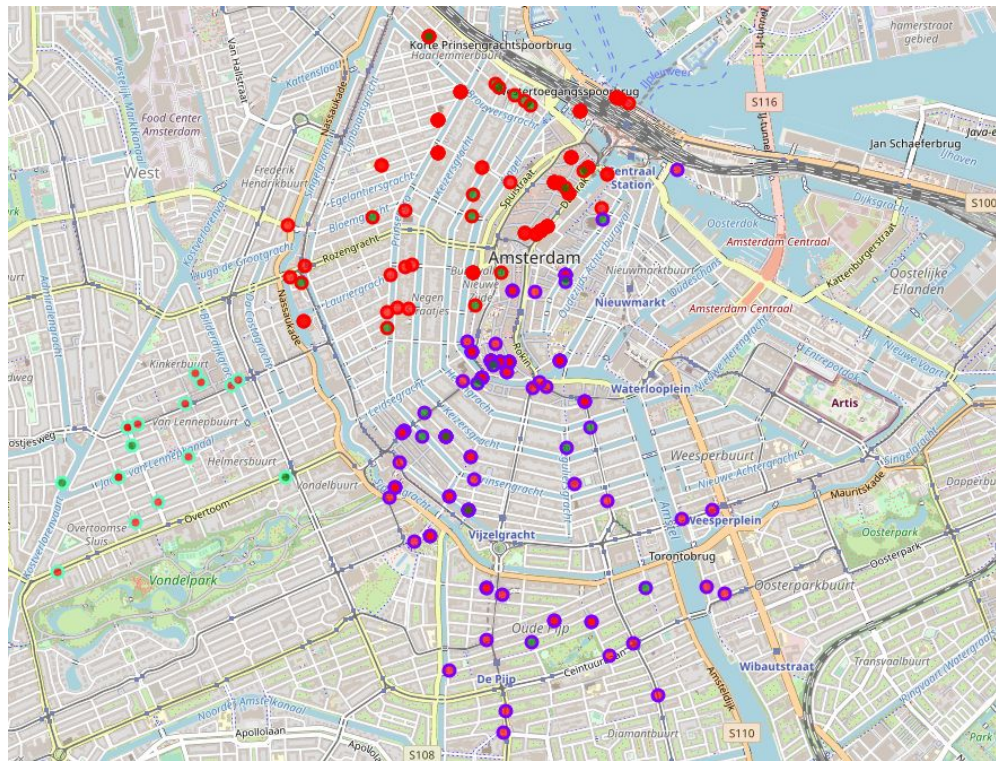
```
category
Dessert Shops      9.4
Pizza Places       9.2
Cocktail Bars      9.2
Diners             9.1
Food Courts        9.1
French Restaurants 9.1
Caribbean Restaurants 9.1
Seafood Restaurants 9.1
Moroccan Restaurants 9.0
Steakhouses        9.0
Name: score, dtype: float64
```

Visualization with Folium

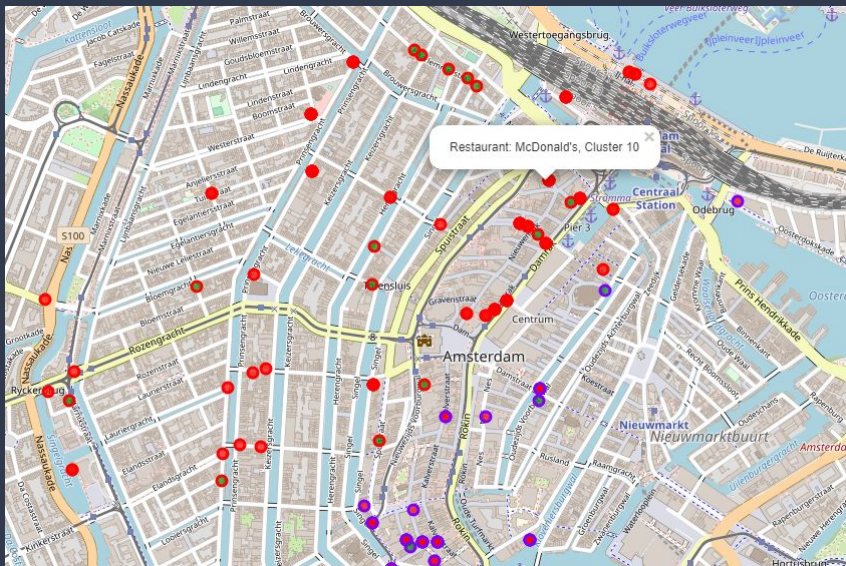


Map of clustered Amsterdam neighbourhoods

Neighbourhoods + coffeshops + restaurants

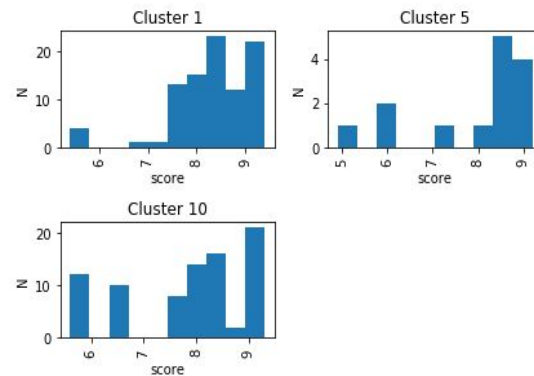


Visualization

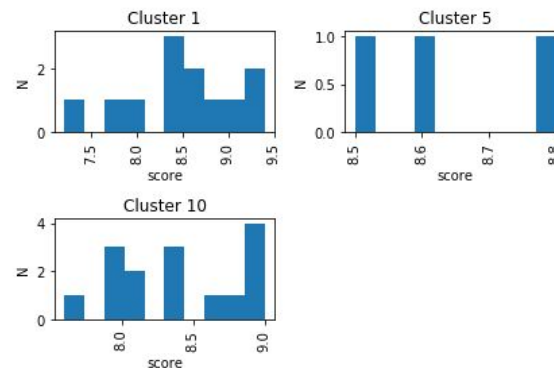


Closer look at "Neighbourhoods + coffeeshops +
restaurants"

Restaurants by their number and score in relevant clusters:



Top-venues/coffeeshops by their number and score:



Results

- Top-level restaurants in **the center of Amsterdam** are located nearby (within 500m) top-rated from coffeeshops.
- Neighbourhood clusters which have the biggest number of said top venues are **1, 5 and 10**, which are, as expected, located close to Amsterdam Centraal railway station, popular tourist attractions and so on.
- The **further** from the center, the **less** coffeeshops with enough good restaurants around them we observe.
- If a visitor of the city seeks this specific kind of experience with maximal proximity and minimal commute, it is strongly advised for him or her to choose one of the neighbourhoods from the clusters **1, 5 or 10**.

Discussion

- **Top-30** coffeeshops of Amsterdam belong to **three** neighbourhoods clusters
- It might be **economically beneficial** to widen the geography of said venues by creating new or moving old ones to different neighbourhoods.
- Such an action would make it possible to attract more tourists to **other areas** located out of historical centrum of the city, as it is currently an outspoken priority of the local government due to enormous overcrowding.

Conclusion and Future Directions

- Amsterdam is a capital of top coffeeshops and excellent food venues, but there's **extreme centralization** of tourist attractions, which causes huge problems with housing, congestion, unemployment, air pollution, social problems and energy tension.
- While our research is focused on **Food Venues** only, other possible categories can also be used for the same implementation (e.g. proximity to coffeeshops) such as Nightlife, Hotels etc.
- We have chosen to limit the scope of our research due to **Foursquare API** daily limit of free user queries.
- The **accuracy** depends on the data provided by FourSquare.