

# Opening a new Vegetarian Restaurant in Frankfurt, Germany

Capstone Project  
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# Summary of Contents

- Introduction
- Data Section
- Methodology
- Results
- Discussion

# Introduction

- In this project I consult a business owner who wants to open a new vegetarian / vegan restaurant in Frankfurt am Main, Germany.
- In order to choose a good location it is important to know about
  - the neighborhoods in the city
  - their venue infrastructure
  - the preferences of the population in visiting these venues
- choosing a beneficial location is critical for business success and therefore of upmost importance to a business persons who wants to open a new restaurant

# Introduction

- Aim of this project: Find a beneficial location for a new a vegetarian / vegan restaurant in Frankfurt
- In order to achieve this aim, I complete the following steps:
  1. gather information on neighborhoods and their locations
  2. gather information on existing venues in these neighborhoods
  3. identify already existing vegetarian / vegan restaurants
  4. examine neighborhoods of top running vegetarian / vegan restaruants
  5. perform a cluster analysis to identify neighborhoods that are similar to the neighborhoods of established top running vegan restaurants

# Summary of Contents

- Introduction
- Data Section
- Methodology
- Results
- Discussion

## Data Section

- Data on neighborhoods in Frankfurt and their locations were scraped from the following website: <https://www.suche-postleitzahl.org/frankfurt-plz-60306-65936.40d9>
- Data on venues in the respective neighborhoods were retrieved via the Foursquare Venue API

*Note: Please refer to full the full report for further information on data preprocessing.*

# Summary of Contents

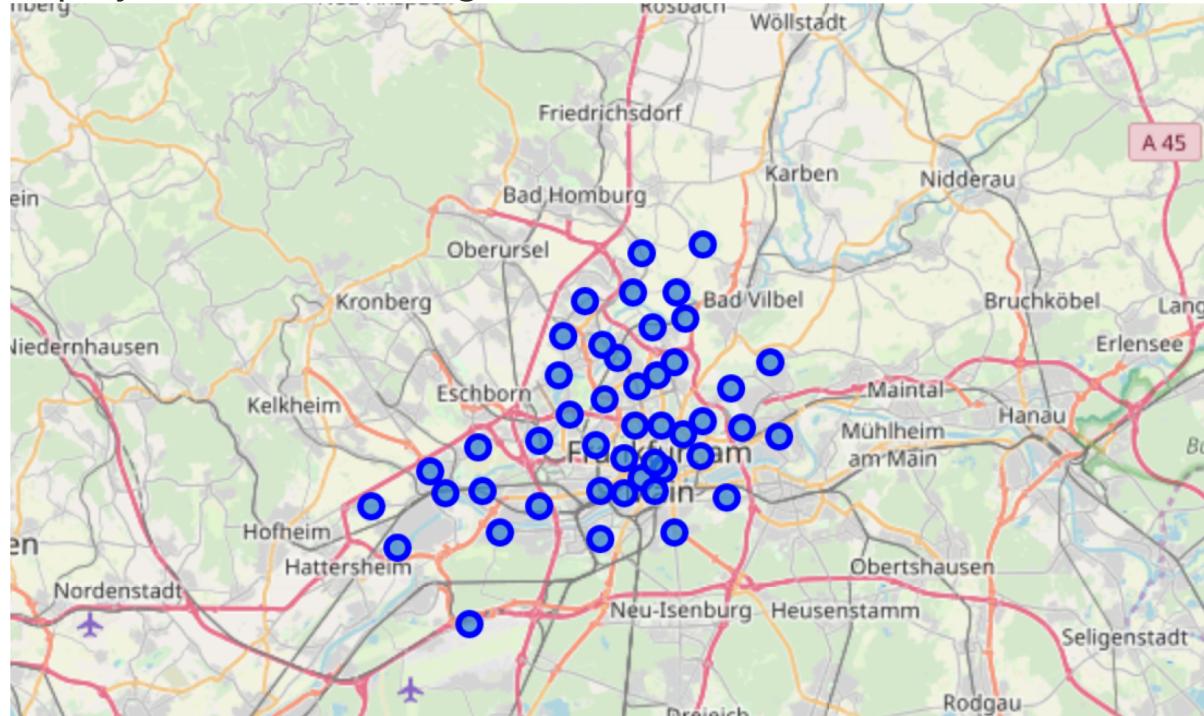
- Introduction
- Data Section
- Methodology
- Results
- Discussion

# Methodology

## Exploratory Analysis: Neighborhoods and their locations

The information scraped from the website contained data on 46 neighborhoods of Frankfurt including their names and location coordinates.

Displayed are the 46 neighborhoods of Frankfurt as blue markers on a map.

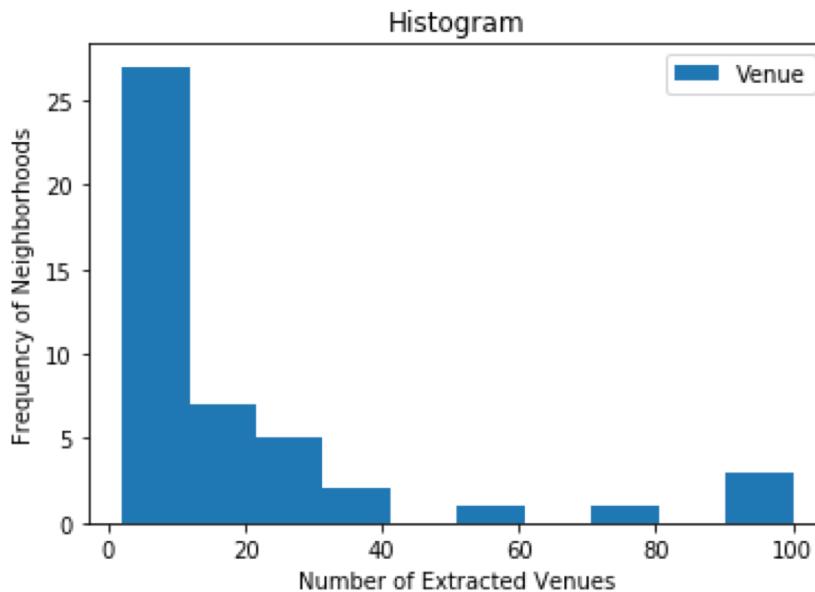


Neighborhoods in the inner city are densely clustered, whereas more suburban neighborhoods are of larger area and more spatially distributed.

# Methodology

## Exploratory Analysis: Venues in Frankfurt city

The histogram displays the number of venues that could be retrieved per neighborhood within a radius of 500m around the center coordinates of the respective neighborhood. In total 885 venues were retrieved with 172 unique venue categories.



Most frequently less than 10 venues were retrieved for a given neighborhood. Neighborhoods with less than 4 retrieved venues were excluded from further analysis. This resulted in the exclusion of the neighborhood 'Fechenheim'.

# Methodology

## Exploratory Analysis: Vegetarian Restaurants

The 885 extracted venues were searched to identify venues of the category 'Vegetarian / Vegan Restaurants'. In total 3 vegetarian restaurants could be retrieved. These were located in the neighborhoods Altstadt, Bahnhofsviertel and Rödelheim.

I continued to use the Foursquare API to extract information about the user ratings and likes of these venues. The results are displayed in the table below.

Neighborhood	Vegan Restaurant	Likes	Rating	Price Tier
Altstadt	Seven Swans & The Tiny Cup	39	7.9	Moderate
Bahnhofsviertel	Vevay	43	7.4	Moderate
Rödelheim	Savory	33	8.1	Moderate

I defined the two best running vegetarian restaurants as those with a user rating above 7.5 and with the most user likes.

# Methodology

## Exploratory Analysis: Vegetarian Restaurants

The table shows the top two running vegetarian restaurants in Frankfurt. Although the user ratings are well for these, the relatively small number of likes indicates that there is much potential upwards.

Neighborhood	Vegan Restaurant	Likes	Rating	Price Tier
Altstadt	Seven Swans & The Tiny Cup	39	7.9	Moderate
Rödelheim	Savory	33	8.1	Moderate

# Methodology

## Exploratory Analysis: Health Related Venues

I continued to explore the venue data of 885 extracted venues in Frankfurt to search for venues that indicate health oriented shopping behavior, specifically health food stores. The table displays all health food stores that could be retrieved in the venue data for Frankfurt.

Neighborhood	Venue Name	Category
Westend-Nord	Basic	Health Food Store
Westend-Nord	Reformhaus Achim Andersch	Health Food Store

Westend-Nord was the only neighborhood in which health food stores could be retrieved. The neighborhoods of already existing vegetarian restaurants such as Altstadt or Rödelheim did not contain any health food stores.

# Methodology

## Exploratory Analysis: Neighborhoods of Vegetarian Restaurants

I continued to explore the ten most common venue categories in the neighborhoods of the top two running vegetarian restaurants.

	Neighborhood			
	Altstadt	Count	Rödelheim	Count
1 <sup>st</sup> Most Common Venue	Café	10	Supermarket	6
2 <sup>nd</sup> Most Common Venue	Bar	5	Bakery	1
3 <sup>rd</sup> Most Common Venue	Restaurant	5	Bank	1
4 <sup>th</sup> Most Common Venue	Italian Restaurant	5	Bus Stop	1
5 <sup>th</sup> Most Common Venue	Plaza	4	Chinese Restaurant	1
6 <sup>th</sup> Most Common Venue	German Restaurant	4	Doner Restaurant	1
7 <sup>th</sup> Most Common Venue	Art Museum	3	Grocery Store	1
8 <sup>th</sup> Most Common Venue	Wine Bar	3	Ice Cream Store	1
9 <sup>th</sup> Most Common Venue	Burger Joint	3	Italian Restaurant	1
10 <sup>th</sup> Most Common Venue	Clothing Store	2	Light Rail Station	1

# Methodology

## Exploratory Analysis: Neighborhoods of Vegetarian Restaurants

The top 10 most common venues indicate that ‚Altstadt‘ has a typical venue infrastructure of an inner-city neighborhood as indicated by the dominance of cafés followed by restaurants, bars and cultural venues.

In contrast the neighborhood ‚Rödelheim‘ appears as a more suburban neighborhood with a high frequency of supermarkets, grocery stores and public transport stations.

# Methodology

## Cluster Analysis

I continued to perform a k-means cluster analysis to identify neighborhoods that are similar to the neighborhoods of the top two, already existing vegetarian / vegan restaurants. To do so, I entered the top 4 most common venues of each neighborhood in a cluster analysis with  $k= 5$  means.

# Summary of Contents

- Introduction
- Data Section
- Methodology
- Results
- Discussion

# Results

## Cluster Analysis

The neighborhood of **Rödelheim** was attributed to cluster ID 4 with a total number of 8 neighborhoods.

Common to the neighborhoods in that cluster is the presence of supermarkets and public transport stations among the top ranking categories. Followed by venues such as pharmacy stores, bakeries, restaurants and ice cream shops. Altogether the venue infrastructure hints towards a neighborhood with an suburban venue infrastructure.

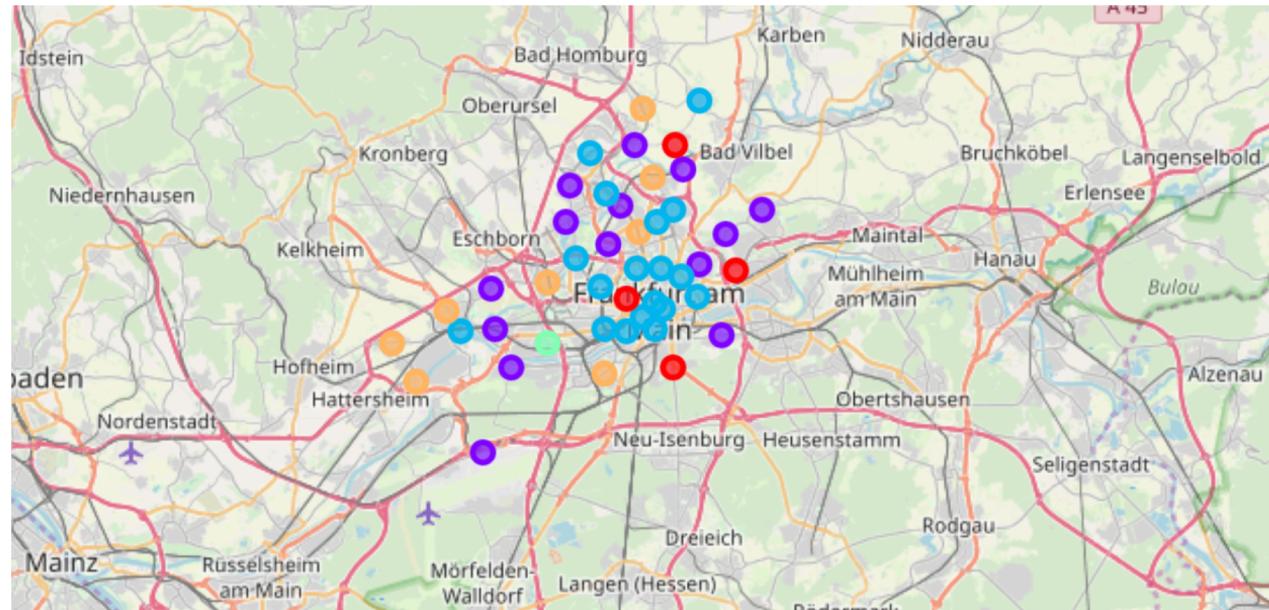
The neighborhood of **Altstadt** was attributed to cluster ID 2 with a total number of 18 neighborhoods.

The venue infrastructure of neighborhoods in this cluster is dominated by cafes, hotels, restaurants and parcs. It resembles the densely populated neighborhoods typically found in the inner-city. Notably, the neighborhood Westend-Nord with its Health Food Stores was also located within this cluster.

# Results

## Cluster Analysis

The below map displays the results of the cluster analysis. The neighborhood 'Altstadt' belongs to cluster 2 (blue circle markers). The neighborhood 'Rödelheim' belongs to cluster 4 (orange circle markers).



# Results

## Identify a Neighborhood for a New Opening

The neighborhood ‚Westend-Nord‘ appears like a good candidate for opening a new vegetarian restaurant:

- It is located within the same cluster as ‚Altstadt‘
- It is the only neighborhood in which health food stores could be retrieved

I continued to explore the venues in Westend-Nord in more detail by plotting the top ten most common venue categories:

Neighborhood: Westend-Nord	
Venue Category :	Frequency :
Café	6
Italian Restaurant	3
Asian Restaurant	2
Greek Restaurant	2
Health Food Store	2
Supermarket	2
Apple Wine Pub	1
Bakery	1
Beer Garden	1
Fast Food Restaurant	1

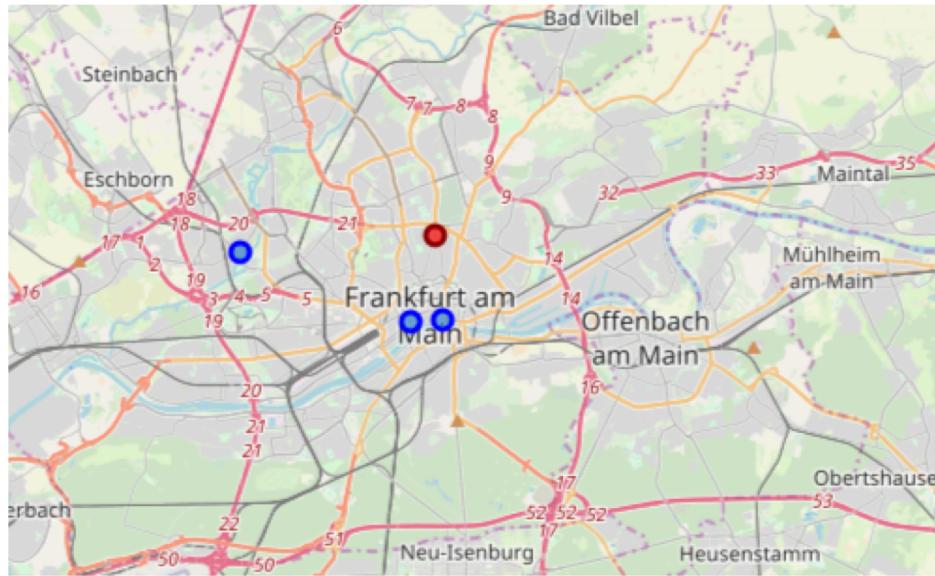
# Results

## Identify a Neighborhood for a New Opening

The venue infrastructure with a large number of cafés, two health food stores and other restaurant venues confirms the potential of 'Westend-Nord' as a promising neighborhhod for opening a new vegetarian restaurant.

I continued to plot already existing vegetarian restaurants and the spot in Westend-Nord on a map to spatially visualize the location and distance to existing venues.

*The blue circle markers display already existing vegetarian restaurants. The red circle marker signals 'Westend-Nord' as a potential new spot for an opening.*



# Summary of Contents

- Introduction
- Data Section
- Methodology
- Results
- Discussion

# Discussion

## Discussion

The cluster analysis combined with the exploration of health related venues identified 'Westend-Nord' as a promising neighborhood to open a new vegetarian / vegan restaurant in Frankfurt. With its many cafes and health food stores the neighborhood bears much potential for walk-in customers.

### Limitations

In general the number of venues that could be retrieved per neighborhood in Frankfurt city was very little. As the analysis showed, most frequently ten or less venues were retrieved for a neighborhood. In addition, the radius based extraction of venues within 500 meters around the center coordinates of the neighborhood did not retrieve all venues, particularly in larger suburban neighborhoods.

### Conclusion

Based on the above discussed results, Westend-Nord appears like a good spot for opening a new vegetarian restaurant. Given the health food stores, the cafés and the restaurant infrastructure in this inner-city neighborhood it might even have the potential to outrank already existing vegetarian restaurants in Frankfurt.