

Case Study

A SIMPLIFIED RESTAURANT LOCATION ANALYSIS USING MACHINE LEARNING

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AUTHOR NOTE

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Introduction

With a population of about 1.54 million, Munich is the third-largest city in Germany, with one of the highest proportions of foreign nationals in the country – 27.6 percent. It is expected that the resident population will exceed the 1.7 million mark in 2030 with an increasing portion of young, well-educated adults (City of Munich, 2019). It is the capital of Bavaria, the second state by Gross Domestic Product (GDP) in Germany (Statistik BW, 2019), and accounts for 19% of the state GDP (City of Munich, 2019).

As any other metropole, Munich offers a large demand for restaurants, which business is part of the second-largest sector per number of employees in the city (MUC.RAW, 2019). The local portal Mux.de counts 2.771 restaurants in the urban area (MUX.DE, 2019). New entrants are attracted by the high profitability, with an EBITDA up to 35% (Macrotrends, 2019). The Munich restaurants market is highly fragmented and dominated by small businesses with less than 10 employees (Gruner et al., 2016). The degree of rivalry is high.

New entrants need to take into account a number of factors to succeed, including an accurate selection of the location. In the following an analysis will be conducted drawing on location data to elaborate recommendations for the selection of an appropriate district for a premium Italian restaurant. The project is intended to assist the decision of investors interested in entering the Munich market with a fine dining restaurant business, as the food market in Germany continues to see a trend towards premiumization, according to the Agriculture and Agri-Food Canada Market Access Secretariat (2015).

This paper is written as part of the IBM Data Science Professional Certificate program (Coursera, 2019). The primary objective of this educational exercise is to demonstrate how to apply analytics techniques and machine learning on location data to gain insights that can be used to support recommendations. Assumptions will be taken about the target customer base, leaving the market positioning of the above-mentioned business outside of the scope of this study. Only open data will be used to conduct the analysis.

Problem definition

There are a number of factors to be considered to identify a suitable location for restaurants that depend from their market positioning. Those include the following ones, each of which triggers one or multiple strategic questions:

Culinary Trends. Is the offer in line with the consumer trends?

Demographic. Is there a customer base that is willing to buy the service and pay a premium for it? Is there a chance for recurring clients?

Neighborhood. Which venues are available nearby?

Infrastructure. Is the restaurant reachable? Is there any public transportation connection? Are there parking areas?

Competition. How many restaurants/dining services are nearby? Are they premium ones?

The research will analyze the above-mentioned success factors to identify evidences that will support recommendations for the selection of an appropriate location.

Research approach

The study will use a pragmatist approach to answer the research questions. The fieldwork will be conducted using a mixed method consisted in integrating quantitative secondary data with qualitative evaluations to assist the interpretation of the results.

Data collection

Geographical data

The list of the districts in Munich can be retrieved from (Statistisches Amt München, 2019). The data includes the number of habitants and the surface of the districts. The data has been republished on Wikipedia (Wikipedia, 2018) in a semi-structured format. Therefore, the latter source will be preferred.

The list of the postal codes of Munich is available in (Landeshauptstadt München, 2019), while the polygons of the corresponding to the ZIP codes are available in GeoJSON at (SUCHE-POSTLEITZAHL.ORG, 2019).

Culinary Trends

The main purpose of the analysis of this factor is to verify if a potential customer base exists. To analyze this aspect, the results of the survey about the culinary trends in Germany provided by Civey (2018) will be used.

Demographic

The demographic and lifestyle characteristics of the population can support the identification of geographical areas that are more suitable than others for a fine dining restaurant. Characteristics like population density, age distribution, per capita income, and number of households can be used to identify the customer profiles available in a geographical area.

The following metrics will be considered (Gaille, 2016):

- Pre-capita income, as household with a higher household income spend more;
- Residents age, (a) considering that individuals aged 35 to 44 spent the most per capita on food away from home; (b) young, urban professionals with no kids – dine at higher-priced restaurants; (c) Older adults and empty nesters (down-scale) – eat on-premise at inexpensive sit-down restaurants, buffets and fast food eateries. (d) individuals aged 45-54 with children older than 18 years and those aged 55-64 have consistent food expenditure at restaurants;
- Number of households, (a) as one-person households have the highest per-capita spending; (b) households with only a husband and wife have the highest per-capita spending; (c) Busy parents of children use drive-thru and carry-out restaurants;

For the purpose of this research only residents will be considered, as resident population usually represents a sizable market whose dining behavior and preferences can be fairly accurately assessed (University of Wisconsin-Madison Extension, 2011).

(Statistisches Amt München, 2019) offers detailed information about the demographic of the municipal districts that include number of people, resident age, and number of households.

The average pre-capita in the districts is available in (TZ, 2011). Although the data is relatively hold, it can be normalized to provide an indicator of the average buying power in the districts.

Neighborhood

The availability and frequency of venue categories within the districts can support the neighborhood classification. The venues will be retrieved using the Foursquare API (Foursquare, 2019).

Infrastructure

The availability of infrastructures such as public transportation and parking areas within the districts can support the neighborhood classification. The data will be retrieved using the Foursquare API (Foursquare, 2019).

Competition

The degree of competition within the district can be estimated using the number existing restaurants classified by served food (Italian, Asian, Greek, etc.) and ideally cost indicator. The data will be primarily retrieved using the Foursquare API (Foursquare, 2019).

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