Business density analysis in Paris-France

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Abstract

Choosing a small business location is an issue most entrepreneurs approach with a pinch of salt. Many small business startups, in order to reduce expenditure usually settle for a cheap location which may not attract enough clients to ensure its sustainability. In this project, we attempt to use business density analysis on neighborhoods in Paris in order to ensure optimal choice of location for small businesses. The results enable the determination of highly dense businesses in each neighborhood of Paris. Neighborhoods where particular businesses were not common could serve as favorable business location destinations after considering other factors. The project could also recommend favorable tourists destinations in the touristic city of Paris in France.

Keywords: *Neighborhoods analysis; Business density analysis; clustering neighborhoods; Business venues; Touristic venues.*

1. Introduction

Despite the increasingly pace of technology and digital enterprises, there will almost always be a requirement for a bricks and mortar presence, whether that's to house your staff, store stock in a secure warehouse, or provide a physical brand presence for your customers.

There are many things to consider when choosing a location for your business venture, whether setting up an office or a shop for the first time, or looking to expand into new areas. Following the recent release of a new interactive crime report which revealed fascinating insights about crime and security across the UK, entrepreneur Jake Fox reveals the key factors a business needs to consider when selecting a new location as; accessibility, security, competition, cost, availability of labor and growth potentials.

1.1. Problem statement

Even when Entrepreneurs possess the capital required in setting up a business, Choosing the right location that can attract potential customers for the business is a major decision to make. Even when a city is chosen, it requires further business density analysis or neighborhood analysis in order to choose a suitable neighborhood for set up of the business.

1.2. Project Objectives

The main objective of this project is to perform small business density analysis in the neighborhoods of the city of Paris in France as well as recommending favorable business locations for potential entrepreneurs. Other objectives include the following:

- Build a data frame of neighborhoods in Paris - France by connecting to Open Data about Paris website
- Get the geographical coordinates of the neighborhoods in Paris using the geocoder function
- Obtain the venues data for the neighborhoods using Foursquare API
- Explore, cluster the neighborhoods and select the best cluster to open a new business
- Recommend favorable destinations for tourism in the city of Paris

1.3 Target audience

This project could be used by the following groups of people:

1. Business persons with interest in setting up small businesses in Paris
2. Customers looking for where to obtain particular services in Paris
3. Tourists interested in visiting and spending quality time in Paris for the first time
4. Paris city administration interested in channeling balance business set ups in particular neighborhoods in the city
5. Government interested in balance developments in the city of Paris.

2. Methodology

2.1. Background to study area

Paris is the capital and most populous city of France, with an area of 105 square kilometres (41 square miles) and an official estimated population of 2,140,526 residents as of 1 January 2019. Since the 17th century, Paris is one of Europe's major centres of finance, diplomacy, commerce, fashion, science, and the arts. The geographical coordinates of Paris are: Latitute 48.8566101 and Logitude: 2.3514992. The City of Paris is the centre and seat of government of the Île-de-France, or Paris Region, which has an estimated official 2019 population of 12,213,364.

This project will be implemented in Paris - France, owing to the fact that its the Capital city of France and a historic touristic city.

2.2. Data collection

The following sources of data are used for the project:

1. Json file of open data on Paris-France showing neighborhoods, their population and geographical coordinates(Longitude and latitude)
2. Use the Foursquare API to get all the business venues in the city center of Paris. There are 1817 venues divided in 223 unique categories
3. Also use geocoder function to obtain geographical coordinates of all the venues obtained.

3.3. Data analyses

The following data analysis procedures are used

- Explore the neighborhoods and segment the data using One hot encoding of the venues and categories of business
- Compute the top 5 most common business venues for each neighborhood(Arrondisement) in Paris
- Also compute the top 10 most common business venues in descending order for each neighborhood or arrondisement.
- Cluster the venues and represent on a Map using the Machine Learning KMeans clustering algorithm in scikit learn.

3.4. Project implementation tools

The Business density analysis project is implemented in Python 3.5, IBM Jupiter Lab using the Following Libraries:

- Numpy for Data analysis
- Pandas for Data Analysis
- Scikit learn for implementation of Machine learning Algorithms
- Matplotlib and seaborn for graphical representation of results.
- Folium for the production of Maps
- Geocoder from Geopy to convert an address into latitude and longitude values.
- Foursquare to obtain a data set of business venues in Paris

3.5. Presentation of results

- Table showing lists of neighborhoods(Arrondisements) and their geographical coordinates (latitude and longitudes)
- Table showing business venues, neighborhoods and their geographical coordinates
- Table showing the top ten most common venues in each neighborhood(arrondisement)
- Line graph showing the elbow method of choosing the right number of clusters to segment the city of Paris according to business venues(k = 5)
- The map of Paris superimposed with business venues
- The map of Paris showing clusters of business venues and neighborhoods
- SWOT (Strength, Weakness, Opportunities and Threats) Analysis of the Business density analysis project