

**World Cities**  
Final Report

# Table of Contents

<b>1. Introduction</b>	<b>3</b>
<b>2. Methodology</b>	<b>4</b>
2.1. Cities	4
2.2. Features	4
2.3. Clustering	4
<b>3. Results</b>	<b>5</b>
<b>4. Discussion</b>	<b>7</b>
<b>5. Conclusion</b>	<b>8</b>
<b>6. References</b>	<b>9</b>
<b>7. Appendix A</b>	<b>10</b>

## **1. Introduction**

Travel agencies usually need to recommend travel packages and routes to customers who don't exactly know where they want to go. This recommendation must be given according to the customer preferences, which can be obtained by their opinion about other visited cities.

In this subject, it is useful for a travel agency to know how the most famous cities in the world are related to themselves, and which cities are in the same clusters. Therefore, collecting information about the cities allow the application of a machine learning technique called clusterization, where similar instances are grouped.

## 2. Methodology

The project consists in choosing the cities to cluster, and collection information that will be used as features for each city. In this section, the cities used will be described, followed by the selected features and how they were collected.

### 2.1. Cities

The cities were chosen based on the website <https://www.worldatlas.com/articles/the-most-popular-cities-in-the-world-to-visit.html>, which present the 25 most popular cities to visit in the world. The information is presented in a html table, and a script was used to transform this data in a pandas DataFrame, so it could be used further.

### 2.2. Features

The Foursquare API allows to request information about venues located in the city. Each venue is described by a series of data, one of them being category. Thus, the data selected to be used as a city feature was the number of venues for each venue category found in all the 25 cities. The list of categories can be found at Appendix A.

### 2.3. Clustering

The KMeans algorithm was used to cluster the cities in similar groups, based on its features. This machine learning technique finds the cities that are more similar and group them together, at the same time that separate different cities in different clusters.

### 3. Results

The Figure 1 shows a map where each city is represented by a circle, and the circle color represents the city cluster. Cities with the same color where clustered together.

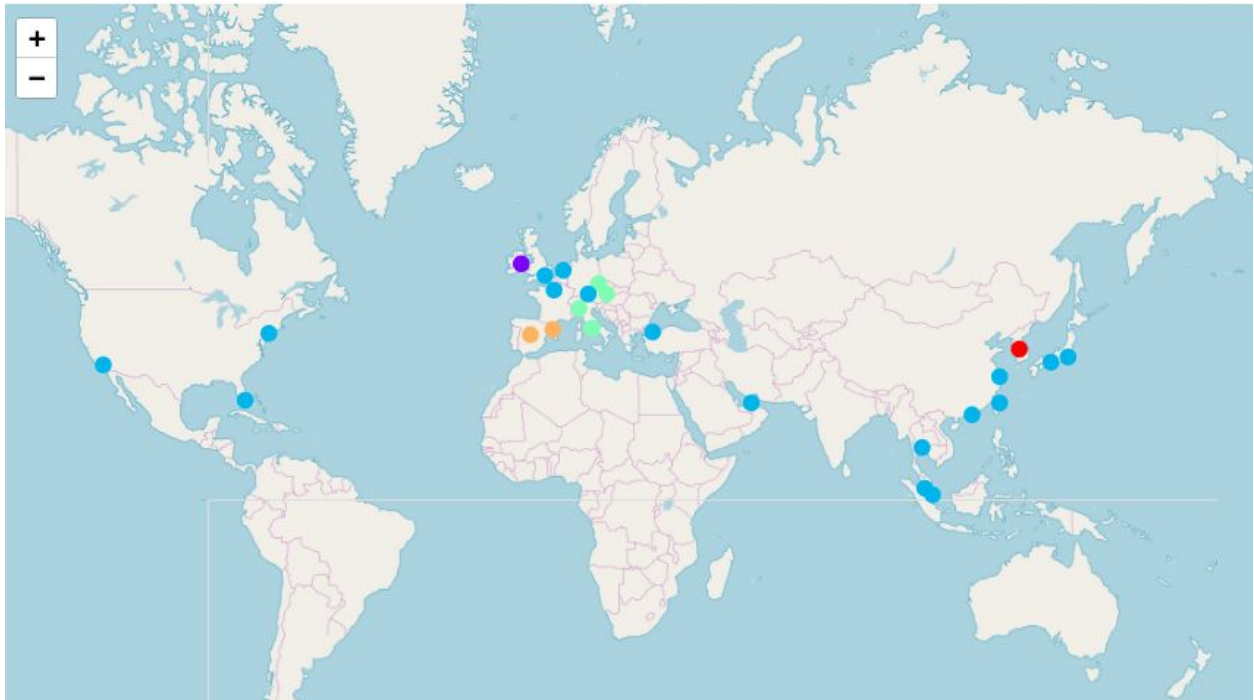


Figure 1. Result Map

The following Figure presents the relation of each city with its cluster.

City	ClusterId
Bangkok	0
London	0
Paris	0
Dubai	0
New York	0
Singapore	0
Kuala Lumpur	0
Istanbul	3
Tokyo	0
Seoul	4
Hong Kong	0
Barcelona	2
Amsterdam	0
Milan	1
Taipei	0
Rome	1
Osaka	0
Vienna	1
Shanghai	0
Prague	1
Los Angeles	0
Madrid	2
Munich	0
Miami	0
Dublin	0

Figure 2. Cities clusters

## **4. Discussion**

As seen, the cities were clustered in similar groups, based on the categories of venues. This information is useful for detecting related and non-related cities.

## **5. Conclusion**

As proposed, the cities were clustered based on their features. This information may be used to solve different problems, among them the travel agency situation described earlier.

As improvement, different clustering techniques may be applied, comparing the results and determining better ways to cluster cities.



## 6. References

Jessica Dillinger. 2018. *The Most Popular Cities In The World To Visit*. [ONLINE] Available at: <https://www.worldatlas.com/articles/the-most-popular-cities-in-the-world-to-visit.html>. [Accessed 4 December 2018].

Foursquare Developers. [ONLINE] Available at: <https://developer.foursquare.com/>. [Accessed 4 December 2018]

## 7. Appendix A

### City Features

Fast Food Restaurant Gukbap Restaurant Argentinian Restaurant Boutique Wine Bar Unagi Restaurant Fish Market Botanical Garden European Restaurant Tour Provider Yoshoku Restaurant Cupcake Shop Cheese Shop	Pub Italian Restaurant Yoga Studio Sake Bar Shopping Mall Tailor Shop Bistro French Restaurant Leather Goods Store Korean Restaurant Filipino Restaurant Gym Indian Restaurant Athletics & Sports	Memorial Site Organic Grocery Travel Agency Post Office Bookstore Middle Eastern Restaurant Video Game Store Szechuan Restaurant Waterfront Japanese Restaurant German Restaurant Sushi Restaurant Building Cocktail Bar Intersection	Alsatian Restaurant Hotel Bar Dive Bar Restaurant Diner Pizza Place Music Store Hot Dog Joint Ice Cream Shop Cuban Restaurant Bakery Gift Shop Dumpling Restaurant Marijuana Dispensary River Kebab Restaurant	Hunan Restaurant Udon Restaurant Chocolate Shop Night Market Coffee Shop Gourmet Shop Bossam/Jokbal Restaurant Bank Deli / Bodega Eastern
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