



# European Cities similar to Porto

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# INTRODUCTION

Welcome to my final project of the IBM Data Science Professional course.

The main purpose of this study is to find a similar city to Porto in Europe, accordingly to their Cost of Living.

It started with a friend who wants to experience living in a different city, but wants to make sure it is similar to his current city in terms of venues nearby.

Other important criteria is the Cost of Living level.

So, the goal is to have an interactive map with similar cities with the indication of it's Living Cost.

# DATA

For this study, we use the following data:

- Cost of Living Index of the main cities in Europe – [Numbeo](#)
- Coordinates of World Cities Database – [Simple Maps](#)
- Foursquare location data to find the nearby venues

After the data was imported into dataframes, it was time for me to clean and organize it. So after dropping the unnecessary columns and removing all duplicates, I merged both data and ended up with the following dataframe with 194 cities:

	City	Country	Cost of Living Index	Latitude	Longitude
0	Zurich	Switzerland	127.69	47.3800	8.550
1	Basel	Switzerland	125.55	47.5804	7.590
2	Geneva	Switzerland	121.19	46.2100	6.140
6	Lausanne	Switzerland	121.03	46.5304	6.650
7	Bern	Switzerland	114.25	46.9167	7.467

# INITIAL DATA VISUALIZATION

All the 194 cities plotted in an interactive map, centered in Europe.

By clicking on the data points, we get the City and Country's name.



# NEARBY VENUES

I started by getting the venues for one city only, as a test. So we got the data for Zurich in Switzerland

	name	categories	lat	lng
0	The Alehouse - Palmhof	Gastropub	47.379138	8.548037
1	K55 GmbH	Electronics Store	47.378553	8.548116
2	Hausammann	Bakery	47.383184	8.548202
3	Kleine Freiheit	Snack Place	47.379216	8.544588
4	focusTerra, ETH Zürich	Science Museum	47.378231	8.547438

After data, the same was done for all the Cities. We got 328 different categories, so it needed to be organized.



# TOP 10 VENUES

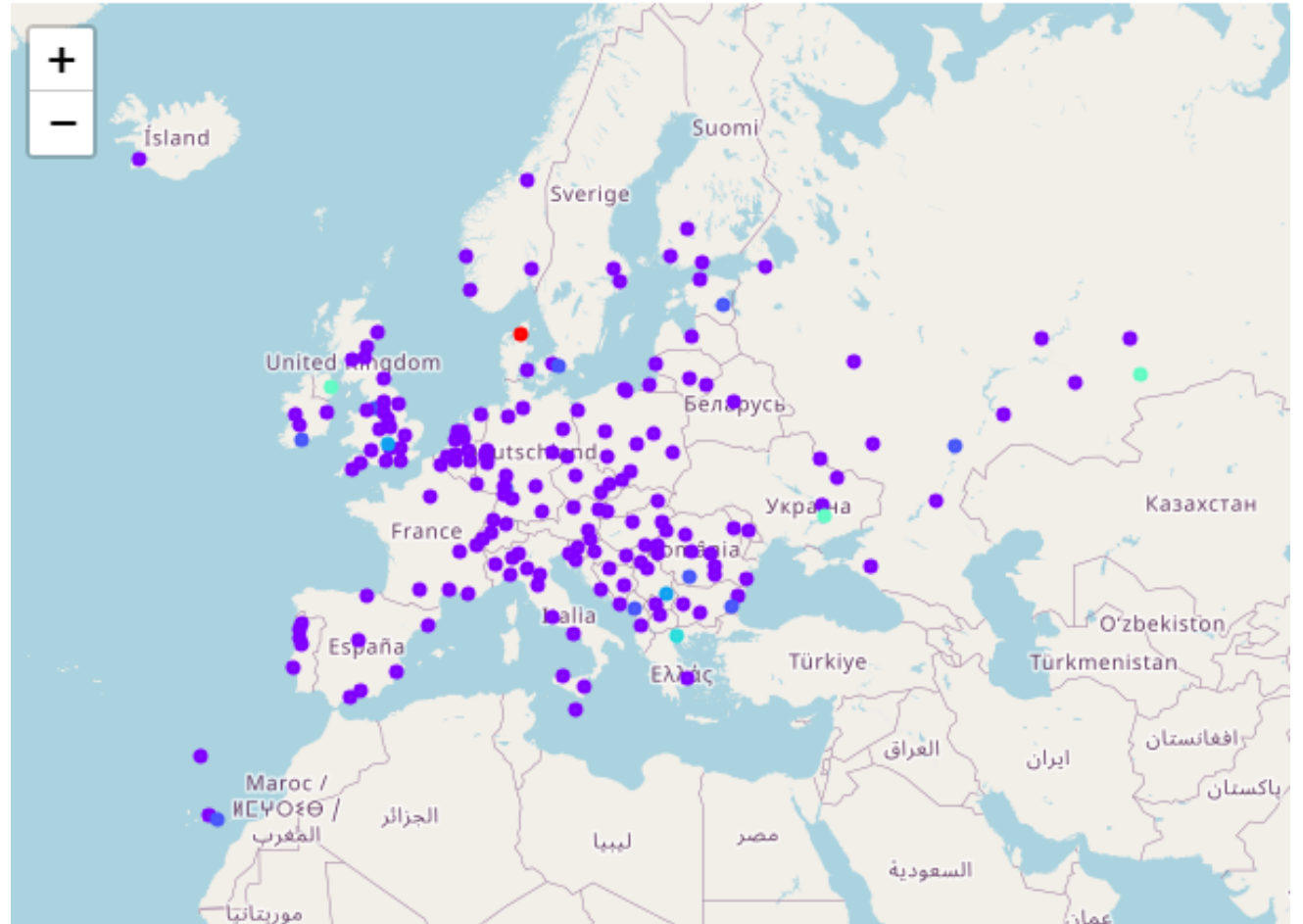
The frequency of each category was checked for each European City, sorted to get the top 10 places and merged into a table:

City	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
Aalborg	Convenience Store	Zoo	Food	Falafel Restaurant	Farmers Market	Fast Food Restaurant	Fish & Chips Shop	Fish Market	Fish Taverna	Flea Market
Aberdeen	Beach	Zoo	Fair	Farmers Market	Fast Food Restaurant	Fish & Chips Shop	Fish Market	Fish Taverna	Flea Market	Flower Shop
Alicante	Spanish Restaurant	Italian Restaurant	Mediterranean Restaurant	Deli / Bodega	Concert Hall	Restaurant	Pizza Place	Performing Arts Venue	Farmers Market	Nightclub
Amsterdam	Coffee Shop	Restaurant	Café	Music Store	French Restaurant	Breakfast Spot	Snack Place	Gym	Roof Deck	Train Station
Antwerp	Thai Restaurant	Coffee Shop	Cosmetics Shop	Pub	Comic Shop	Friterie	Opera House	Sushi Restaurant	Sandwich Place	Asian Restaurant

# CLUSTERING THE CITIES

To find the similar cities to Porto, I used the K-Means Clustering where it separate all the cities into 5 groups.

We created a map to visualize it:



# COST OF LIVING LEVELS

To get the visualization easier, I split the cities into 5 categories, accordingly to their Cost of Living Index.

- Very Low: 27,32 – 47,39
- Low: 47,39 – 67,46
- Moderate: 67,46 – 87,54
- High: 87,54 – 107,62
- Very High: 107,62 – 127,69

- Very Low
- Low
- Moderate
- High
- Very High



# SIMILAR CITIES

I looked for the Cluster Label for Porto and now we know where to find all the similar cities.

City	Country	Cost of Living Index	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
Porto	Portugal	48.63	41.15	-8.62	1.0	Hotel	Burger Joint	Hostel	Beer Bar	Syrian Restaurant	Bar	Bakery	Sushi Restaurant	Café	Mexican Restaurant

After I remove all the cities with different characteristics, I got the following:

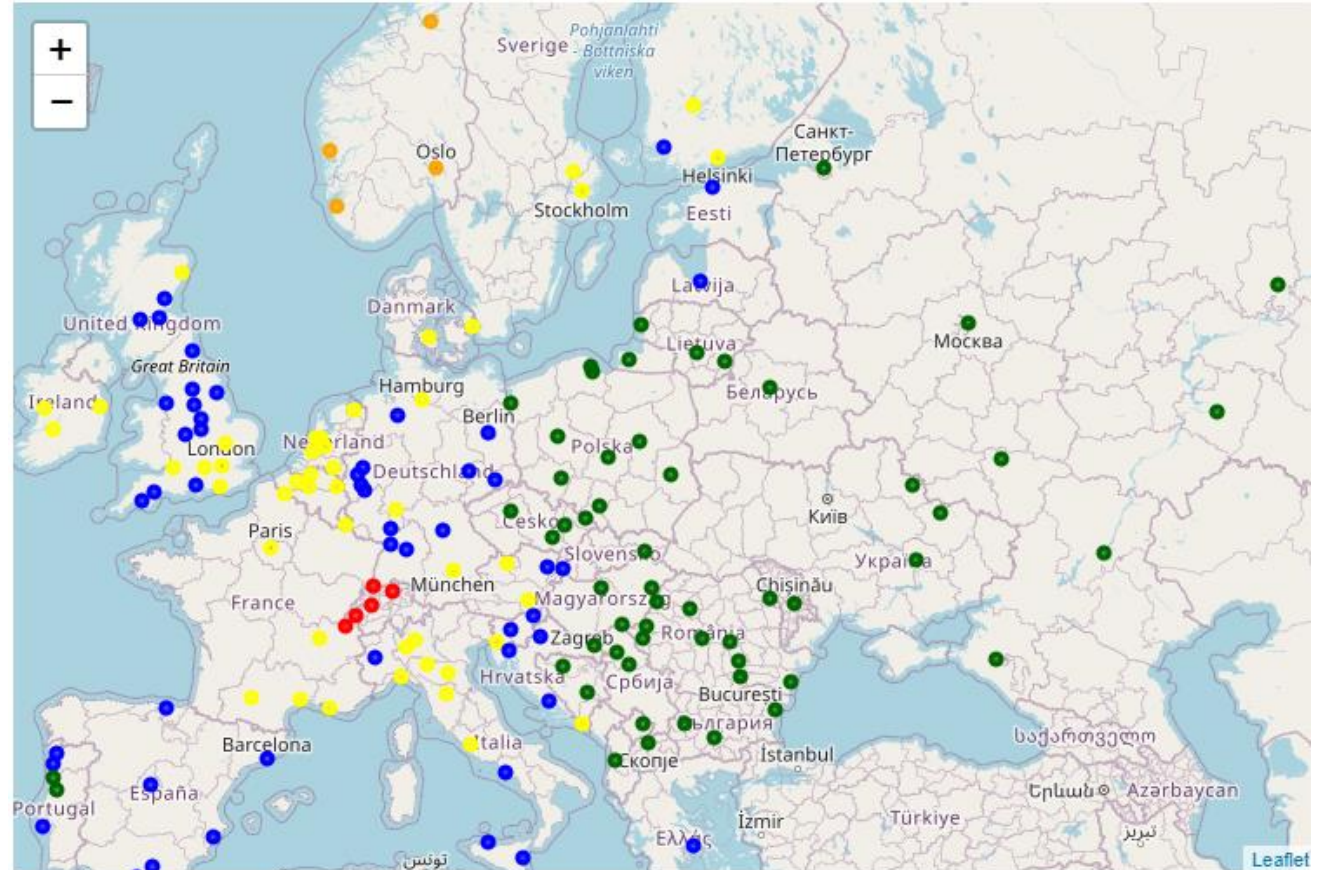
City	Country	Cost of Living Index	Latitude	Longitude	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue	Living Cost
Zurich	Switzerland	127.69	47.3800	8.550	Italian Restaurant	Hotel	Restaurant	Bakery	Swiss Restaurant	Middle Eastern Restaurant	Snack Place	Electronics Store	Vegetarian / Vegan Restaurant	Gastropub	Very High
Basel	Switzerland	125.55	47.5804	7.590	Fast Food Restaurant	Tram Station	Nightclub	Supermarket	Bar	Sandwich Place	Grocery Store	Toy / Game Store	Lounge	Shopping Mall	Very High
Geneva	Switzerland	121.19	46.2100	6.140	Bar	Plaza	Coffee Shop	Breakfast Spot	Moroccan Restaurant	Falafel Restaurant	Seafood Restaurant	Chocolate Shop	Trattoria/Osteria	Park	Very High

# FINAL DATA VISUALIZATION

With all the data ready, it's time to get the final map.

When we click on each datapoint we get the City and the Cost of Living Index.

- Very Low
- Low
- Moderate
- High
- Very High



# RESULTS

With this study, we conclude:

- There are 174 cities with similar Venues Categories in Europe;
- 63 of them have Very Low Cost of Living.
- The city with the Lowest index is Sumy in Ukraine with value 27.32:

City	Country	Cost of Living Index	Latitude	Longitude	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue	Living Cost
Sumy	Ukraine	27.32	50.9243	34.7809	Arcade	Zoo	Food	Falafel Restaurant	Farmers Market	Fast Food Restaurant	Fish & Chips Shop	Fish Market	Fish Taverna	Flea Market	Very Low

- The most expensive city is Zurich in Switzerland with index 127.69:

City	Country	Cost of Living Index	Latitude	Longitude	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue	Living Cost
Zurich	Switzerland	127.69	47.38	8.55	Italian Restaurant	Hotel	Restaurant	Bakery	Swiss Restaurant	Middle Eastern Restaurant	Snack Place	Electronics Store	Vegetarian / Vegan Restaurant	Gastropub	Very High

# CONCLUSION

In this study, I've analyzed the principal venues and some European Cities regarding their Cost of Living Level. I've built some maps with that information, which I found very helpful for this type of studies.

I think this study is just the beginning for a lot of things we can look into and help us taking informed decisions. I will definitely use it to choose my vacations and to chose the destination of my company!

I believe the result is quite appropriate having in mind the simple goal from the beginning.