# Must-visit places for foodies in European capitals

BATTLE OF THE NEIGHBOURHOODS

Capstone Project

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# 1. Introduction / Business problem

*“Foodie”*

person who eats food not only out of hunger but due to their interest or hobby and passionate about food

Different cultures and cuisines all over the World provide exquisite experiences and typical foodie interests and activities include travelling around the world and discover a whole new set of cultural gastronomical experiences.

# 1. Introduction / Business problem

AIMS:

to look for food-related venues with particular restaurants in the capitals of European countries, cluster them and ultimately reveal the different cities in terms of food venues, even if they have closer geography

# 2. Data

**Dataset 1:** - coordinates of the world's capitals

- available on: http://techslides.com/list-of-countries-and-capitals

- filtered by "Continent Name" – "Europe" and listed as "Sovereign states" https://en.wikipedia.org/wiki/Category:Capitals_in_Europe

**Raw data from: http://techslides.com/list-of-countries-and-capitals**

| | Country Name | Capital Name | Capital Latitude | Capital Longitude | Country Code | Continent Name |
|---|---|---|---|---|---|---|
| 0 | Afghanistan | Kabul | 34.516667 | 69.183333 | AF | Asia |
| 1 | Aland Islands | Mariehamn | 60.116667 | 19.900000 | AX | Europe |
| 2 | Albania | Tirana | 41.316667 | 19.816667 | AL | Europe |
| 3 | Algeria | Algiers | 36.750000 | 3.050000 | DZ | Africa |
| 4 | American Samoa | Pago Pago | -14.266667 | -170.700000 | AS | Australia |

# 2. Data

**Dataset 2:** - Foursquare API

- venues were retrieved for the top 15 food venues in a 500m radius from each European Capital city center for the category “Food”

| | Capital Name | Capital Latitude | Capital Longitude | Venue | Venue Latitude | Venue Longitude | Venue Category |
|---|---|---|---|---|---|---|---|
| 0 | Tirana | 41.316667 | 19.816667 | Sophie Caffe & Snacks | 41.318426 | 19.814562 | Coffee Shop |
| 1 | Tirana | 41.316667 | 19.816667 | Era Restaurant & Pizzeria | 41.320253 | 19.814534 | Pizza Place |
| 2 | Tirana | 41.316667 | 19.816667 | Sophie Caffe & Snacks | 41.317183 | 19.818986 | Café |
| 3 | Tirana | 41.316667 | 19.816667 | D'angelo coffee shop | 41.319406 | 19.818964 | Coffee Shop |
| 4 | Tirana | 41.316667 | 19.816667 | Hotel Dinasty | 41.314882 | 19.812469 | Bed & Breakfast |
| 5 | Tirana | 41.316667 | 19.816667 | Artigiano | 41.319398 | 19.818842 | Italian Restaurant |
| 6 | Tirana | 41.316667 | 19.816667 | SALT | 41.321630 | 19.817421 | Bistro |
| 7 | Tirana | 41.316667 | 19.816667 | Caffé Vergnano | 41.321447 | 19.817820 | Café |
| 8 | Tirana | 41.316667 | 19.816667 | Mystic2 Bar Restaurant | 41.319848 | 19.814208 | Restaurant |
| 9 | Tirana | 41.316667 | 19.816667 | Çoko | 41.321535 | 19.816496 | Bistro |

# 3. Methodology

## 3.1 Download and Explore the World's Coordinates Dataset

- Download raw dataset (read_html from pandas)

- Create dataframe

- Filter data to obtain the Sovereign Countries of European Continent

| | Country Name | Capital Name | Capital Latitude | Capital Longitude | Country Code | Continent Name |
|---|---|---|---|---|---|---|
| 0 | Albania | Tirana | 41.316667 | 19.816667 | AL | Europe |
| 1 | Andorra | Andorra la Vella | 42.500000 | 1.516667 | AD | Europe |
| 2 | Armenia | Yerevan | 40.166667 | 44.500000 | AM | Europe |
| 3 | Austria | Vienna | 48.200000 | 16.366667 | AT | Europe |
| 4 | Azerbaijan | Baku | 40.383333 | 49.866667 | AZ | Europe |

Curated dataframe
(49 rows x 6 columns)


Map of European Continent with superimposed tag of Capital's City Center

# 3. Methodology

## 3.2. RESTful API Calls to Foursquare

- only explored the “Food” category, by addressing the categoryId in the URI
- to create an API request URL for each capital, a function “getNearbyFood” was created, with radius of 500m and LIMIT of 15
- after the GET request, only the relevant information for each nearby venue was retained (venue name, venue latitude, venue longitude and venue category), by appending it to a list
- Note: **python library “Pickle”** was needed to serialise the information retrieved from GET request, which was then deserialised to get an exact python object structure

## 3.3. Data Cleaning

Checked and remove duplicated venues

# 3. Methodology

## 3.4. Analysis of each European Capital

- Analyse the most common type of food served within the 500m vicinity of the European capitals' city centers → use a "one hot encoding" function

- Obtained a new dataframe, add the capitals' column back to the dataframe and move it to the first column. The size of this new dataframe is 621 x 103.

Top 10 food categories in European capitals were found by counting their occurrences

| | count | mean | std | min | 25% | 50% | 75% | max |
|---|---|---|---|---|---|---|---|---|
| Café | 48.0 | 1.833333 | 1.860374 | 0.0 | 0.0 | 1.5 | 3.00 | 8.0 |
| Italian Restaurant | 48.0 | 0.541667 | 1.071057 | 0.0 | 0.0 | 0.0 | 1.00 | 5.0 |
| Coffee Shop | 48.0 | 1.145833 | 1.352532 | 0.0 | 0.0 | 1.0 | 2.00 | 5.0 |
| Restaurant | 48.0 | 1.208333 | 1.147770 | 0.0 | 0.0 | 1.0 | 2.00 | 5.0 |
| Japanese Restaurant | 48.0 | 0.145833 | 0.618495 | 0.0 | 0.0 | 0.0 | 0.00 | 4.0 |
| Fast Food Restaurant | 48.0 | 0.250000 | 0.635811 | 0.0 | 0.0 | 0.0 | 0.00 | 3.0 |
| Spanish Restaurant | 48.0 | 0.062500 | 0.433013 | 0.0 | 0.0 | 0.0 | 0.00 | 3.0 |
| Tea Room | 48.0 | 0.145833 | 0.504852 | 0.0 | 0.0 | 0.0 | 0.00 | 3.0 |
| Pizza Place | 48.0 | 0.500000 | 0.771845 | 0.0 | 0.0 | 0.0 | 1.00 | 3.0 |
| Ice Cream Shop | 48.0 | 0.333333 | 0.663111 | 0.0 | 0.0 | 0.0 | 0.25 | 3.0 |

# 3. Methodology

## 3.4. Analysis of each European Capital (cont.)

- group the rows by capital name and by taking the mean of the frequency of occurrence of each category

- Sort the venues in descending order and create new dataframe; displayed the top 10 venues for each European capital

```
europe_venues_sorted
```

| | Capital Name | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | Amsterdam | Restaurant | Café | Coffee Shop | Ice Cream Shop | Pizza Place | Italian Restaurant | Breakfast Spot | Australian Restaurant | Hotel | French Restaurant |
| 1 | Andorra la Vella | Restaurant | Portuguese Restaurant | Coffee Shop | Diner | Café | Breakfast Spot | BBQ Joint | Bakery | Snack Place | Clothing Store |
| 2 | Ankara | Café | Coffee Shop | Tea Room | Chocolate Shop | Comfort Food Restaurant | Kebab Restaurant | Steakhouse | Fast Food Restaurant | Falafel Restaurant | General Entertainment |
| 3 | Athens | Coffee Shop | Café | Dessert Shop | Bar | Souvlaki Shop | Sushi Restaurant | Restaurant | Other Nightlife | Wine Bar | Vegetarian / Vegan Restaurant |
| 4 | Baku | Tea Room | Café | Restaurant | Seafood Restaurant | Modern European Restaurant | Middle Eastern Restaurant | Chinese Restaurant | Eastern European Restaurant | Afghan Restaurant | Diner |

# 3. Methodology

## 3.5. Clustering

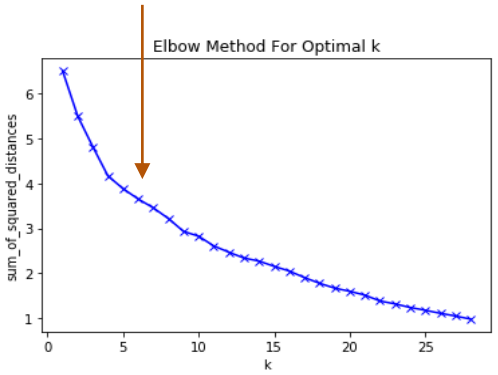
- Determining the optimal number of clusters (k)

- Added the cluster labels to the dataframe to get the segmentation of the European capitals based upon the most common venues in its vicinity

- Merge the 2 main dataframes

- Segmentation of European capitals according to food category (using python library “folium”)

k = 6




# 4. Results

## Cluster 0

Brussels, Kyiv, Bucharest, Athens, Dublin, Tallinn, Lisbon, Tbilisi, Madrid, Skopje, Riga, Nicosia, Andorra la Vella, London and Valletta

```
---------------------------------------------
Coffee Shop              7
Restaurant               4
Sandwich Place           1
Cocktail Bar             1
Portuguese Restaurant    1
Spanish Restaurant       1
Name: 1st Most Common Venue, dtype: int64
---------------------------------------------
Café                     3
Romanian Restaurant      1
Greek Restaurant         1
Portuguese Restaurant    1
Bakery                   1
Bar                      1
English Restaurant       1
Thai Restaurant          1
Coffee Shop              1
Chinese Restaurant       1
Tapas Restaurant         1
Dessert Shop             1
Indian Restaurant        1
Name: 2nd Most Common Venue, dtype: int64
---------------------------------------------
```

## Cluster 1

Bern

```
---------------------------------------------
Japanese Restaurant    1
Name: 1st Most Common Venue, dtype: int64
---------------------------------------------
Wings Joint    1
Name: 2nd Most Common Venue, dtype: int64
---------------------------------------------
```

## Cluster 2

Vienna, Podgorica, Helsinki, Ankara, Bratislava and Paris

```
---------------------------------------------
Café                     5
Japanese Restaurant      1
Name: 1st Most Common Venue, dtype: int64
---------------------------------------------
Coffee Shop              2
Italian Restaurant       1
Café                     1
Bar                      1
Food Court               1
Name: 2nd Most Common Venue, dtype: int64
---------------------------------------------
```

# 4. Results

## Cluster 3

Vatican City, Luxembourg, Chisinau, Tirana and Copenhagen

```
-------------------------------------------
Italian Restaurant    2
Bakery                1
Coffee Shop           1
Pizza Place           1
Name: 1st Most Common Venue, dtype: int64
-------------------------------------------
Pizza Place           2
Romanian Restaurant   1
Café                  1
Sandwich Place        1
Name: 2nd Most Common Venue, dtype: int64
-------------------------------------------
```

## Cluster 4

Zagreb, Oslo, Amsterdam, Ljubljana, Reykjavik, Minsk, Busapest, Moscow, Rome, Baku, Stockholm, Berlin, Prague, Sarajevo, Sofia, Monaco, Yerevan and Warsaw

```
Café                  9
Fast Food Restaurant  2
Bakery                2
Restaurant            1
French Restaurant     1
Cocktail Bar          1
Food Court            1
Tea Room              1
Name: 1st Most Common Venue, dtype: int64
-------------------------------------------
Café                  4
Ice Cream Shop        3
Pizza Place           2
Steakhouse            1
Coffee Shop           1
Italian Restaurant    1
Fast Food Restaurant  1
Bakery                1
Jewish Restaurant     1
Restaurant            1
German Restaurant     1
South American Restaurant  1
Name: 2nd Most Common Venue, dtype: int64
-------------------------------------------
```

## Cluster 5

Belgrade, Vilnius and Vaduz

```
Restaurant    3
Name: 1st Most Common Venue, dtype: int64
-------------------------------------------
Seafood Restaurant    1
Pizza Place           1
Bed & Breakfast       1
Name: 2nd Most Common Venue, dtype: int64
-------------------------------------------
```

# 5. Discussion / Conclusions

Analysis of food venues around the capital city centers of European Continent during this project showed that central European countries are clearly different from the western and southern Europe

Coffee shops, cafés and restaurants are on the top list of the most common categories of food venues

A complementary analysis to further explore this subject could include the consideration of the different cultural backgrounds and peoples' migration patterns

# Thank you!