

The background image shows a rooftop terrace in Lisbon. Three people are sitting on the terrace, looking out over the city. A man in a dark shirt is standing and looking out. A woman in a light-colored shirt is sitting on the left, looking out. A man in a dark shirt is sitting on the right, looking out. There is a table with a water bottle and a cup on it. The sun is setting over the city, creating a warm, golden light. The city is densely packed with buildings, and the sun is low on the horizon, casting long shadows. The overall mood is peaceful and scenic.

**Coursera Capstone Project**  
The Battle of Neighborhoods

## Explore restaurants in Lisbon's Famous Viewpoints

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A work by  
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# Business problem

This final project explores the famous Viewpoints that exist in Lisbon, regarding the type of restaurants. The goal is to understand the number and type of restaurants present at this specific locations – an information that can be helpful to business personnel who wants to invest or open a restaurant or for a tourist looking for the best places to visit.





# Target Audience

Business entrepreneur who wants to invest or open a restaurant

Tourist who wants to understand the best Viewpoints to visit

A local person who wants to know the best locations to enjoy a meal at the end of the day or schedule an event

A Business Analyst or Data scientist who want to implement exploratory Data Analysis techniques to obtain and analyze data to solve a problem

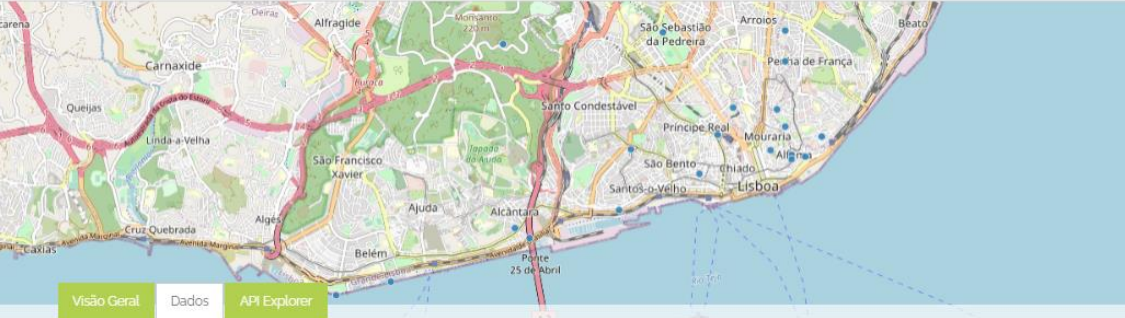


# Data Section

Lisbon's City Council website (<https://www.lisboa.pt>) contains the information that is required

Miradouros

Atualizado em há 5 meses | 20 Registos



30/09/2020 Camada de Elementos Personalizar Licença Transferência APIs

A exibir 1 a 10 de 20 Sugestão: filtre as colunas usando

OBJECTID	COD_SIG	IDTIPO	CAT_NOME	CAT_ID	INF_ID	INF_NOME	INF_MORADA
1	0805531053001	2	Espaços Verdes e Lazer - Miradou...	211819	12514	Miradouro do Panorâmico de Mon...	Estrada Bela Vista
2	0202512431001	2	Espaços Verdes e Lazer - Miradou...	211819	12522	Experiência Pilar 7	Avenida da Índia, Por
3	16	7	Espaços Verdes e Lazer - Miradou...	211819	3232	Miradouro de Santo Estêvão	Largo de Santo Estêv
4	41	7	Espaços Verdes e Lazer - Miradou...	211819	1948	Miradouro do Castelo de São Jorge	Castelo de São Jorge
5	20	7	Espaços Verdes e Lazer - Miradou...	211819	1958	Miradouro Sophia de Mello Breyn...	Largo da Graça
6	23	7	Espaços Verdes e Lazer - Miradou...	211819	1960	Miradouro de Santa Clara	Campo de Santa Clar
7	32	7	Espaços Verdes e Lazer - Miradou...	211819	3233	Miradouro da Basílica da Estrela	Praça da Estrela 1200
8	4	7	Espaços Verdes e Lazer - Miradou...	211819	1965	Miradouro do Torel	Rua Júlio de Andrade
9	21	7	Espaços Verdes e Lazer - Miradou...	211819	1959	Miradouro das Portas do Sol	Largo das Portas do S
10	11	7	Espaços Verdes e Lazer - Miradou...	211819	1953	Miradouro do Padrão dos Descobr...	Avenida de Brasília

The table contains the following information for each Viewpoint:

- ID
- Name
- Address
- Phone Number
- Fax
- Email
- Website
- Description
- Municipal Information
- Coordinates



# Data Section

Since the website also provides a shape file (GeoJson), the table can be extracted by using the link [https://opendata.arcgis.com/datasets/02763aa9ec6b4d719841f713e682b12a\\_1.geojson](https://opendata.arcgis.com/datasets/02763aa9ec6b4d719841f713e682b12a_1.geojson)

After cleaning and data preparation steps, the final dataset is obtained with Name, Address, Latitude and Longitude information for each Viewpoint

	Viewpoint	Adress	Latitude	Longitude
0	Miradouro do Panorâmico de Monsanto	Estrada Bela Vista	38.728618	-9.184607
1	Experiência Pilar 7	Avenida da Índia, Ponte 25 de Abril - Pilar 7	38.700008	-9.179553
2	Miradouro de Santo Estêvão	Largo de Santo Estêvão	38.712070	-9.127729
3	Miradouro do Castelo de São Jorge	Castelo de São Jorge	38.712991	-9.134210
4	Miradouro Sophia de Mello Breyner Andresen (Mi...	Largo da Graça	38.716427	-9.131584
5	Miradouro de Santa Clara	Campo de Santa Clara	38.714970	-9.124694
6	Miradouro da Basílica da Estrela	Praça da Estrela\n1200-667 LISBOA	38.713097	-9.160581
7	Miradouro do Torel	Rua Júlio de Andradel	38.719323	-9.141286
8	Miradouro das Portas do Sol	Largo das Portas do Sol\n	38.712346	-9.130366
9	Miradouro do Padrão dos Descobrimentos	Avenida de Brasília\n	38.693614	-9.205697
10	Miradouro da Rocha de Conde de Óbidos	Rua Presidente Arriaga;	38.704181	-9.162765
11	Miradouro da Penha de França	Largo da Penha de França\n1170-298 LISBOA	38.730633	-9.131550
12	Miradouro de Santa Luzia	Largo de Santa Luzia\n	38.711646	-9.130360
13	Miradouro de Santo Amaro	Calçada de Santo Amaro	38.701464	-9.182371
14	Miradouro do Parque Eduardo VII	Alameda Cardeal Cerejeira\n	38.730358	-9.154480
15	Miradouro de São Pedro de Alcântara	Rua de São Pedro de Alcântara	38.715299	-9.144277
16	Miradouro do Monte Agudo	Rua Heliodoro Salgado	38.726145	-9.131528
17	Miradouro da Torre de Belém	Avenida de Brasília\n1400-038	38.691578	-9.215928
18	Miradouro de Santa Catarina	Rua de Santa Catarina\n1200-403 LISBOA	38.709515	-9.147672
19	Miradouro da Senhora do Monte	Largo do Monte\n	38.718975	-9.132994

# Approach

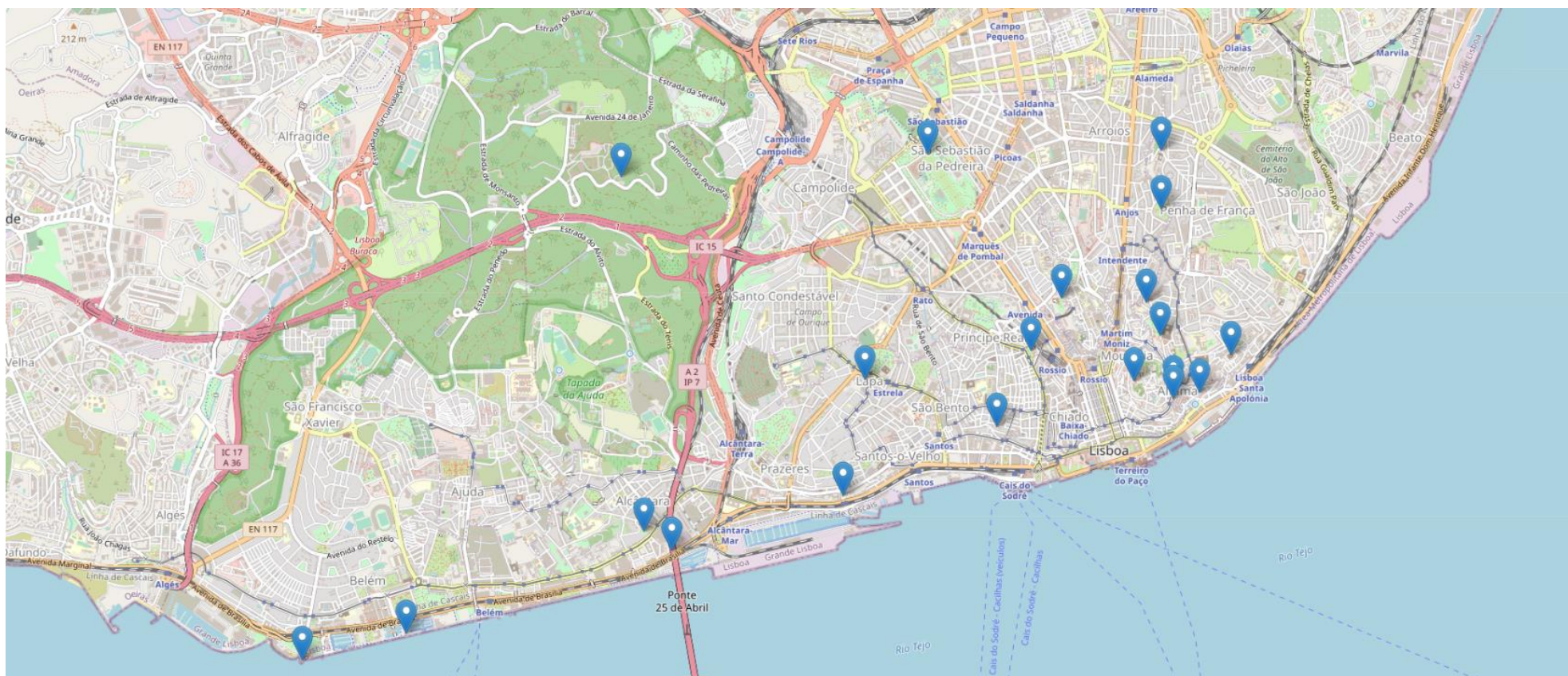
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With this clear and simple dataset, is possible to visually analyze the locations of each viewpoint and explore, through the Foursquare API, the venues near this locations. Therefore, the following approach will be realized:

- Visualize the distribution of Viewpoints using Folium
- Use Foursquare API to get all venues for each Viewpoint
- Map the distribution of venues around Viewpoints (Folium)
- Analysis to find the most common types of restaurants
- Analyzing using Clustering (K-Means)
- Compare the different clusters in terms of Location and Number/Type of restaurants
- Inference From these Results and related Conclusions

# Methodology

## Visualize Viewpoints Distribution using Folium



# Methodology

## Get nearby venues

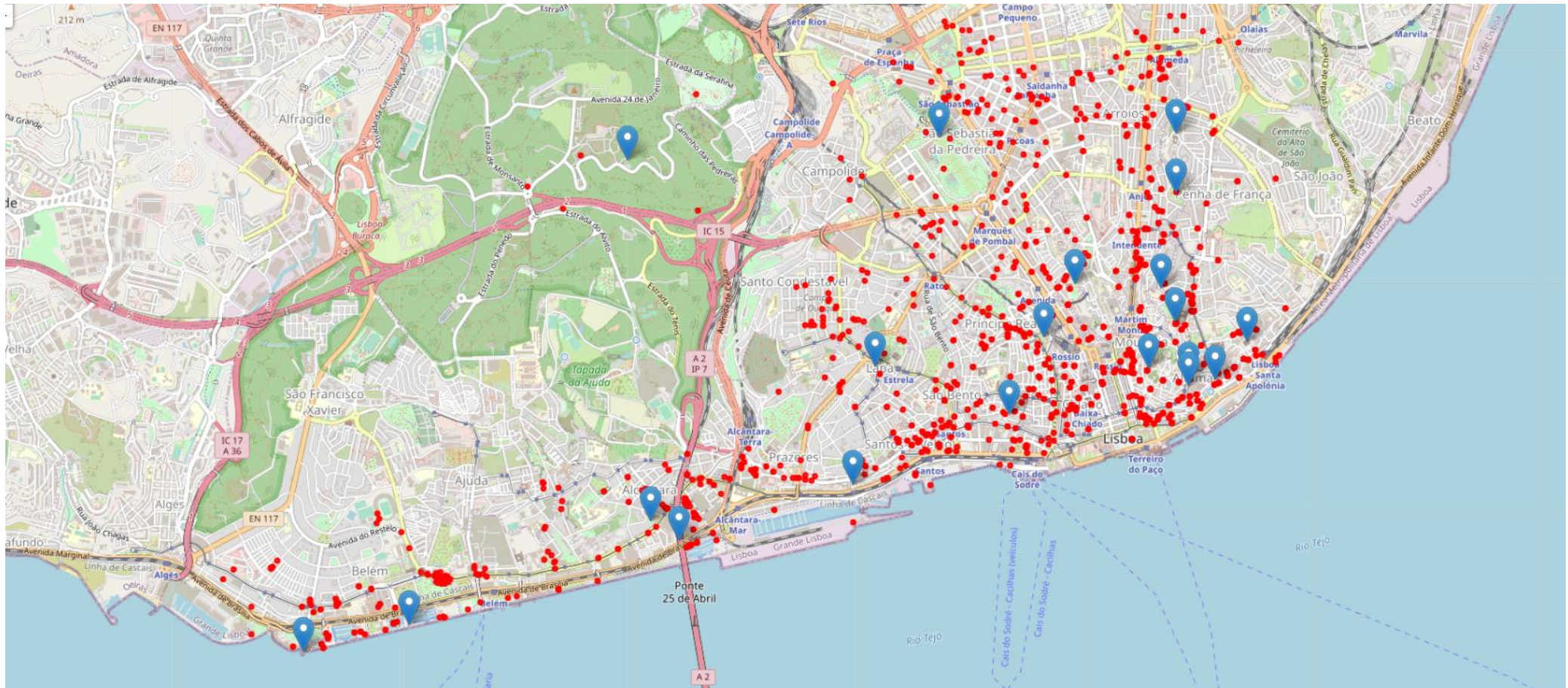
	Viewpoint	Viewpoint Latitude	Viewpoint Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Miradouro do Panorâmico de Monsanto	38.728618	-9.184607	Messe Monsanto	38.729066	-9.189070	Portuguese Restaurant
1	Miradouro do Panorâmico de Monsanto	38.728618	-9.184607	Monte Verde	38.726703	-9.194175	Portuguese Restaurant
2	Miradouro do Panorâmico de Monsanto	38.728618	-9.184607	Restaurante Monteverde	38.725040	-9.190780	Portuguese Restaurant
3	Miradouro do Panorâmico de Monsanto	38.728618	-9.184607	Pastelaria Snack Bar Creme e Canela	38.724917	-9.177665	Breakfast Spot
4	Miradouro do Panorâmico de Monsanto	38.728618	-9.184607	Papagaio da Serafina	38.733658	-9.177860	Portuguese Restaurant
5	Experiência Pilar 7	38.700008	-9.179553	Village Underground	38.700861	-9.178150	Café
6	Experiência Pilar 7	38.700008	-9.179553	Rio Maravilha	38.701798	-9.178076	Portuguese Restaurant
7	Experiência Pilar 7	38.700008	-9.179553	5 Oceanos	38.699654	-9.178412	Seafood Restaurant
8	Experiência Pilar 7	38.700008	-9.179553	A Padaria Portuguesa	38.702512	-9.180872	Bakery
9	Experiência Pilar 7	38.700008	-9.179553	1300 Taberna	38.702888	-9.178968	Restaurant
10	Experiência Pilar 7	38.700008	-9.179553	Doca de Santo	38.700551	-9.176251	Restaurant
11	Experiência Pilar 7	38.700008	-9.179553	Don Pomodoro	38.699638	-9.178586	Italian Restaurant
12	Experiência Pilar 7	38.700008	-9.179553	Rui dos Pregos	38.700079	-9.175933	Steakhouse
13	Experiência Pilar 7	38.700008	-9.179553	The Therapist	38.701634	-9.177599	Comfort Food Restaurant
14	Experiência Pilar 7	38.700008	-9.179553	Cucurico	38.702564	-9.178860	BBQ Joint
15	Experiência Pilar 7	38.700008	-9.179553	Café Dias	38.702917	-9.184385	Café
16	Experiência Pilar 7	38.700008	-9.179553	O Mercado	38.705005	-9.178732	Mediterranean Restaurant
17	Experiência Pilar 7	38.700008	-9.179553	Cantina LX Factory	38.703228	-9.178896	Portuguese Restaurant
18	Experiência Pilar 7	38.700008	-9.179553	A Tapadinha	38.706576	-9.178730	Eastern European Restaurant
19	Experiência Pilar 7	38.700008	-9.179553	chef nino	38.703059	-9.178802	Café

1733 venues are  
retrieved from  
Foursquare API



# Methodology

## Analyze venues data



# Methodology

## Analyze venues data

By grouping the venues by Viewpoint, is possible to see how many places exist for each Viewpoint

!2J:

	Viewpoint	Counts
0	Experiência Pilar 7	44
1	Miradouro Sophia de Mello Breyner Andresen (Mi...	100
2	Miradouro da Basílica da Estrela	100
3	Miradouro da Penha de França	100
4	Miradouro da Rocha de Conde de Óbidos	88
5	Miradouro da Senhora do Monte	100
6	Miradouro da Torre de Belém	39
7	Miradouro das Portas do Sol	100
8	Miradouro de Santa Catarina	100
9	Miradouro de Santa Clara	100
10	Miradouro de Santa Luzia	100
11	Miradouro de Santo Amaro	83
12	Miradouro de Santo Estêvão	100
13	Miradouro de São Pedro de Alcântara	100
14	Miradouro do Castelo de São Jorge	100
15	Miradouro do Monte Agudo	100
16	Miradouro do Padrão dos Descobrimentos	74
17	Miradouro do Panorâmico de Monsanto	5
18	Miradouro do Parque Eduardo VII	100
19	Miradouro do Torel	100

Analysis of the category of venues retrieved, grouping by Venue Category

!2J:

	Venue Category	Counts
46	Portuguese Restaurant	502
48	Restaurant	177
12	Café	175
34	Indian Restaurant	84
7	Bakery	75
38	Mediterranean Restaurant	64
65	Vegetarian / Vegan Restaurant	46
52	Seafood Restaurant	46
35	Italian Restaurant	41
44	Pizza Place	35



# Methodology

## Analyze venues data

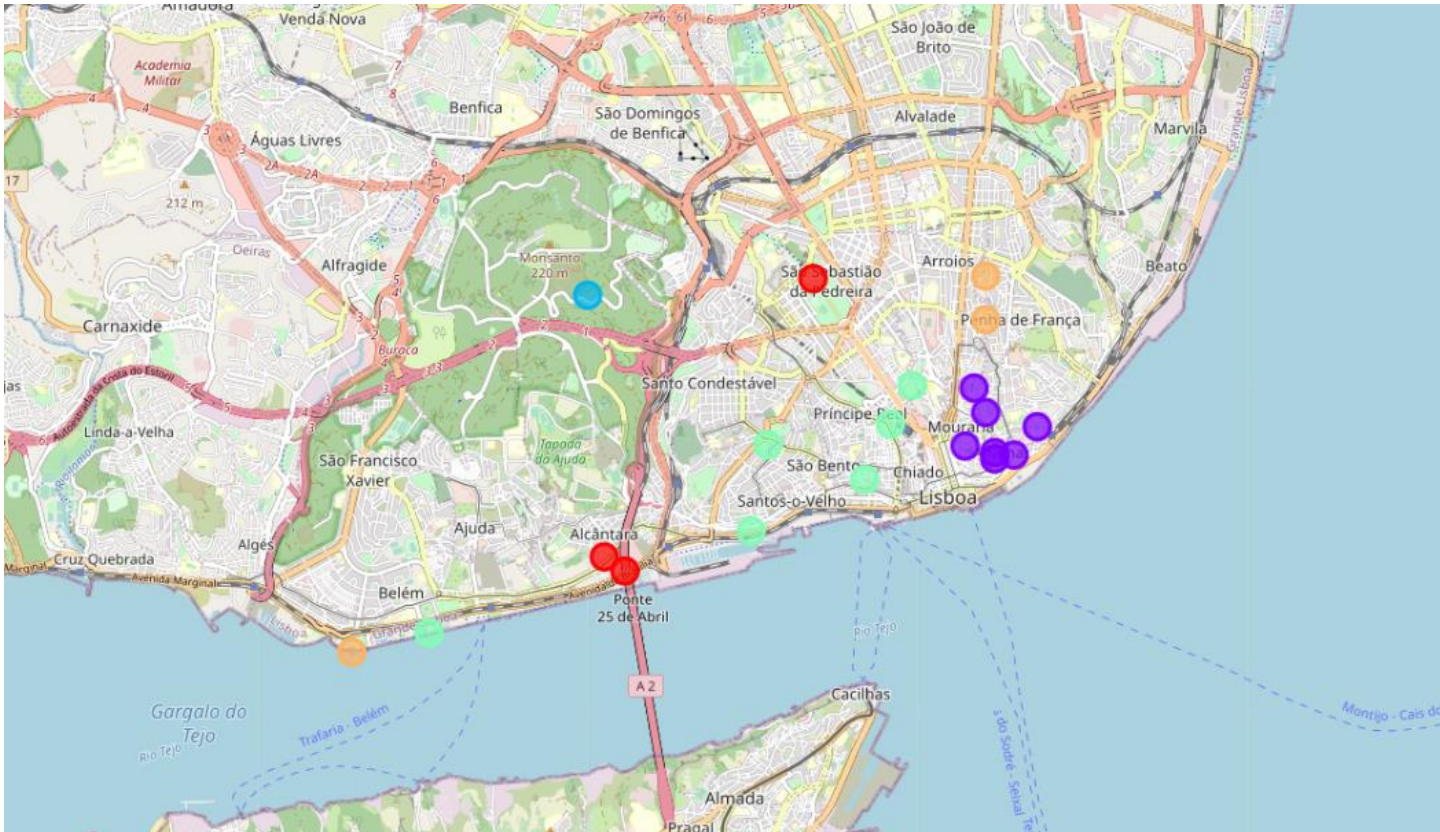
### 10 most common venues for each Viewpoint

	Viewpoint	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	Experiência Pilar 7	Restaurant	Portuguese Restaurant	Mediterranean Restaurant	Café	Bakery	Seafood Restaurant	Italian Restaurant	Pizza Place	BBQ Joint	Sushi Restaurant
1	Miradouro Sophia de Mello Breyner Andresen (Mi...	Portuguese Restaurant	Café	Indian Restaurant	Restaurant	Mediterranean Restaurant	Bakery	Chinese Restaurant	Vegetarian / Vegan Restaurant	Seafood Restaurant	Breakfast Spot
2	Miradouro da Basílica da Estrela	Portuguese Restaurant	Café	Restaurant	Vegetarian / Vegan Restaurant	Seafood Restaurant	Indian Restaurant	Italian Restaurant	Breakfast Spot	Bakery	Steakhouse
3	Miradouro da Penha de França	Portuguese Restaurant	Café	Indian Restaurant	Restaurant	Bakery	Italian Restaurant	Vegetarian / Vegan Restaurant	Seafood Restaurant	Pizza Place	BBQ Joint
4	Miradouro da Rocha de Conde de Óbidos	Portuguese Restaurant	Restaurant	Café	Mediterranean Restaurant	Italian Restaurant	Seafood Restaurant	Tapas Restaurant	Bakery	Breakfast Spot	Mexican Restaurant
5	Miradouro da Senhora do Monte	Portuguese Restaurant	Café	Indian Restaurant	Restaurant	Bakery	Vegetarian / Vegan Restaurant	Seafood Restaurant	Breakfast Spot	Mediterranean Restaurant	Chinese Restaurant
6	Miradouro da Torre de Belém	Portuguese Restaurant	Café	Restaurant	Food Truck	Japanese Restaurant	Sushi Restaurant	Bakery	Burger Joint	Seafood Restaurant	Indian Restaurant
7	Miradouro das Portas do Sol	Portuguese Restaurant	Café	Restaurant	Indian Restaurant	Mediterranean Restaurant	Vegetarian / Vegan Restaurant	Bistro	African Restaurant	Snack Place	Pizza Place
8	Miradouro de Santa Catarina	Portuguese Restaurant	Restaurant	Tapas Restaurant	Café	Vegetarian / Vegan Restaurant	Italian Restaurant	Bakery	Seafood Restaurant	Peruvian Restaurant	Gastropub
9	Miradouro de Santa Clara	Portuguese Restaurant	Café	Mediterranean Restaurant	Bakery	Bistro	Vegetarian / Vegan Restaurant	Restaurant	Indian Restaurant	Chinese Restaurant	Breakfast Spot

# Methodology

## Clustering

Using Folium, is possible to observe the different clusters



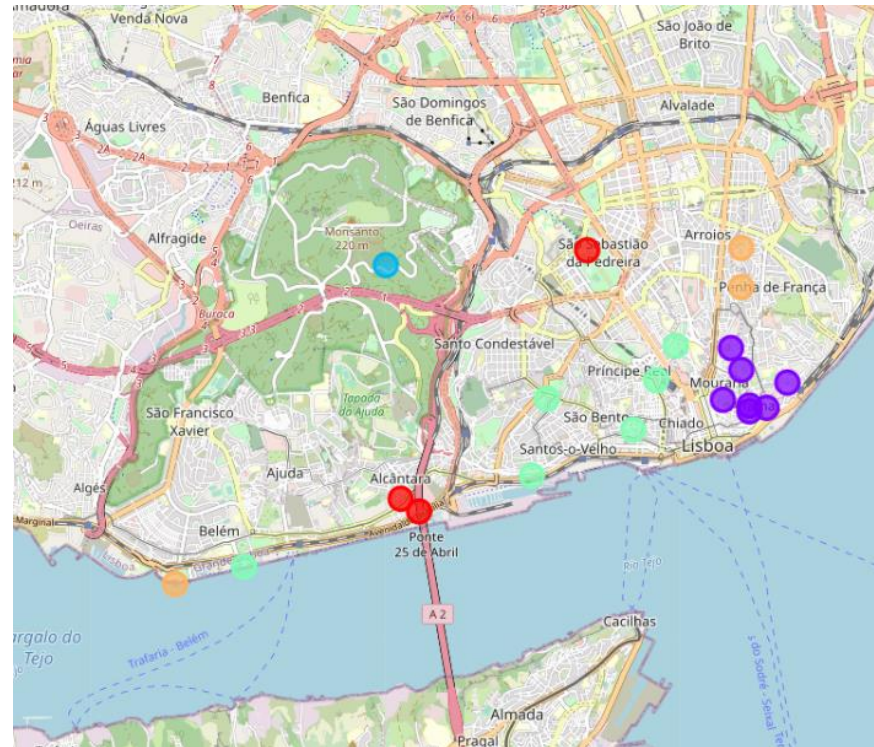
Cluster 1: Red  
Cluster 2: Purple  
Cluster 3: Blue  
Cluster 4: Green  
Cluster 5: Orange



# Methodology

## Clustering

Cluster 1: Red



```
#Cluster 1
lisbonviewpoint_merged.loc[lisbonviewpoint_merged['Cluster Labels'] == 0, lisbonviewpoint_merged.columns[[0] + list(range(5, lisbonviewpoint_merged.shape[1]))]]
```

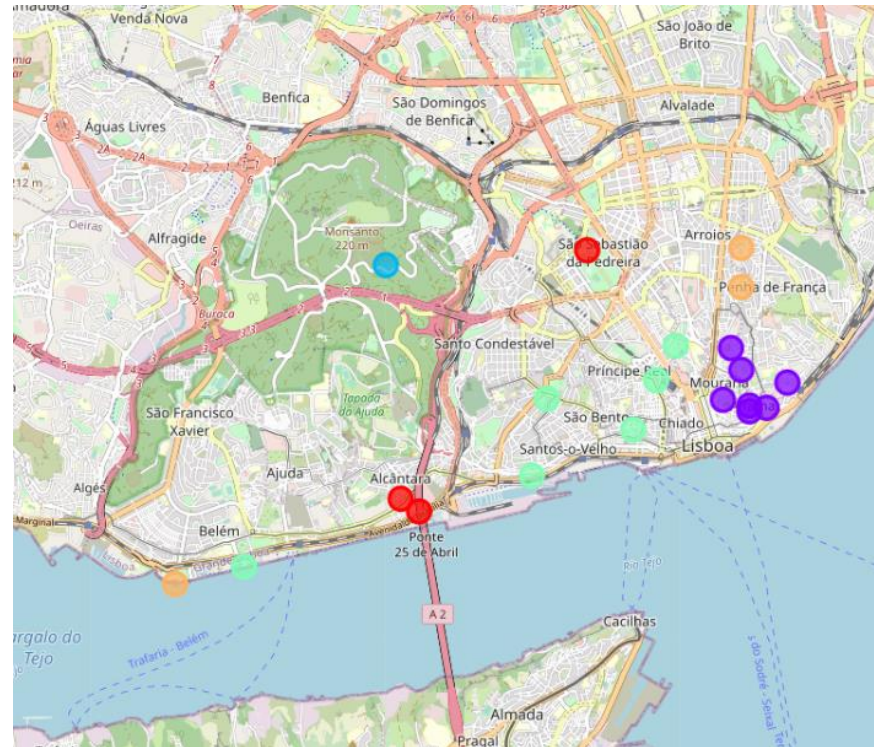
1]:

	Viewpoint	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
1	Experiência Pilar 7	Restaurant	Portuguese Restaurant	Mediterranean Restaurant	Café	Bakery	Seafood Restaurant	Italian Restaurant	Pizza Place	BBQ Joint	Sushi Restaurant
13	Miradouro de Santo Amaro	Restaurant	Portuguese Restaurant	Café	Mediterranean Restaurant	Italian Restaurant	Seafood Restaurant	Bakery	BBQ Joint	Pizza Place	Burger Joint
14	Miradouro do Parque Eduardo VII	Portuguese Restaurant	Restaurant	Italian Restaurant	Café	Japanese Restaurant	Bakery	Burger Joint	Steakhouse	Sushi Restaurant	Snack Place

# Methodology

## Clustering

### Cluster 2: Purple



```
#Cluster 2
lisbonviewpoint_merged.loc[lisbonviewpoint_merged["Cluster_Labels"] == 2, lisbonviewpoint_merged.columns[[0] + list(range(5, lisbonviewpoint_merged.shape[1]))]]
```

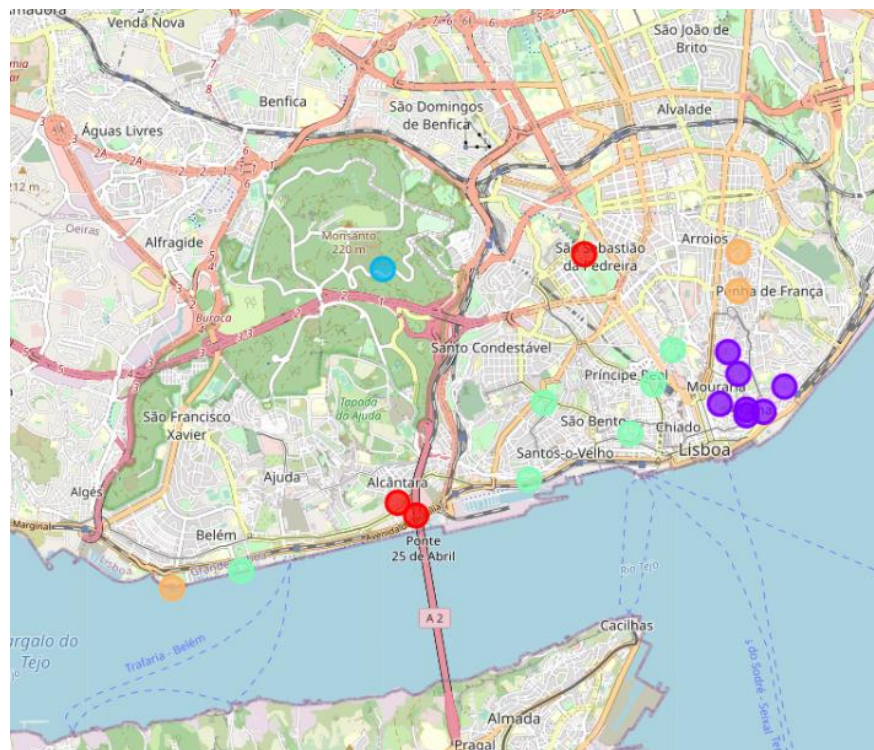
	Viewpoint	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
2	Miradouro de Santo Estêvão	Portuguese Restaurant	Café	Mediterranean Restaurant	Restaurant	Indian Restaurant	Bakery	Creperie	Bistro	Breakfast Spot	Snack Place
3	Miradouro do Castelo de São Jorge	Portuguese Restaurant	Restaurant	Café	Indian Restaurant	Mediterranean Restaurant	Bistro	Chinese Restaurant	Pizza Place	Burger Joint	Seafood Restaurant
4	Miradouro Sophia de Mello Breyner Andersen (50m)	Portuguese Restaurant	Café	Indian Restaurant	Restaurant	Mediterranean Restaurant	Bakery	Chinese Restaurant	Vegetarian / Vegan Restaurant	Seafood Restaurant	Breakfast Spot
5	Miradouro de Santa Clara	Portuguese Restaurant	Café	Mediterranean Restaurant	Bakery	Bistro	Vegetarian / Vegan Restaurant	Restaurant	Indian Restaurant	Chinese Restaurant	Breakfast Spot
8	Miradouro das Portas do Sol	Portuguese Restaurant	Café	Restaurant	Indian Restaurant	Mediterranean Restaurant	Vegetarian / Vegan Restaurant	Bistro	African Restaurant	Snack Place	Pizza Place
12	Miradouro de Santa Luzia	Portuguese Restaurant	Café	Restaurant	Indian Restaurant	Mediterranean Restaurant	Bistro	Burger Joint	Pizza Place	Snack Place	African Restaurant
19	Miradouro da Senhora do Monte	Portuguese Restaurant	Café	Indian Restaurant	Restaurant	Bakery	Vegetarian / Vegan Restaurant	Seafood Restaurant	Breakfast Spot	Mediterranean Restaurant	Chinese Restaurant



# Methodology

## Clustering

Cluster 3: Blue



```
#Cluster 3
lisbonviewpoint_merged.loc[lisbonviewpoint_merged['Cluster_Labels'] == 2, lisbonviewpoint_merged.columns[[0] + list(range(5, lisbonviewpoint_merged.shape[1]))]]
```

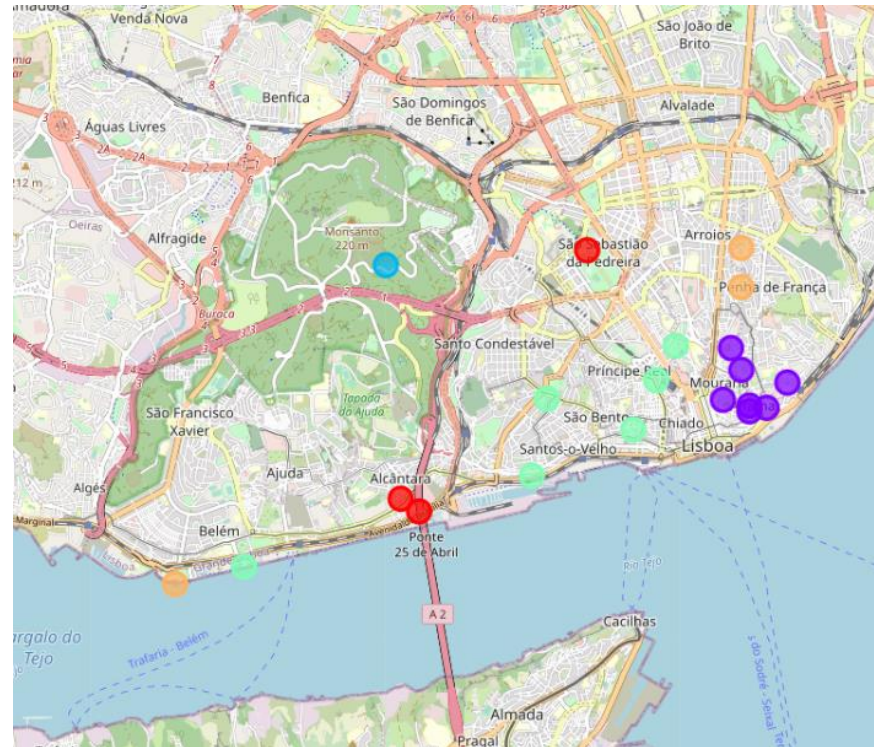
3]:

	Viewpoint	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	Miradouro do Panorâmico de Monsanto	Portuguese Restaurant	Breakfast Spot	Wings Joint	Fast Food Restaurant	Doner Restaurant	Eastern European Restaurant	Empanada Restaurant	Falafel Restaurant	Food Court	Deli / Bodega

# Methodology

## Clustering

### Cluster 4: Green



```
#Cluster 4
lisbonviewpoint_merged.loc[lisbonviewpoint_merged['Cluster Labels'] == 3, lisbonviewpoint_merged.columns[[0] + list(range(5, lisbonviewpoint_merged.shape[1]))]]
```

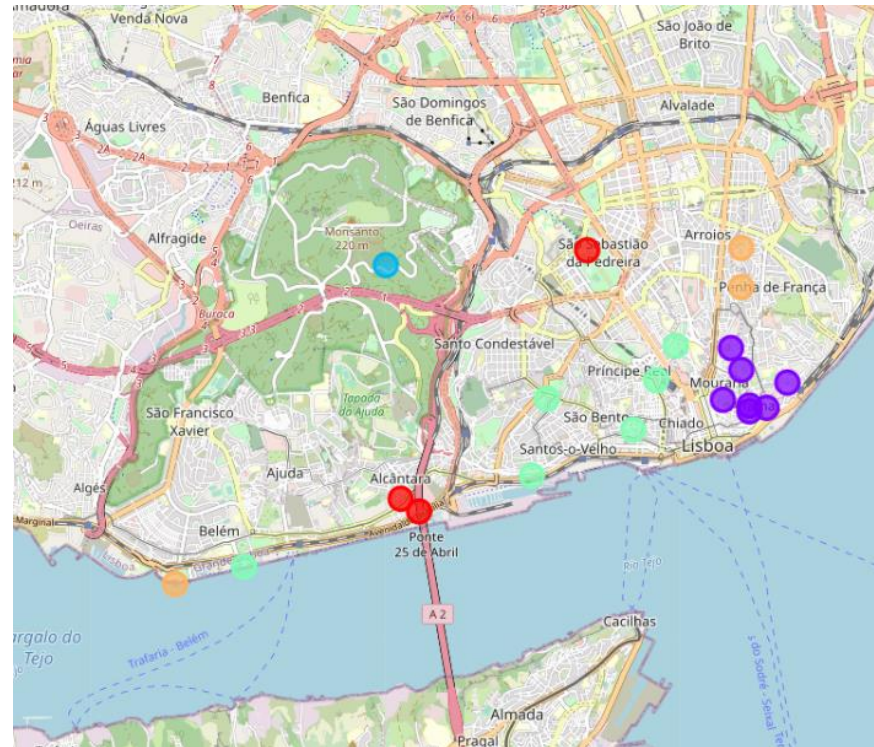
	Viewpoint	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
6	Miradouro da Basílica da Estrela	Portuguese Restaurant	Café	Restaurant	Vegetarian / Vegan Restaurant	Seafood Restaurant	Indian Restaurant	Italian Restaurant	Breakfast Spot	Bakery	Steakhouse
7	Miradouro do Torel	Portuguese Restaurant	Restaurant	Café	Vegetarian / Vegan Restaurant	Indian Restaurant	Tapas Restaurant	Breakfast Spot	Pizza Place	Gastropub	Bakery
9	Miradouro do Padirão dos Descobrimentos	Portuguese Restaurant	Restaurant	Café	Food Truck	Mediterranean Restaurant	Sandwich Place	Bakery	BBQ Joint	Sushi Restaurant	Japanese Restaurant
10	Miradouro da Rocha de Conde de Obidos	Portuguese Restaurant	Restaurant	Café	Mediterranean Restaurant	Italian Restaurant	Seafood Restaurant	Tapas Restaurant	Bakery	Breakfast Spot	Mexican Restaurant
15	Miradouro de São Pedro de Alcântara	Portuguese Restaurant	Restaurant	Café	Indian Restaurant	Tapas Restaurant	Burger Joint	Seafood Restaurant	Peruvian Restaurant	Pizza Place	Russian Restaurant
18	Miradouro de Santa Catarina	Portuguese Restaurant	Restaurant	Tapas Restaurant	Café	Vegetarian / Vegan Restaurant	Italian Restaurant	Bakery	Seafood Restaurant	Peruvian Restaurant	Gastropub



# Methodology

## Clustering

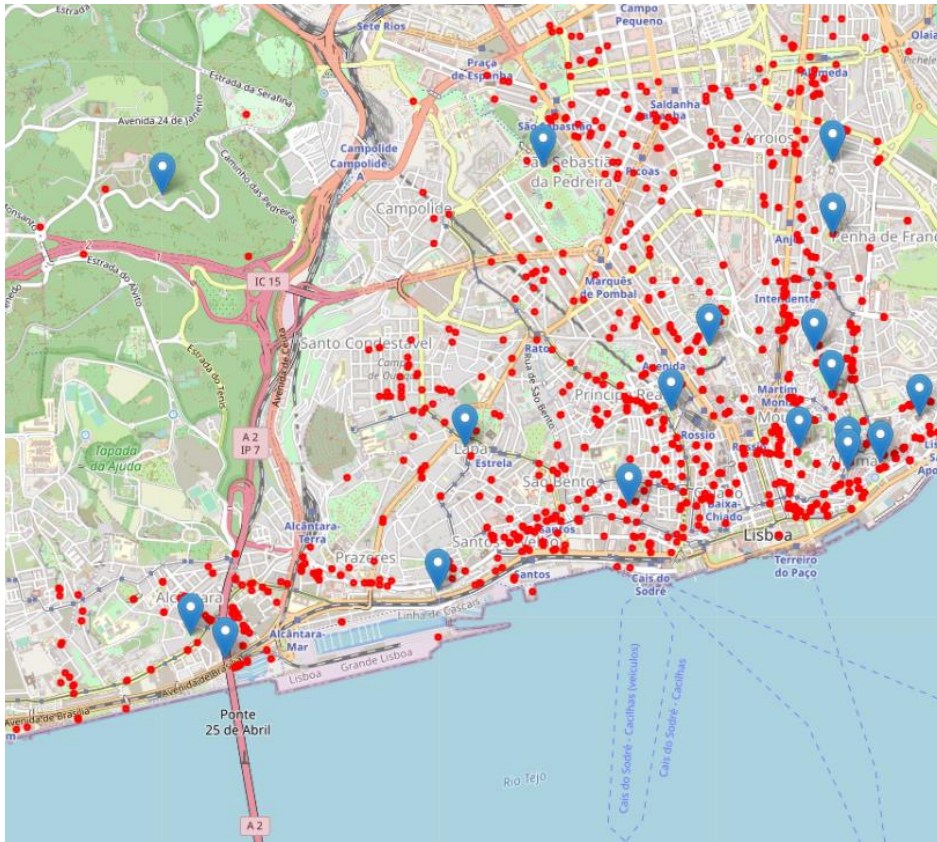
Cluster 5: Orange



```
#Cluster 5
lisbonviewpoint_merged.loc[lisbonviewpoint_merged['Cluster Labels'] == 4, lisbonviewpoint_merged.columns[[0] + list(range(5, lisbonviewpoint_merged.shape[1]))]]
```

	Viewpoint	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
11	Miradouro da Penha de França	Portuguese Restaurant	Café	Indian Restaurant	Restaurant	Bakery	Italian Restaurant	Vegetarian / Vegan Restaurant	Seafood Restaurant	Pizza Place	BBQ Joint
16	Miradouro do Monte Agudo	Portuguese Restaurant	Café	Bakery	Indian Restaurant	Restaurant	BBQ Joint	Seafood Restaurant	Vegetarian / Vegan Restaurant	Italian Restaurant	Pizza Place
17	Miradouro da Torre de Belém	Portuguese Restaurant	Café	Restaurant	Food Truck	Japanese Restaurant	Sushi Restaurant	Bakery	Burger Joint	Seafood Restaurant	Indian Restaurant

# Discussion



Exist 20 official Viewpoints in Lisbon, some of them spatially close to each other and other, like “Miradouro do Monsanto”, more far away

“Miradouro de Monsanto”, “Miradouro da Torre de Belém” or “Experiência Pilar 7” have a much-reduced number of venues nearby

Cluster 2 includes 7 Viewpoint’s nearby that are very similar in terms of the type of restaurants present. On the other hand, Cluster 3 or 5 include a reduced number of Viewpoint’s with similar venue categories

The most popular type of restaurant is Portuguese food, followed by Coffee Spots, being the 2 most popular venue categories in all clusters

Cluster 3 has no Coffee Spots or Vegetarian restaurants and Viewpoints in Cluster 5 like “Miradouro da Torre de Belém” also do not have Vegetarian restaurants



# Conclusions

The most common categories of restaurants are Portuguese Food and Coffee Spots

Viewpoints like “Miradouro de Monsanto”, “Miradouro da Torre de Belém” or “Experiência Pilar 7” have a much-reduced number of venues nearby, so this would be good spots to open a restaurant, with less competition

Coffee Spots and Vegetarian Food would be good options, since restaurants of this category are not present in this locations





# Conclusions

For a tourist aiming to explore the city's viewpoints, Cluster 2 is constituted by a large number of Viewpoints and Venues near each other, so this would be a great area to explore, with lots of different categories of restaurants

