

# Applied Data Science

## Capstone Project

Real-estate: Helping an undecided customer.

### Introduction.

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#### Business problem.

A customer sent us an email interested in buying a holiday property in the Algarve. The customer was not sure which area he would like to buy in, but he gave us some tips on what he was looking for.

- The client stated that he would like to live very close to a tourist area that had several outdoor leisure options.
- The client said that he would not like to live near bars or loud places at night.
- The client would not like to live in isolation or in places that are far from restaurants and other leisure options.
- The client would like to live in a luxury area.

As a real estate office supervisor one of my duties is to facilitate the work of real estate agents by delivering a good report on the client and his demands.

### Data Section.

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#### Data Sources.

Foursquare API.

#### Data Requirements.

To make a good report, we will first collect information on “Foursquare” about all outdoor leisure places in the Algarve. Next, we will clear this data and look for cities with more outdoor leisure options. Since we already know the cities with more options, we will eliminate all outdoor leisure places that are not in any of these cities. Having defined the cities and their places of leisure in

outdoors, we will collect more data on “Foursquare” about what is around each of these outdoor leisure places, analyze them and define which are the best to look for properties for this client based on the client requirements.

## Data Cleaning.

*Defining the desired locations for the analysis.*

1. Perform a “Get Request” in Foursquare API for all “outdoor fun” venues in Algarve.
2. Create a table with the name of the outdoor venue, latitude, longitude, and the city of the venue.
3. Perform a count of locations by cities to define the 5 cities with more locations.

```
city
Albufeira      14
Portimão       8
Lagoa          6
Lagos          6
Sagres         5
Name: outdoor_venue, dtype: int64
```

- 4.
5. Filter the cities from step 3 in the table of step 2.

	outdoor_venue	city	o_latitude	o_longitude
0	Ponta da Piedade	Lagos	37.080517	-8.669393
7	Praia do Pinhão	Lagos	37.095606	-8.670456
9	Praia de São Rafael	Albufeira	37.074662	-8.280580
13	Praia Dona Ana	Lagos	37.091669	-8.669655
14	Praia dos Três Castelos	Portimão	37.118081	-8.548125
16	Farol do Cabo de São Vicente	Sagres	37.023229	-8.995989
17	Praia Porto de Mós	Lagos	37.085577	-8.689277
18	Praia do Camilo	Lagos	37.087583	-8.668481
20	Praia da Rocha	Portimão	37.119220	-8.540215
24	Praia da Galé	Albufeira	37.081561	-8.316407
26	Praia dos Três Irmãos	Portimão	37.119811	-8.581865
28	Praia da Falésia	Albufeira	37.075000	-8.400000

*Creating the analysis table.*

6. Perform a “Get Request” in Foursquare API for each “outdoor venue” from the table of step 4.
7. Create a table with the name of the outdoor venue, latitude, longitude, locations around the outdoor venue, their categories, and latitude and longitude.

# Exploratory Data Analysis

1. Create an analysis table.

2. Transform the analysis table into a frequency table.

*In this step, we check the categories of venues surrounding the target location (outdoor\_venue), as well as the count of locations in each category. This step is important for us to know, for example, which of these locations do not fit the client's requirements (many bars and clubs around them are a dislike feature for choosing).*

3. Checking the 5 most common places in outdoor leisure locations.

*In this step we will do an analysis similar to the previous step, it will be useful in the future for the analysis and classification of clusters in K-Means modeling.*

## Clustering using K-Means method for analysis.

### Clustering.

1. Creating a DATAFRAME to order each category of localities in the surroundings according to their frequency.
2. Dividing the data into clusters.

### Cluster analysis.

Cluster 0:

outdoor_venue	city	1st Most Common Venue near	2nd Most Common Venue near	3rd Most Common Venue near	4th Most Common Venue near	5th Most Common Venue near	6th Most Common Venue near	7th Most Common Venue near	8th Most Common Venue near	9th Most Common Venue near	10th Most Common Venue near
Praia do Pinhão	Lagos	Hotel	Portuguese Restaurant	Restaurant	Beach	Breakfast Spot	Bar	Pizza Place	Seafood Restaurant	Lounge	Burger Joint
Praia da Rocha	Portimão	Bar	Portuguese Restaurant	Hotel	Restaurant	Ice Cream Shop	Nightclub	Bistro	Italian Restaurant	Pizza Place	Cocktail Bar
Praia do Beliche	Sagres	Portuguese Restaurant	Beach	Coffee Shop	Snack Place	Tour Provider	Dive Shop	Castle	Cave	Chinese Restaurant	Cocktail Bar
Praia do Peneco	Albufeira	Portuguese Restaurant	Bar	Restaurant	Hotel	Mediterranean Restaurant	Seafood Restaurant	Plaza	Scenic Lookout	Italian Restaurant	Nightclub
Praia do Carvoeiro	Lagoa	Portuguese Restaurant	Bar	Seafood Restaurant	Restaurant	Beach	Ice Cream Shop	Mediterranean Restaurant	Coffee Shop	Diner	Café
Forte de Santa Catarina	Portimão	Restaurant	Hotel	Lounge	Portuguese Restaurant	Pizza Place	Harbor / Marina	Bakery	Bar	Dive Shop	Seafood Restaurant
Praia da Restinga	Portimão	Seafood Restaurant	Portuguese Restaurant	Bar	Restaurant	Café	Mediterranean Restaurant	Italian Restaurant	Snack Place	Boat or Ferry	Food
Praia Grande	Lagoa	Tapas Restaurant	Bar	Beach	Beach Bar	Tour Provider	Food	Cave	Chinese Restaurant	Cocktail Bar	Coffee Shop
Praia da Mareta	Sagres	Portuguese Restaurant	Pizza Place	Burger Joint	Café	Cocktail Bar	Bar	Restaurant	Hotel	Board Shop	Laundry Service
Praia de Benagil	Lagoa	Seafood Restaurant	Beach	Cave	Portuguese Restaurant	Tour Provider	BBQ Joint	Golf Course	Diner	Gym	Chinese Restaurant
Praia dos Pescadores	Albufeira	Portuguese Restaurant	Bar	Restaurant	Mediterranean Restaurant	Seafood Restaurant	Beach	Italian Restaurant	Nightclub	Rock Club	Hookah Bar
Miradouro 3 Castelos	Portimão	Bar	Restaurant	Portuguese Restaurant	Hotel	Nightclub	Ice Cream Shop	Italian Restaurant	Beach	Cocktail Bar	Mediterranean Restaurant

*Due to the high number of bars in the top positions of the ranking, this cluster is not suitable for the client.*

Cluster 1:

	outdoor_venue	city	1st Most Common Venue near	2nd Most Common Venue near	3rd Most Common Venue near	4th Most Common Venue near	5th Most Common Venue near	6th Most Common Venue near	7th Most Common Venue near	8th Most Common Venue near	9th Most Common Venue near	10th Most Common Venue near
9	Praia de São Rafael	Albufeira	Beach	Mediterranean Restaurant	Gym	Modern European Restaurant	Portuguese Restaurant	Hotel	Diner	Cave	Chinese Restaurant	Cocktail Bar
13	Praia Dona Ana	Lagos	Hotel	Restaurant	Beach	Portuguese Restaurant	Chinese Restaurant	Scenic Lookout	Seafood Restaurant	Snack Place	Pizza Place	Resort
14	Praia dos Três Castelos	Portimão	Hotel	Italian Restaurant	Portuguese Restaurant	Restaurant	Seafood Restaurant	Mediterranean Restaurant	Pizza Place	Japanese Restaurant	Scenic Lookout	Café
17	Praia Porto de Mós	Lagos	Seafood Restaurant	Hotel	Resort	Beach	Dive Shop	Castle	Cave	Chinese Restaurant	Cocktail Bar	Coffee Shop
18	Praia do Camilo	Lagos	Hotel	Beach	Seafood Restaurant	Bar	Snack Place	Scenic Lookout	Food	Cave	Chinese Restaurant	Cocktail Bar
24	Praia da Galé	Albufeira	Hotel	Beach	Pizza Place	Portuguese Restaurant	Italian Restaurant	Café	Seafood Restaurant	Supermarket	French Restaurant	Fountain
26	Praia dos Três Irmãos	Portimão	Hotel	Seafood Restaurant	Beach	Portuguese Restaurant	Bowling Alley	Mediterranean Restaurant	Hotel Pool	Resort	Restaurant	Tour Provider
30	Praia do Vau	Portimão	Hotel	Beach	Café	Mediterranean Restaurant	Dive Shop	Cave	Chinese Restaurant	Cocktail Bar	Coffee Shop	Creperie
32	Praia Barranco das Belharucas	Albufeira	Hotel	Bar	Restaurant	Gastropub	Beach	Fountain	Pool	Seafood Restaurant	Breakfast Spot	Resort
40	Praia Senhora Da Rocha	Lagoa	Bar	Beach	Hotel	Snack Place	Ice Cream Shop	Resort	Italian Restaurant	Restaurant	Tour Provider	Diner
52	Praia dos Salgados	Albufeira	Hotel	Restaurant	Outdoors & Recreation	Coffee Shop	Sushi Restaurant	Beach	Resort	Seafood Restaurant	Italian Restaurant	Casino
60	Praia dos Arrifes	Albufeira	Hotel	Beach	Gym	Modern European Restaurant	Portuguese Restaurant	Mediterranean Restaurant	Diner	Cave	Chinese Restaurant	Cocktail Bar
76	Herdade dos Salgados Resort	Albufeira	Hotel	Restaurant	Italian Restaurant	Golf Course	Sushi Restaurant	Beach	Resort	Café	Coffee Shop	Creperie
89	Praia Maria Luísa	Albufeira	Resort	Seafood Restaurant	Hotel	Beach	Indian Restaurant	Food	Restaurant	Creperie	Castle	Cave
94	Praia dos Aveiros	Albufeira	Hotel	Beach	Cafeteria	Nightclub	Buffet	Restaurant	Cocktail Bar	Diner	Cave	Chinese Restaurant

*Given the high number of hotels this cluster may be unpleasant to the customer, but it has many other options for outdoor leisure.*

## Cluster 2:

	outdoor_venue	city	1st Most Common Venue near	2nd Most Common Venue near	3rd Most Common Venue near	4th Most Common Venue near	5th Most Common Venue near	6th Most Common Venue near	7th Most Common Venue near	8th Most Common Venue near	9th Most Common Venue near	10th Most Common Venue near
	Praia do Alemão	Portimão	Beach	Hotel	Restaurant	Tour Provider	Dive Shop	Cave	Chinese Restaurant	Cocktail Bar	Coffee Shop	Creperie
	Praia do Lourenço	Albufeira	Beach	Portuguese Restaurant	Tour Provider	Dive Shop	Castle	Cave	Chinese Restaurant	Cocktail Bar	Coffee Shop	Creperie

*Given the high outdoors leisure options, this cluster is recommended to our client.*

## Cluster 3:

outdoor_venue	city	1st Most Common Venue near	2nd Most Common Venue near	3rd Most Common Venue near	4th Most Common Venue near	5th Most Common Venue near	6th Most Common Venue near	7th Most Common Venue near	8th Most Common Venue near	9th Most Common Venue near	10th Most Common Venue near
Ponta da Piedade	Lagos	Beach	Scenic Lookout	Bar	Lighthouse	Boat or Ferry	Tour Provider	Chinese Restaurant	Cocktail Bar	Coffee Shop	Creperie
Praia da Falésia	Albufeira	Beach	Restaurant	Seafood Restaurant	Thai Restaurant	Lounge	Speakeasy	Beer Garden	Diner	Cave	Chinese Restaurant
Praia do Tonel	Sagres	Seafood Restaurant	Beach	Ice Cream Shop	Castle	Arts & Crafts Store	Grocery Store	Dive Shop	Cave	Chinese Restaurant	Cocktail Bar
Meia Praia	Lagos	Gym	Hotel Pool	Beach	Beach Bar	Tour Provider	Dive Shop	Cave	Chinese Restaurant	Cocktail Bar	Coffee Shop
Praia da Coelha	Albufeira	Beach	Restaurant	Portuguese Restaurant	Hotel Pool	Resort	Tour Provider	Creperie	Castle	Cave	Chinese Restaurant
Praia do Pintadinho	Lagoa	Beach	Surf Spot	Cocktail Bar	Lighthouse	Tour Provider	Dive Shop	Cave	Chinese Restaurant	Coffee Shop	Creperie
Praia do Castelo	Albufeira	Beach	Restaurant	Seafood Restaurant	Portuguese Restaurant	Resort	Diner	Castle	Cave	Chinese Restaurant	Cocktail Bar
Praia dos Caneiros	Lagoa	Seafood Restaurant	Surf Spot	Beach	Food	Castle	Cave	Chinese Restaurant	Cocktail Bar	Coffee Shop	Creperie

*With many leisure options and few bars, this cluster seems to be the best choice.*

#### Cluster 4:

outdoor_venue	city	1st Most Common Venue near	2nd Most Common Venue near	3rd Most Common Venue near	4th Most Common Venue near	5th Most Common Venue near	6th Most Common Venue near	7th Most Common Venue near	8th Most Common Venue near	9th Most Common Venue near	10th Most Common Venue near
Farol do Cabo de São Vicente	Sagres	Lighthouse	Food Truck	Scenic Lookout	Tour Provider	Castle	Cave	Chinese Restaurant	Cocktail Bar	Coffee Shop	Creperie
Cabo de São Vicente	Sagres	Lighthouse	Food Truck	Scenic Lookout	Tour Provider	Castle	Cave	Chinese Restaurant	Cocktail Bar	Coffee Shop	Creperie

*Given the lack of restaurants and other infrastructure, this cluster is not recommended.*

## Conclusion.

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Analyzing the clusters we can determine that the best reference locations to search for properties for the client are:

outdoor_venue	city	o_latitude	o_longitude
Ponta da Piedade	Lagos	37.080517	-8.669393
Praia da Falésia	Albufeira	37.075020	-8.130998
Praia do Tonel	Sagres	37.005243	-8.947999
Meia Praia	Lagos	37.108176	-8.662033
Praia da Coelha	Albufeira	37.073975	-8.293565
Praia do Pintadinho	Lagoa	37.107763	-8.518518
Praia do Castelo	Albufeira	37.073481	-8.298519
Praia dos Caneiros	Lagoa	37.105142	-8.513445

