

# Examining Hotel Locations in Edinburgh

IBM Data Science Capstone Project

# The problem

- Edinburgh is a popular destination in Scotland
  - Lots of venues
  - Lots of hotels
  - Visited by tourists and business people
- How should a visitor choose a hotel?



# General Approach

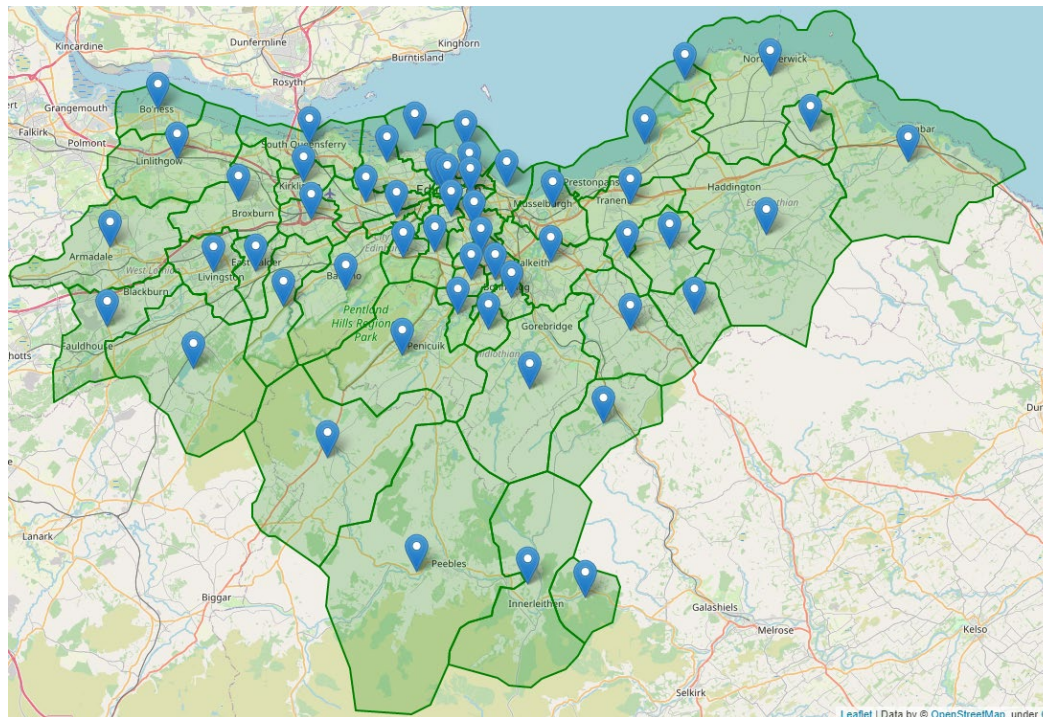
- In this project, the hotels in Edinburgh are located
- Their location is explored
- The venues around hotels are examined
- Data science and machine learning techniques are used to analyse the distributions and define clusters of hotels.

# Methodology

- Determine the postcode regions of Edinburgh
- Locate hotels in each regions (FourSquare)
  - Examine hotel distribution
- Cluster hotels by location - kmeans
  - Locate venues near each hotel cluster (Foursquare)
- Cluster the hotel clusters by venue types
  - How similar are the hotel clusters

# Postcodes in Edinburgh

- Extracted from KML file on Wikipedia
  - Plotted on a Folium map of Edinburgh



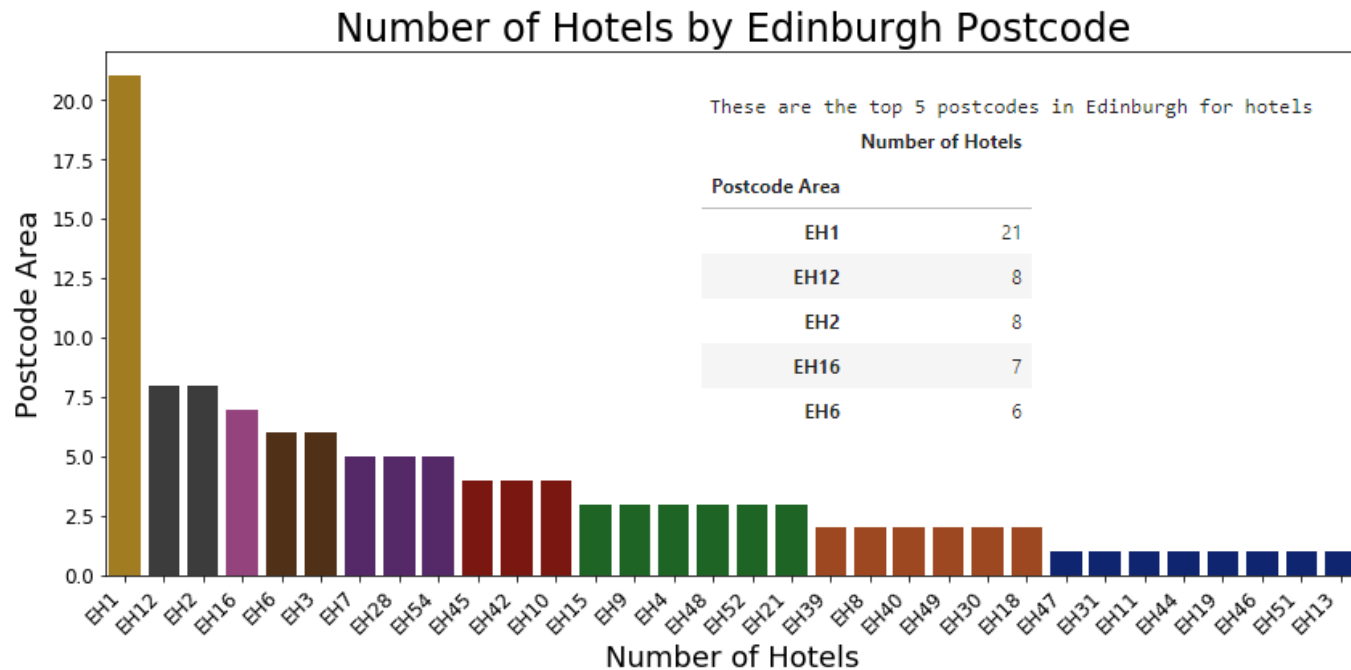
# Hotels in each region

- Use postcode region centroids to fetch hotels
  - FourSquare API (search endpoint, query “Hotel”)

	Postcode Area	Name	Categories	Address	PostCode	Latitude	Longitude
0	EH1	Radisson Collection Royal Mile Hotel	Hotel	1 George IV Bridge	EH1 1AD	55.949031	-3.192676
1	EH1	Apex City of Edinburgh Hotel	Hotel	61 Grassmarket	EH1 2HJ	55.947198	-3.195282
2	EH1	Apex Grassmarket Hotel	Hotel	31-35 Grassmarket	EH1 2HS	55.947182	-3.196664
3	EH1	Stay Central Hotel	Hotel	139 Cowgate	EH1 1JS	55.948268	-3.190160
4	EH1	Radisson Blu Hotel	Hotel	80 High Street, The Royal Mile	EH1 1TH	55.950040	-3.186826

# Hotels in each region

- Can view the distribution of hotels

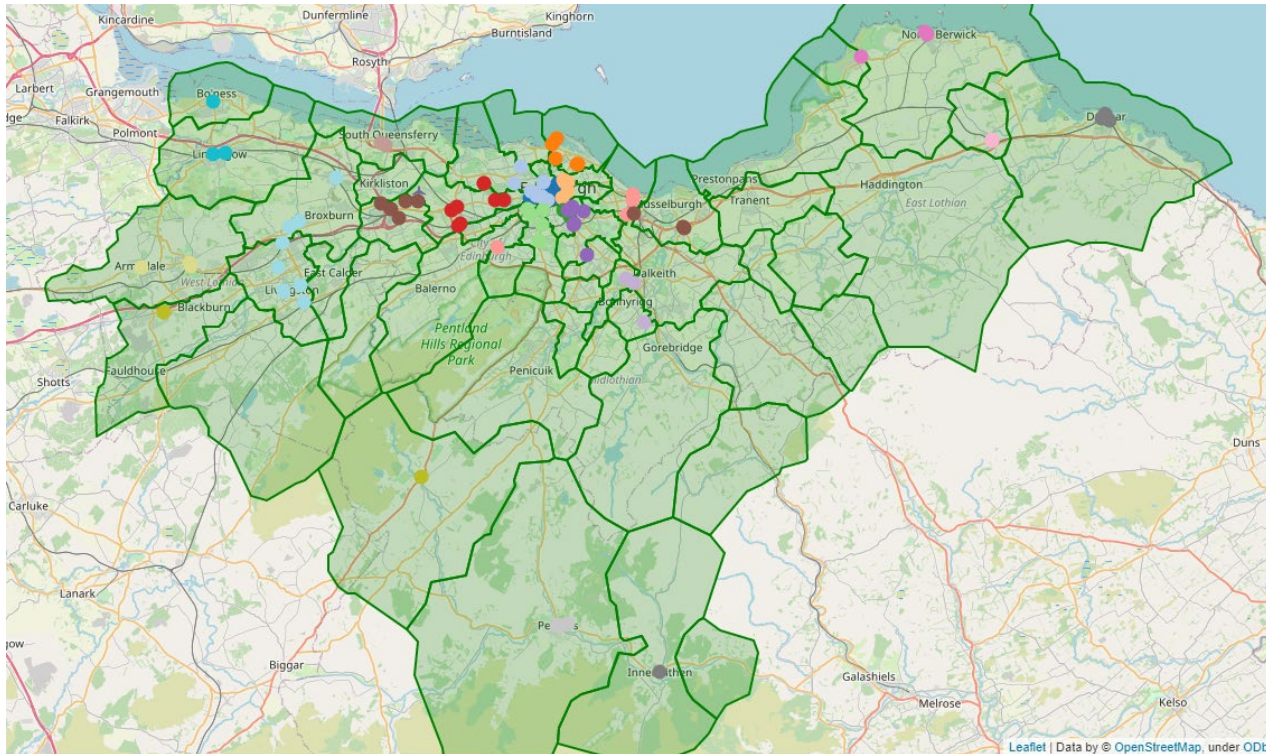


- Most hotels in EH1 (city centre)
  - Map could be more convenient to view locations



# Hotels in each region

- Plot hotels on postcode map

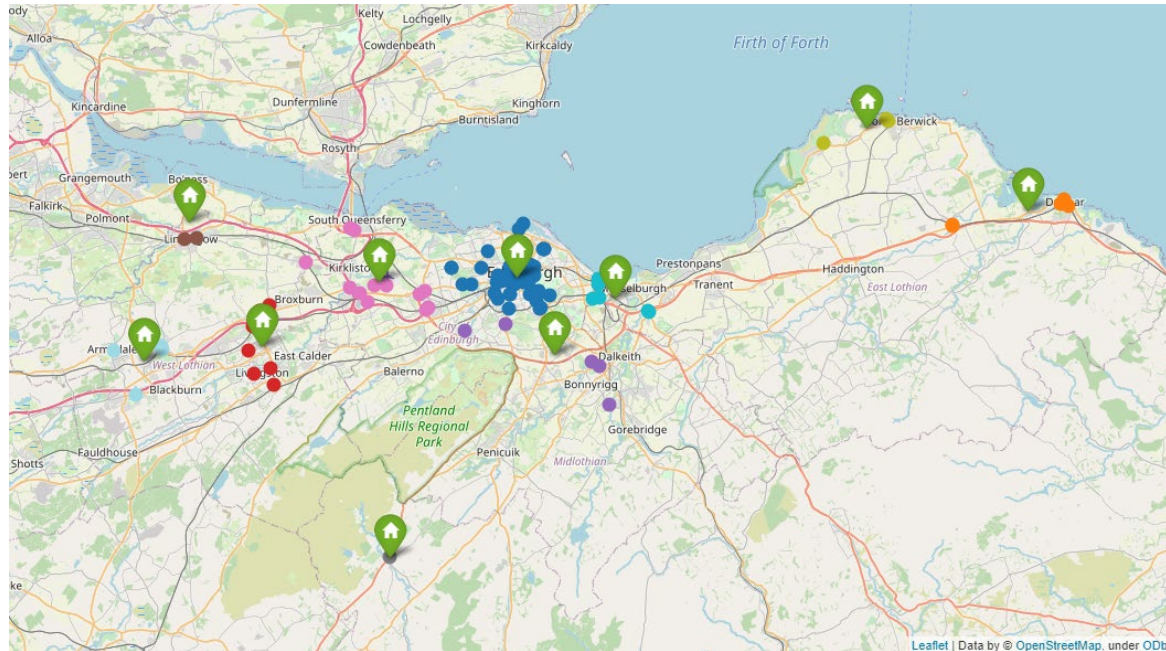


- Hotels appear to be clustered. Post codes rather arbitrary



# Hotel Clusters

- Use kmeans to cluster hotels by locations (latitude and longitude)
  - Use metrics to get optimum number of clusters (11)



- Can see distinct clusters in locations. E.g. city, hills, coast.

# Venues

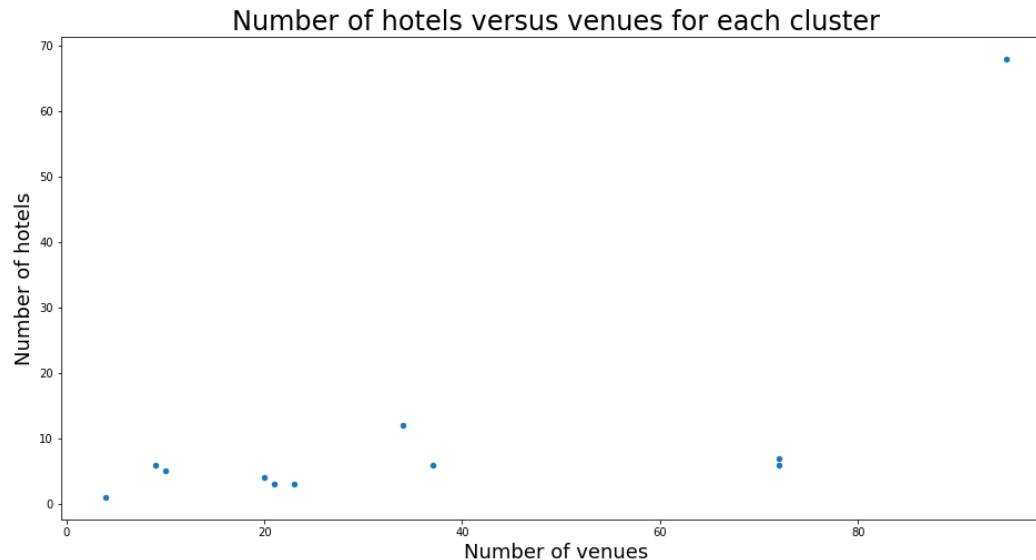
- Some hotel clusters might have similar venues
  - Use cluster centroids to fetch venues
    - FourSquare API with explore endpoint
    - Exclude Hotels, Hostels and Bed & Breakfast from results

	Cluster	Name	Category	Latitude	Longitude
0	0	West Princes Street Gardens	Park	55.951042	-3.199393
1	0	Edinburgh Castle	Castle	55.948815	-3.200283
2	0	Old Town	Neighborhood	55.949500	-3.192805
3	0	Castlehill	Scenic Lookout	55.948811	-3.196581
4	0	Whiski Rooms	Scottish Restaurant	55.950015	-3.193522
5	0	Oink	Sandwich Place	55.948592	-3.194099
6	0	Castello Coffee Co	Coffee Shop	55.951192	-3.202808
7	0	Mary's Milk Bar	Ice Cream Shop	55.947062	-3.197525
8	0	Dishoom	Indian Restaurant	55.953726	-3.192540
9	0	The Bon Vivant	Cocktail Bar	55.953953	-3.199726

Found details on 397 venues in Edinburgh.

# Venues

- Number of hotels and venues in a cluster are correlated
  - More hotel choice if you stay where there is a lot to see and do



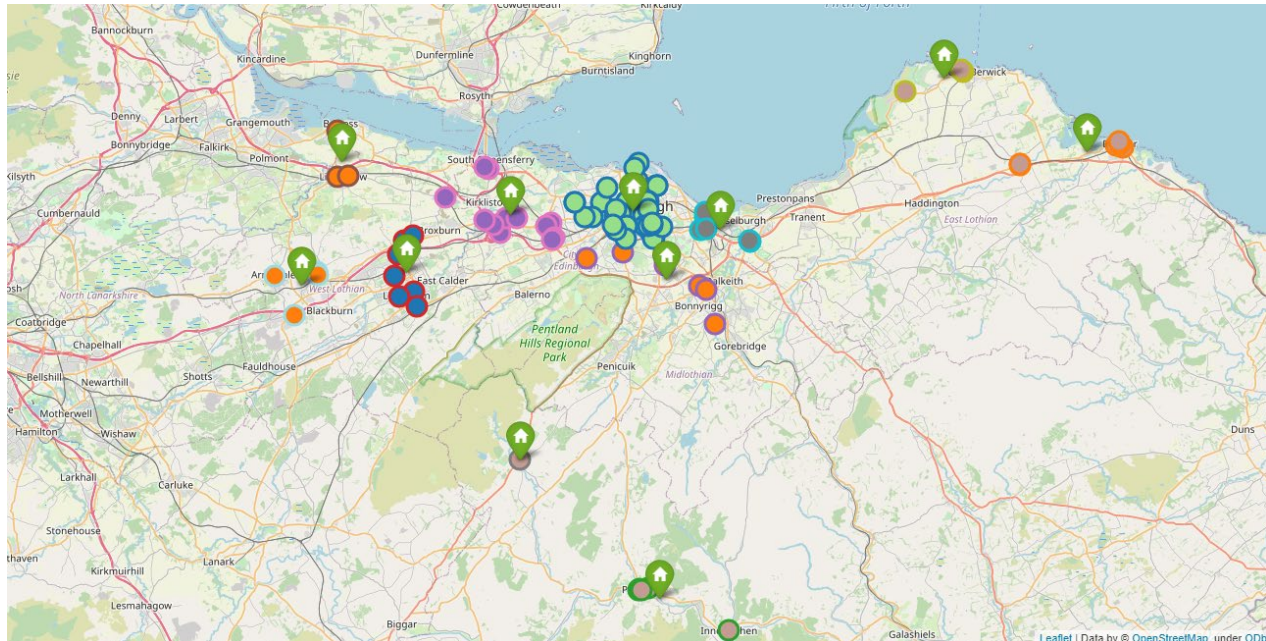
# Venues

- One hot coding to examine venues in each cluster.
  - 5 most common venue type per cluster

	Cluster	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	Latitude	Longitude
0	0	Park	Coffee Shop	Café	Beer Bar	Cocktail Bar	55.950166	-3.198208
1	1	Farm	Surf Spot	Grocery Store	Park	Fish & Chips Shop	55.996219	-2.562977
2	2	Café	Trail	Pizza Place	Forest	Gastropub	55.645380	-3.160983
3	3	Supermarket	Coffee Shop	Pub	Grocery Store	Clothing Store	55.901795	-3.516069
4	4	Supermarket	Fast Food Restaurant	Pub	Furniture / Home Store	Clothing Store	55.895996	-3.152021
5	5	Supermarket	Pub	Gym / Fitness Center	Sandwich Place	Gastropub	55.988384	-3.606645
6	6	Tram Station	Rental Car Location	Pub	Airport Lounge	Donut Shop	55.946615	-3.369685
7	7	Construction & Landscaping	Steakhouse	Pub	Grocery Store	Rental Car Location	55.753883	-3.356618
8	8	Restaurant	Pub	Coffee Shop	Golf Course	Mountain	56.053347	-2.763430
9	9	Clothing Store	Coffee Shop	Pub	Fast Food Restaurant	Park	55.935636	-3.076713
10	10	Supermarket	Discount Store	Pub	Pizza Place	Sandwich Place	55.891775	-3.662861

# Venues

- Use k means to cluster the hotel clusters themselves by venue types
  - Optimum is 6 clusters. Some hotel clusters are similar in terms of venue while geographically distinct



# Conclusions

- Two level clustering reveals hotels can be clustered by location and then by venues type
  - Can be used for a visitor to choose a hotel by type of location (city, coast, hills, near airport).
  - More information on similarity by type of venue
    - Out of city centre locations are similar (e.g. coast and hills)
- Could go further in investigating types of venues
  - Distances from particular highlights such as Edinburgh Castle
  - Public transport connections / walking routes