

The background features abstract, overlapping green geometric shapes, primarily triangles and polygons, in various shades of green, creating a modern and dynamic visual effect.

# Clustering and Segmentation of wards in Cambridge, UK

# INTRODUCTION

- ▶ Cambridge in England is a very special city
  - ▶ It is small, with a population of just about 125,000
  - ▶ Many world-known companies are located in the city
  - ▶ It is very international with people from all over the world
- ▶ Thus... it is interesting to study it for people
  - ▶ Trying to relocate to Cambridge
  - ▶ Settling in Cambridge



# DATA DESCRIPTION

Data will be acquired from the following sources to conduct the study.

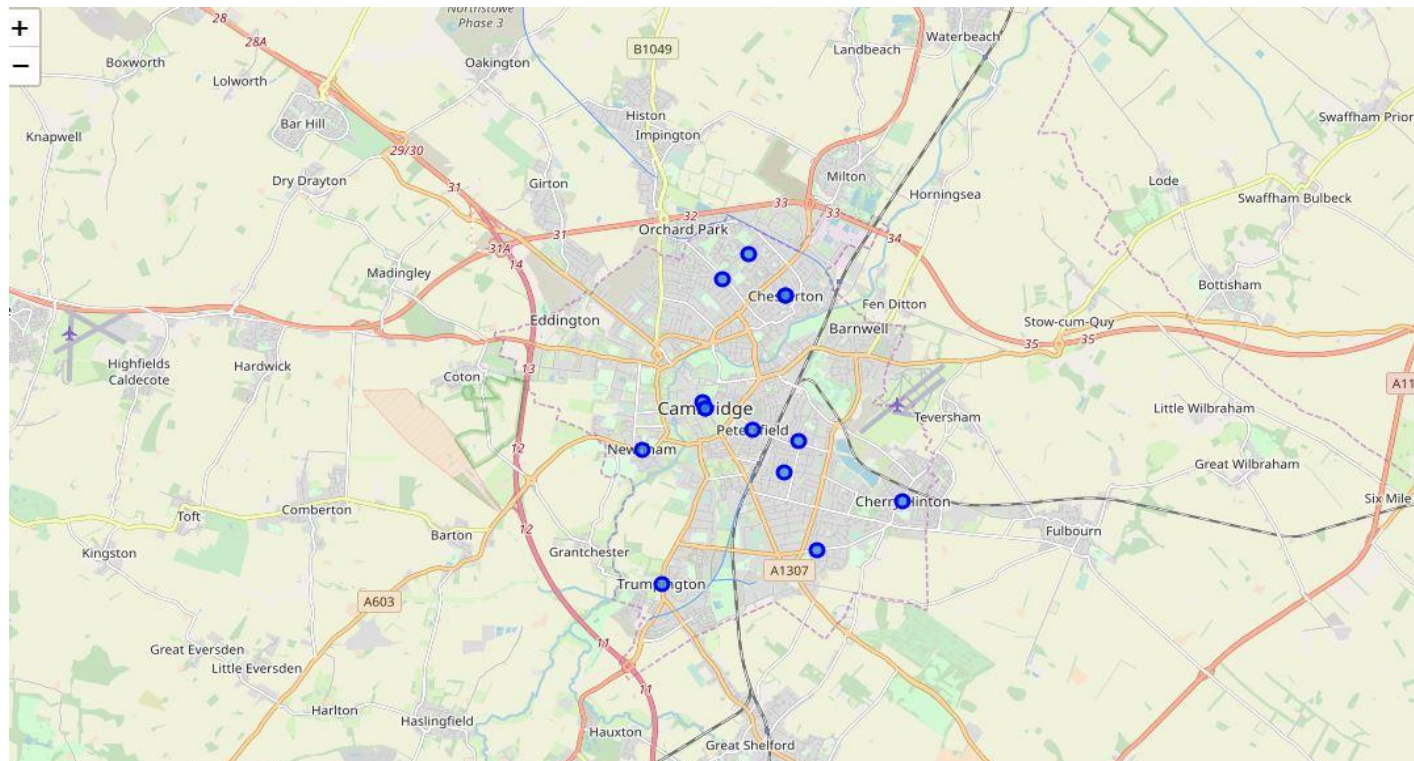
- ▶ The divisions of Cambridge wards are obtained from <https://mapit.mysociety.org/area/2263/children>
- ▶ Foursquare API is employed to get the common venues at different wards of Cambridge to clustering them based on similarities
- ▶ The geocoder from geopy is used to convert addresses into latitude and longitude values

# METHODOLOGY

- Here is a list of the wards in Cambridge

	Ward	Latitude	Longitude
0	Abbey	52.204406	0.122944
1	Arbury	52.225036	0.128007
2	Castle	52.203482	0.123582
3	Cherry Hinton	52.187843	0.175241
4	Coleridge	52.192661	0.144213
5	East Chesterton	52.222288	0.144592
6	King's Hedges	52.229237	0.135074
7	Market	52.203482	0.123582
8	Newnham	52.196542	0.107044
9	Petersfield	52.199810	0.135933
10	Queen Edith's	52.179638	0.152737
11	Romsey	52.197962	0.148062
12	Trumpington	52.173992	0.112116
13	West Chesterton	52.222288	0.144592

- A map of Cambridge is generated using Folium package with wards superimposed on it



- Foursquare API is utilized to extract the venues of different wards

	Ward	Ward Latitude	Ward Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Abbey	52.204406	0.122944	Arts Picturehouse	52.202927	0.123748	Indie Movie Theater
1	Abbey	52.204406	0.122944	Savino's	52.204327	0.123427	Café
2	Abbey	52.204406	0.122944	Hilton Cambridge City Centre	52.203379	0.121676	Hotel
3	Abbey	52.204406	0.122944	Pint Shop	52.204269	0.119238	Bar
4	Abbey	52.204406	0.122944	John Lewis & Partners	52.203671	0.122583	Department Store



► Top 10 most popular venues of the wards of Cambridge

	Ward	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	Abbey	Pub	Coffee Shop	Sandwich Place	Café	Italian Restaurant	Clothing Store	Sushi Restaurant	Burger Joint	Science Museum	Restaurant
1	Arbury	Bed & Breakfast	Chinese Restaurant	Bus Station	Wings Joint	Gastropub	Department Store	Eastern European Restaurant	Electronics Store	English Restaurant	Fast Food Restaurant
2	Castle	Pub	Coffee Shop	Italian Restaurant	Sandwich Place	Café	Burger Joint	Sushi Restaurant	Science Museum	Pizza Place	Bar
3	Cherry Hinton	Pharmacy	Plaza	Indian Restaurant	Pub	Gastropub	Restaurant	Electronics Store	Coffee Shop	Cosmetics Shop	Deli / Bodega
4	Coleridge	Coffee Shop	Playground	Gym	Bar	Bookstore	Park	Platform	English Restaurant	Cosmetics Shop	Deli / Bodega

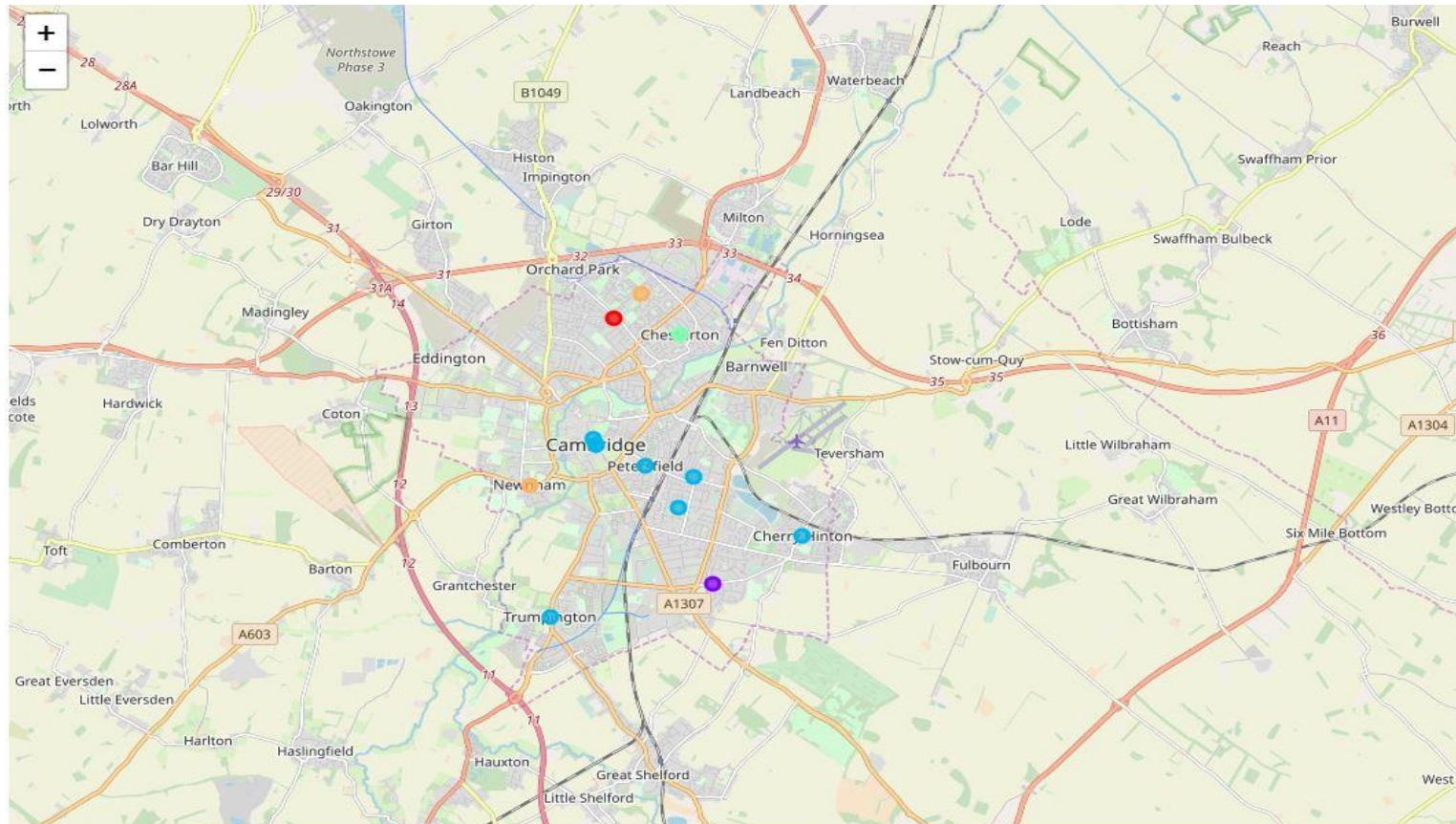
- The k-means clustering was chosen to cluster the wards for the reason of simplicity and efficiency. This figure shows the results of the clustering.

	Ward	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
0	Abbey	52.204406	0.122944	2	Pub	Coffee Shop	Sandwich Place	Café	Italian Restaurant	Clothing Store	Sushi Restaurant	Burger Joint	Science Museum	Restaurant
1	Arbury	52.225036	0.128007	0	Bed & Breakfast	Chinese Restaurant	Bus Station	Wings Joint	Gastropub	Department Store	Eastern European Restaurant	Electronics Store	English Restaurant	Fast Food Restaurant
2	Castle	52.203482	0.123582	2	Pub	Coffee Shop	Italian Restaurant	Sandwich Place	Café	Burger Joint	Sushi Restaurant	Science Museum	Pizza Place	Bar
3	Cherry Hinton	52.187843	0.175241	2	Pharmacy	Plaza	Indian Restaurant	Pub	Gastropub	Restaurant	Electronics Store	Coffee Shop	Cosmetics Shop	Deli / Bodega
4	Coleridge	52.192661	0.144213	2	Coffee Shop	Playground	Gym	Bar	Bookstore	Park	Platform	English Restaurant	Cosmetics Shop	Deli / Bodega



# RESULTS

- The clustering results were displayed on the maps as shown below with different clusters marked with different colours. We can see clearly the similarities/dis-similarities of different wards.



# DISCUSSION & FUTURE RECOMMENDATIONS

- ▶ From this study, it can be seen that the wards of Cambridge can be clustering with different functionalities.
  
- ▶ In the future, the following work can be added to the current study
  1. Better-tune the radius for retrieving the venues of wards
  2. Use elbow method to choose the best number of clusters
  3. Other clustering methods can also be explored to study the wards.
  4. Choropleth maps might be adopted together with supplementary data such as population density, average income, housing price index, etc to give richer information of each ward.

# CONCLUSIONS

- ▶ This study briefly clustered and segmented the wards in Cambridge.
- ▶ It is expected to give people who are coming to or trying to settling in Cambridge a taste of different wards.
- ▶ In the future, more data can be added to it to enrich its value.

# REFERENCES

[1] <https://en.wikipedia.org/wiki/Cambridge>

[2] <https://mapit.mysociety.org/area/2263/children>