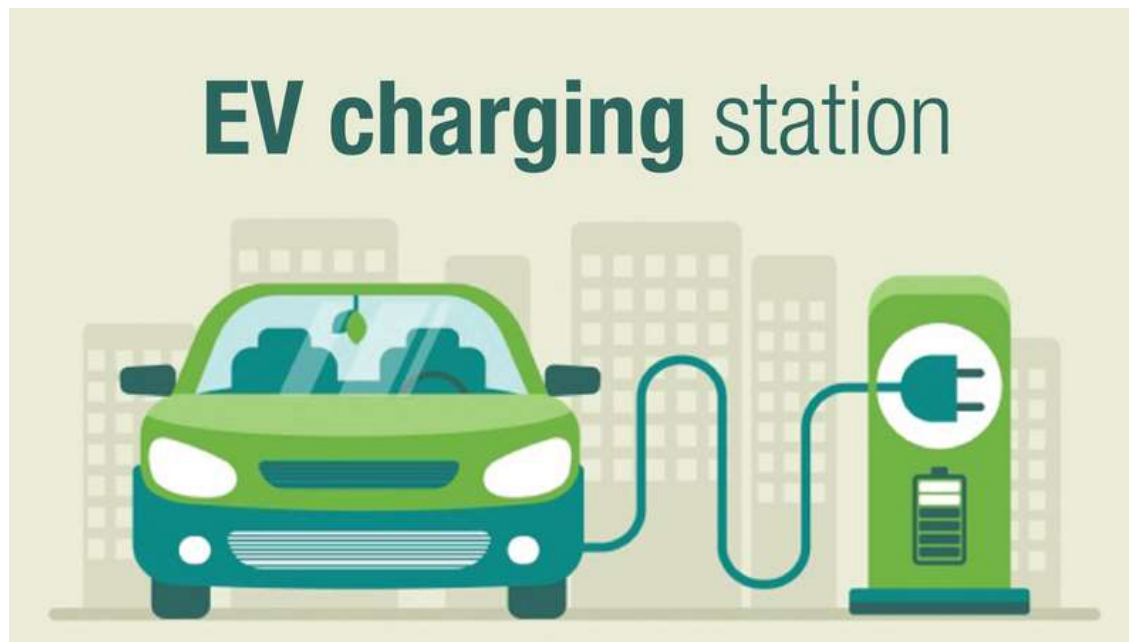

INVESTIGATING ELECTRIC VEHICLE CHARGER LOCATIONS IN LONDON

IBM DATA SCIENCE PROJECT



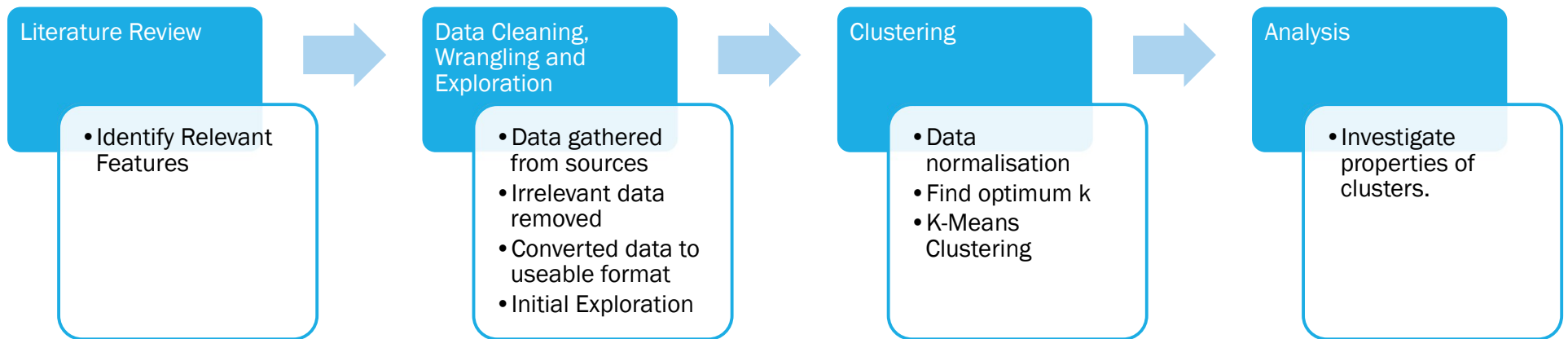
INTRODUCTION/ BUSINESS PROBLEM

- Electric Vehicles, (EVs) are seen as an environmentally friendly alternative to petrol vehicles
- EVs require supportive infrastructure in the form of charging stations
- Public chargers are available in public areas like sidewalks or public parking garages
- There are two broad types of chargers; rapid chargers and regular or slow chargers
- Ensuring the optimal type, location and number of chargers installed is extremely important
- Government planners need to identify areas that may need more of a certain type of chargers
- The problem statement can be phrased as:
 - *Are the locations of different types of chargers suitable for the characteristics of those locations in London boroughs?*

DATA

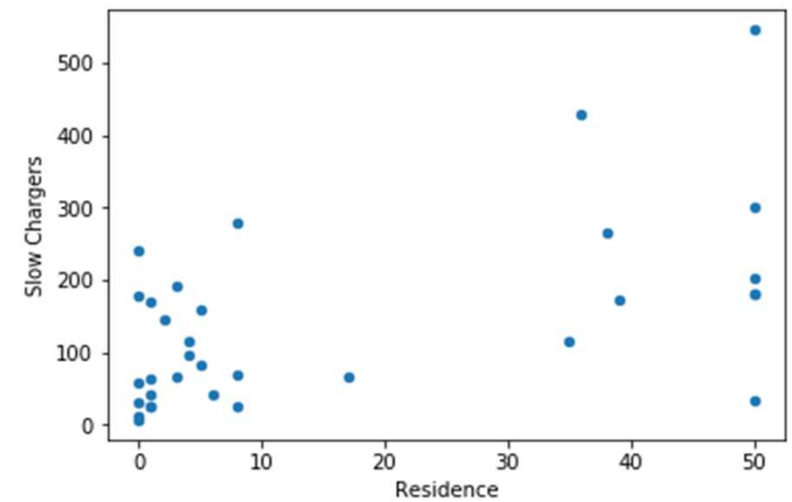
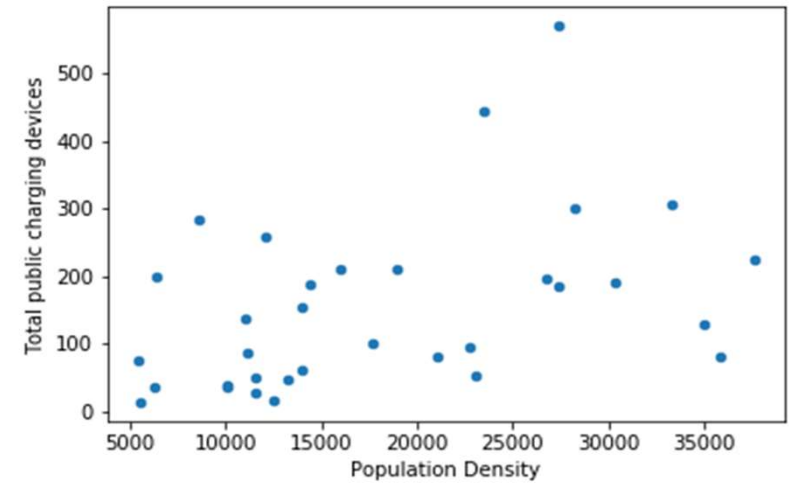
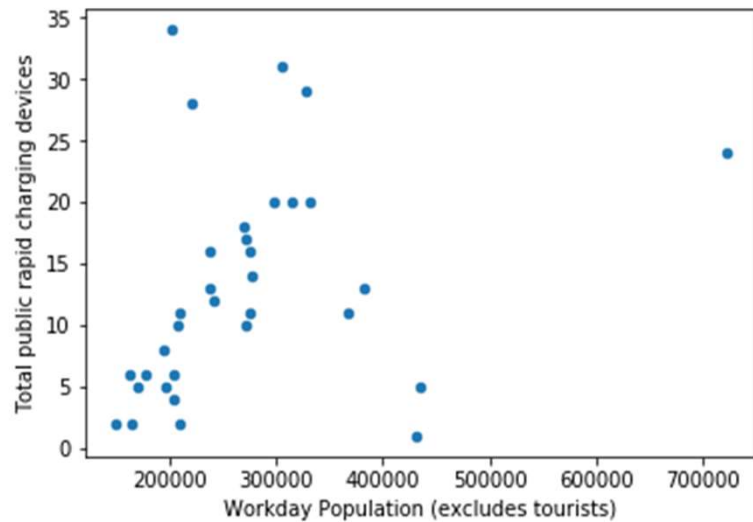
- Combination of publicly available information and location data from Foursquare.
- Data included Population stats , Job Density, EV numbers, EV types, Parking dat, Residential data, GPS coordinates (For London Boroughs)
- Sources include:
 - https://en.wikipedia.org/wiki/List_of_London_boroughs
 - <http://maps.dft.gov.uk/ev-charging-map/ev-charging.html>
 - <https://data.london.gov.uk/dataset/daytime-population-borough?resource=7c9b10fb-f8c9-45bb-8844-d5e5cd7f6dca>
 - <https://data.london.gov.uk/dataset/jobs-and-job-density-borough?resource=116a2961-6c12-4960-ab3a-945c7448a989>.
 - Foursquare Location data

METHODOLOGY



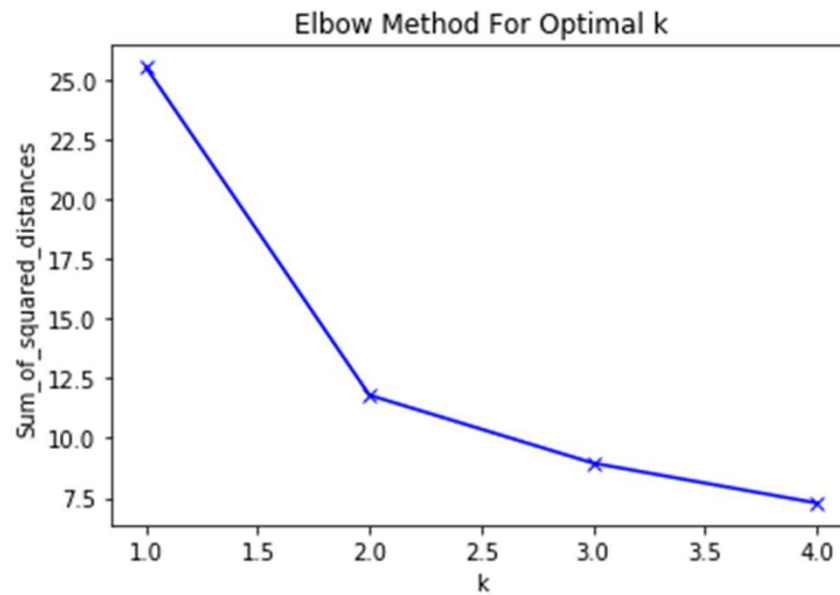
RESULTS

- Initial Data Exploration
- Confirm that there are some potential relationships between input features and number and types of chargers.



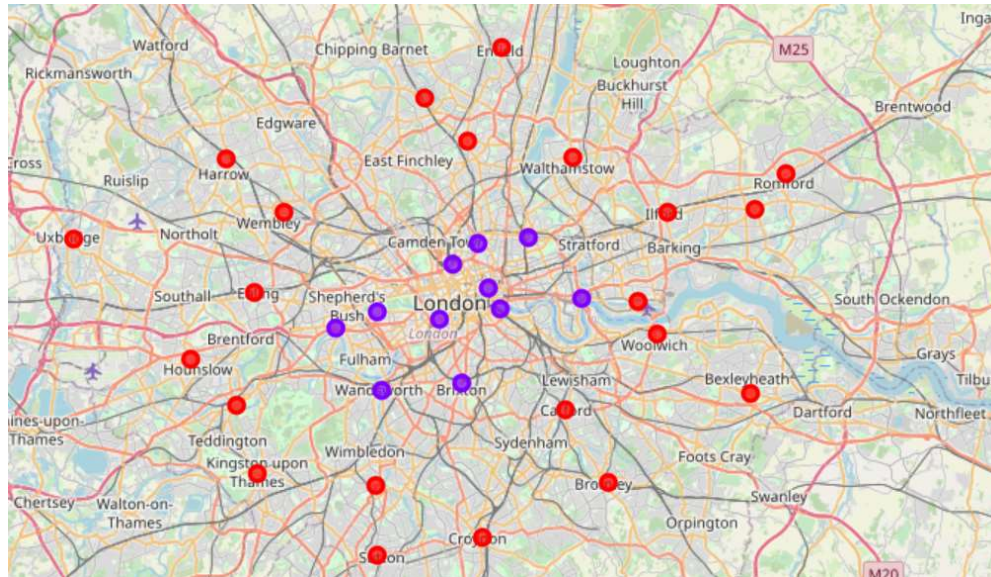
RESULTS

- Data normalised using Min-Max Method
- Optimum K found to be 2
- K-Mean Clustering Performed



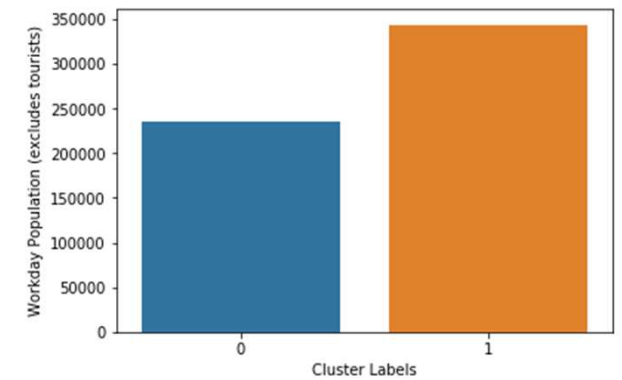
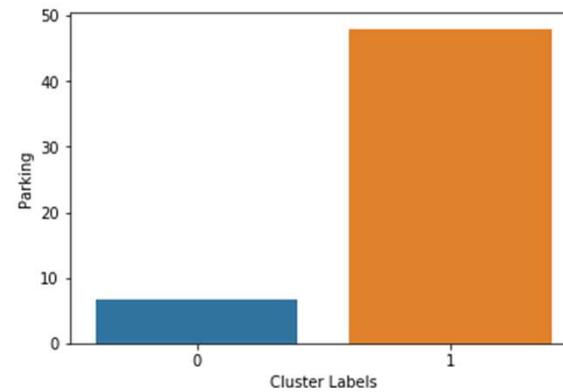
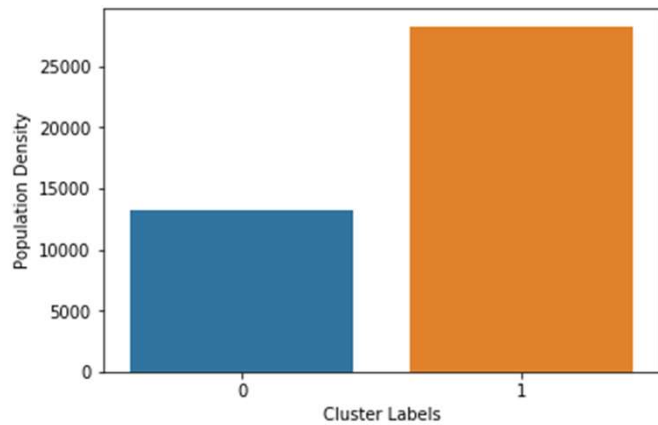
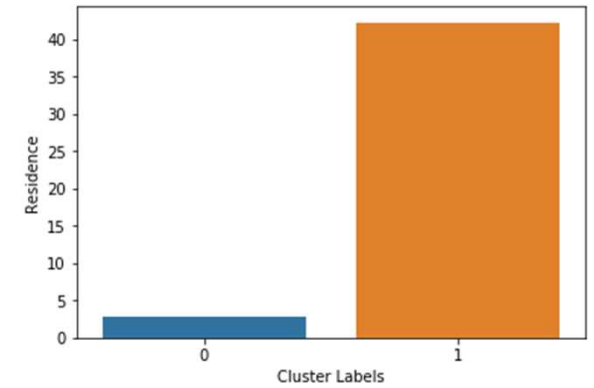
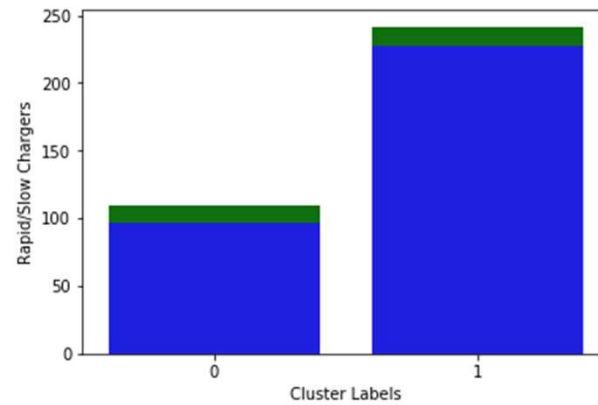
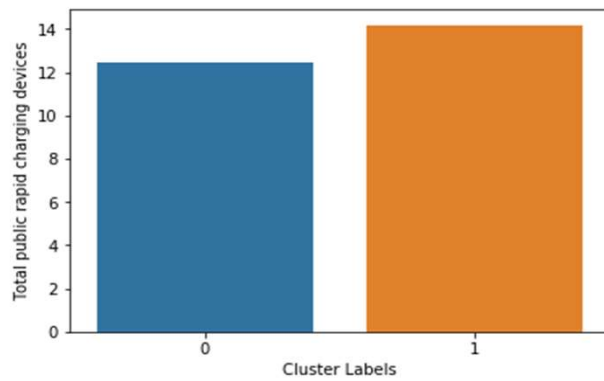
RESULTS

- Visualise Clusters



RESULTS

■ Properties of Clusters



DISCUSSION

- Cluster 1 is more densely populated with higher amounts of both workday and resident populations and also significantly more parking
- more chargers available in cluster 1 which is good
- Despite the clear differences in each cluster the number of rapid chargers is almost the same this is bad
- For Cluster 1, it is clear that much more of both types of chargers may need to be installed in cluster 1 since it has large number of residential and work populations.
- For cluster 0 while it is less densely populated its work day population relative to its proportion of residences may mean that more rapid chargers are needed to charge electric vehicles during working hours.

CONCLUSION

- The distribution of EV chargers is far from optimal
- More densely populated areas like city centres are more likely to require more of both types of EV chargers
- Areas that have higher working populations like commercial sectors may need more rapid chargers to charge workers cars during daily working hours
- Future recommendation could be to repeat this process for many different cities to compare different approaches and identify different relevant features.