

The Battle of Neighborhoods

1.0 Introduction:

According to Bloomberg News, the London Housing Market is in a rut. It is now facing a number of different headwinds, including the prospect of higher taxes and a warning from the Bank of England that U.K. home values could fall as much as 30 percent in the event of a disorderly exit from the European Union. More specifically, four overlooked cracks suggest that the London market may be in worse shape than many realize: hidden price falls, record-low sales, homebuilder exodus and tax hikes addressing overseas buyers of homes in England and Wales.

2.0 Business Problem:

In this scenario, it is urgent to adopt machine learning tools in order to assist homebuyers clientele in London to make wise and effective decisions. As a result, the business problem we are currently posing is: how could we provide support to homebuyers clientele in to purchase a suitable real estate in London in this uncertain economic and financial scenario?

To solve this business problem, we are going to cluster London neighborhoods in order to recommend venues and the current average price of real estate where homebuyers can make a real estate investment. We will recommend profitable venues according to amenities and essential facilities surrounding such venues i.e. elementary schools, high schools, hospitals & grocery stores.

3.0 Data section

Data on London properties and the relative price paid data were extracted from the HM Land Registry (<http://landregistry.data.gov.uk/>). The following fields comprise the address data included in Price Paid Data: Postcode; PAON Primary Addressable Object Name. Typically the house number or name; SAON Secondary Addressable Object Name. If there is a sub-building, for example, the building is divided into flats, there will be a SAON; Street; Locality; Town/City; District; County.

To explore and target recommended locations across different venues according to the presence of amenities and essential facilities, we will access data through FourSquare API interface and arrange them as a dataframe for visualization. By merging data on London properties and the relative price paid data from the HM Land Registry and data on amenities and essential facilities surrounding such properties from FourSquare API interface, we will be able to recommend profitable real estate investments.

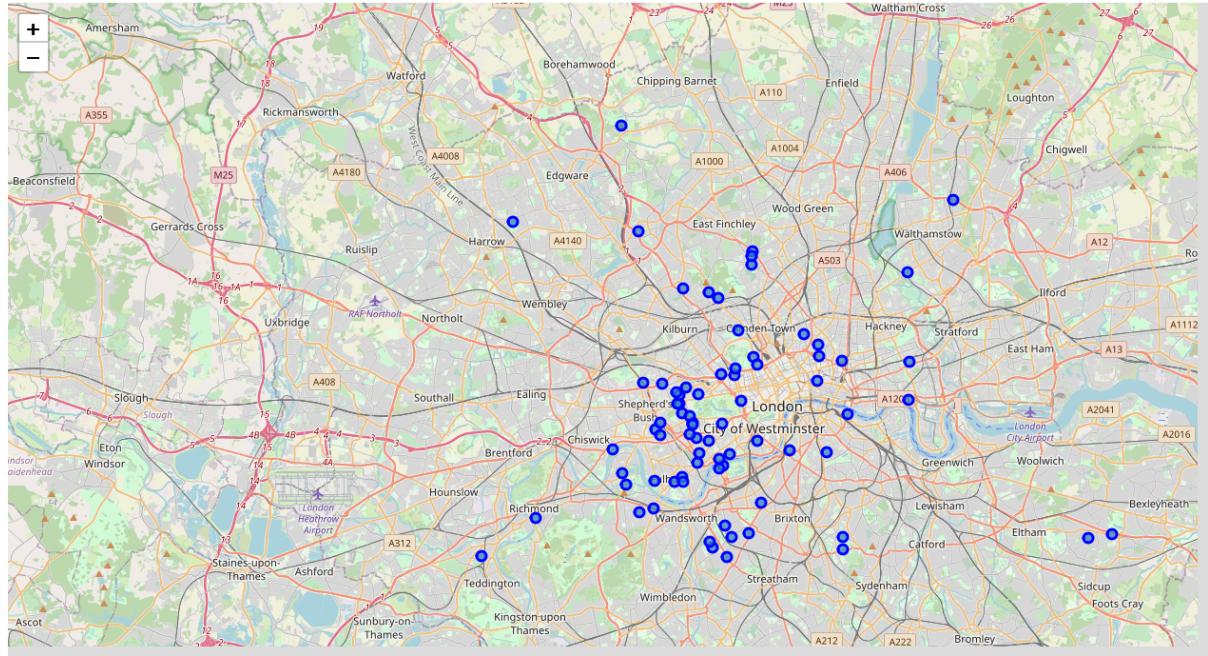
4.0 Methodology

Methodology section will describe the main components of our analysis and predication system. The Methodology section comprises four stages:

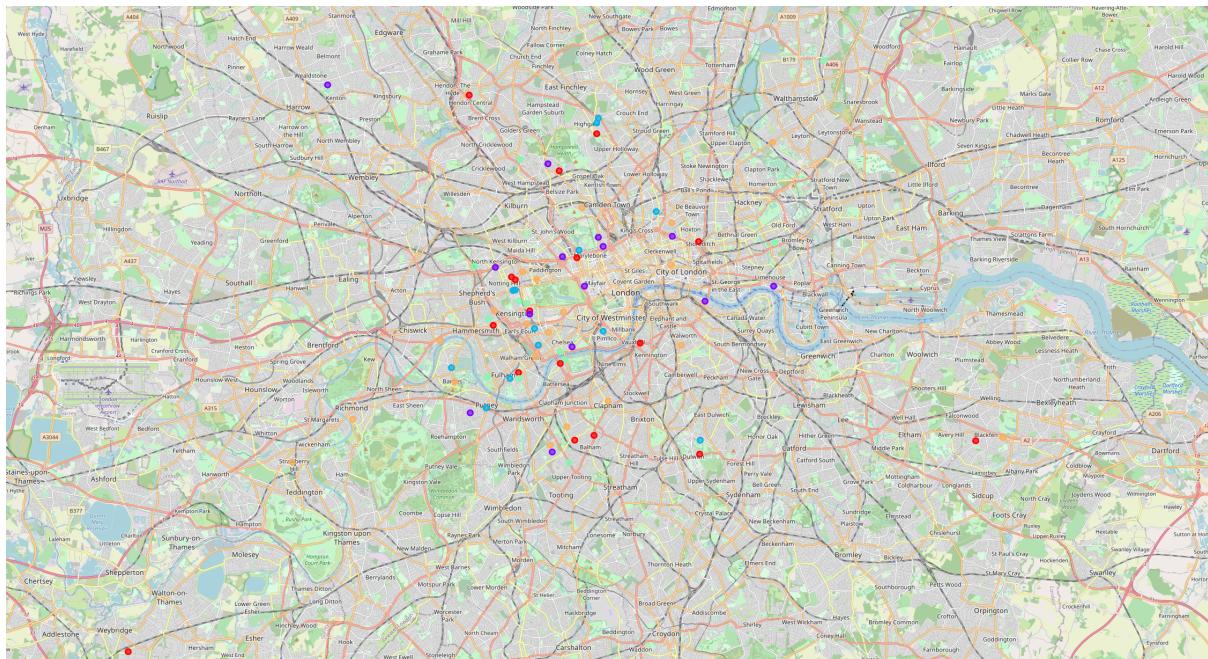
1. Collect Inspection Data
2. Explore and Understand Data
3. Data preparation and pre-processing
4. Modelling

5.0 Results and Discussion

Below is the Map and round London City of Westminster and 5 group of recommendation clusters.



Map 1: London City of Westminster



Map 2: 5 Cluster around London City of Westminster

Avg_Price	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	
405	2250000.0	Restaurant	Juice Bar	Italian Restaurant	Hotel	Clothing Store	Indian Restaurant	Bakery	Pub	Garden	Sushi Restaurant
1215	2208500.0	Pizza Place	Café	Hotel	Restaurant	Bar	Garden	Italian Restaurant	Gastropub	Bakery	Movie Theater
1253	2217000.0	Pub	French Restaurant	Bakery	Chinese Restaurant	Brewery	Coffee Shop	Lake	Train Station	Dry Cleaner	Eastern European Restaurant
2225	2200000.0	Nan	Nan								
2638	2250000.0	Outdoor Sculpture	Grocery Store	Pizza Place	Hotel	Bakery	Bookstore	Coffee Shop	Clothing Store	Pharmacy	Outdoor Supply Store

Table 1: Cluster 1 around London City of Westminster

Avg_Price	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	
196	2450000.0	Café	Bar	Indian Restaurant	Coffee Shop	Restaurant	Pub	Fish & Chips Shop	French Restaurant	Brewery	Supermarket
981	2480000.0	Automotive Shop	Pizza Place	Zoo	Factory	Eastern European Restaurant	Egyptian Restaurant	Electronics Store	English Restaurant	Ethiopian Restaurant	Event Space
1553	2456875.0	Construction & Landscaping	Home Service	Zoo	Falafel Restaurant	Eastern European Restaurant	Egyptian Restaurant	Electronics Store	English Restaurant	Ethiopian Restaurant	Event Space
1980	2492500.0	Supermarket	English Restaurant	Park	Rental Car Location	Dry Cleaner	Café	Gym	Hardware Store	American Restaurant	Pub
2136	2461000.0	Spa	Windmill	Soccer Field	Factory	Dry Cleaner	Eastern European Restaurant	Egyptian Restaurant	Electronics Store	English Restaurant	Ethiopian Restaurant

Table 2: Cluster 2 around London City of Westminster

Avg_Price	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	
655	2375000.0	Pizza Place	Restaurant	Bookstore	Farmers Market	Food & Drink Shop	Nature Preserve	Café	Thai Restaurant	Movie Theater	Park
1102	2340000.0	Pool	Playground	Factory	Dry Cleaner	Eastern European Restaurant	Egyptian Restaurant	Electronics Store	English Restaurant	Ethiopian Restaurant	Event Space
2068	2375000.0	Pub	Hotel	Park	Grocery Store	Pizza Place	Ice Cream Shop	Yoga Studio	Indian Restaurant	Breakfast Spot	Sandwich Place
2129	2379652.7	Pub	Grocery Store	Coffee Shop	Yoga Studio	Bakery	Park	Pizza Place	Ice Cream Shop	Indian Restaurant	Hotel
2944	2367500.0	Hotel	Pub	Garden	Italian Restaurant	Café	Coffee Shop	Chinese Restaurant	Mediterranean Restaurant	Bar	Residential Building (Apartment./ Condo)

Table 3: Cluster 3 around London City of Westminster

Avg_Price	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	
390	2435000.0	Pub	French Restaurant	Grocery Store	Plaza	Art Gallery	English Restaurant	Garden	Gym / Fitness Center	Japanese Restaurant	Diner
422	2400000.0	Pub	Casino	Nightclub	Zoo	Factory	Eastern European Restaurant	Egyptian Restaurant	Electronics Store	English Restaurant	Ethiopian Restaurant
1632	2397132.0	Health & Beauty Service	Convenience Store	Breakfast Spot	Coffee Shop	Grocery Store	Italian Restaurant	Falafel Restaurant	Egyptian Restaurant	Electronics Store	English Restaurant
1797	2400000.0	Art Gallery	Zoo	Falafel Restaurant	Eastern European Restaurant	Egyptian Restaurant	Electronics Store	English Restaurant	Ethiopian Restaurant	Event Space	Exhibit
1914	2445000.0	Construction & Landscaping	Bar	Grocery Store	Gym	Athletics & Sports	Dance Studio	Exhibit	Egyptian Restaurant	Electronics Store	English Restaurant

Table 4: Cluster 4 around London City of Westminster

Avg_Price	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	
2242	2.300000e+06	Soup Place	Farm	Zoo	Exhibit	Dry Cleaner	Eastern European Restaurant	Egyptian Restaurant	Electronics Store	English Restaurant	Ethiopian Restaurant
2406	2.286679e+06	Café	Italian Restaurant	Coffee Shop	Pub	Bar	Park	French Restaurant	Belgian Restaurant	Modern European Restaurant	Portuguese Restaurant
2686	2.287500e+06	Pub	Art Museum	Brewery	Gym / Fitness Center	Gift Shop	Fish & Chips Shop	Filipino Restaurant	Dry Cleaner	Eastern European Restaurant	Egyptian Restaurant
3377	2.298000e+06	Hotel	Zoo	Falafel Restaurant	Eastern European Restaurant	Egyptian Restaurant	Electronics Store	English Restaurant	Ethiopian Restaurant	Event Space	Exhibit
4285	2.265000e+06	Pub	Zoo	Factory	Dry Cleaner	Eastern European Restaurant	Egyptian Restaurant	Electronics Store	English Restaurant	Ethiopian Restaurant	Event Space

Table 5: Cluster 5 around London City of Westminster

First, we may examine them according to neighborhoods/London areas. It is interesting to note that, although West London (Notting Hill, Kensington, Chelsea, Marylebone) and North-West London (Hampsted) might be considered highly profitable venues to purchase a real estate according to amenities and essential facilities surrounding such venues i.e. elementary schools, high schools, hospitals & grocery stores, South-West London (Wandsworth, Balham) and North-West London (Islington) are arising as next future elite venues with a wide range of amenities and facilities. Accordingly, one might target under-priced real estates in these areas of London in order to make a business affair.

Second, we may analyse our results according to the five clusters we have produced. Even though, all clusters could praise an optimal range of facilities and amenities, we have found two main patterns. The first pattern we are referring to, i.e. Clusters 0, 2 and 4, may target home

buyers prone to live in 'green' areas with parks, waterfronts. Instead, the second pattern we are referring to, i.e. Clusters 1 and 3, may target individuals who love pubs, theatres and soccer.

6.0 Conclusion

To sum up, according to Bloomberg News, the London Housing Market is in a rut. It is now facing a number of different headwinds, including the prospect of higher taxes and a warning from the Bank of England that U.K. home values could fall as much as 30 percent in the event of a disorderly exit from the European Union. In this scenario, it is urgent to adopt machine learning tools in order to assist homebuyers clientele in London to make wise and effective decisions. As a result, the business problem we were posing was: how could we provide support to homebuyers clientele in to purchase a suitable real estate in London in this uncertain economic and financial scenario?

To solve this business problem, we clustered London neighborhoods in order to recommend venues and the current average price of real estate where homebuyers can make a real estate investment. We recommended profitable venues according to amenities and essential facilities surrounding such venues i.e. elementary schools, high schools, hospitals & grocery stores.

First, we gathered data on London properties and the relative price paid data were extracted from the HM Land Registry (<http://landregistry.data.gov.uk/>). Moreover, to explore and target recommended locations across different venues according to the presence of amenities and essential facilities, we accessed data through FourSquare API interface and arranged them as a data frame for visualization. By merging data on London properties and the relative price paid data from the HM Land Registry and data on amenities and essential facilities surrounding such properties from FourSquare API interface, we were able to recommend profitable real estate investments.

Second, The Methodology section comprised four stages: 1. Collect Inspection Data; 2. Explore and Understand Data; 3. Data preparation and pre-processing; 4. Modeling. In particular, in the modeling section, we used the k-means clustering technique as it is fast and efficient in terms of computational cost, is highly flexible to account for mutations in real estate market in London and is accurate.

Finally, we drew the conclusion that even though the London Housing Market may be in a rut, it is still an "ever-green" for business affairs. We discussed our results under two main perspectives. First, we examined them according to neighborhoods/London areas. although West London (Notting Hill, Kensington, Chelsea, Marylebone) and North-West London (Hampsted) might be considered highly profitable venues to purchase a real estate according to amenities and essential facilities surrounding such venues i.e. elementary schools, high schools, hospitals & grocery stores, South-West London (Wandsworth, Balham) and North-West London (Islington) are arising as next future elite venues with a wide range of amenities and facilities. Accordingly, one might target under-priced real estates in these areas of London in order to make a business affair. Second, we analyzed our results according to the five clusters we produced. While Clusters 0, 2 and 4 may target home buyers prone to live in 'green' areas with parks, waterfronts, Clusters 1 and 3 may target individuals who love pubs, theatres and soccer.