



# Property Capstone

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## Introduction

This research focuses on finding a suitable location for purchasing a property in Preston, UK. The property will be acquired by a fictitious independent property developer who is looking to purchase a property then convert it into a serviced accommodation rental. This is simply a short-term let (usually let for a couple of days and booked through the Airbnb.co.uk or Booking.com).

In the first section, the business context will be covered. This section is an undervalued part of data science. However, it sets the criteria by which the quality of the data analysis will be judged as data should aid decision-making. Careful consideration has been taken to ensure that this section covers the key factors that will guide the analysis.

The second section will focus on how serviced accommodation are delivered through online platforms (such as Airbnb and Booking.com) and directly. This type of accommodation offers short-term lets (typically days instead of months) to travellers. Properties are usually occupied by corporate travellers from Monday afternoon to Friday morning and by recreational travellers from Friday afternoon to Monday morning. Both types of travellers are referred to as guests, but the importance of the distinction between corporate and recreational travellers will be explained in this section. It will also establish why this market in Preston may be undervalued.

The third section will cover the data that will be used to assert where the best location to build a serviced accommodation would be based on K-Means clustering, which is an unsupervised form of machine learning.

The conclusion will summarise the findings and how the data analysis could have been improved.



This is a high-end let in the centre of Preston.

One of the interesting aspects of this property is that it recirculates odourless warm air from the bathroom into the property, reducing heating costs.

## Business Context

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This research focuses on finding a suitable location for purchasing a property in Preston, UK. The fictitious client is an independent property developer who is looking to purchase a property then convert the property into a serviced accommodation rental.

### Preston, Lancashire UK

Preston is a city in the northwest of the United Kingdom; it is roughly 50 minutes driving or 34.7 miles from Manchester. According to the Office for National Statistics, the independent research agency based in the UK, there were 313,332 people who lived in Preston in 2018. The city also possesses strong local sectors, such as nuclear/energy, advanced manufacturing and engineering. The manufacturing, waste and water management and construction industries account for 4,000, 400, and 4,500 jobs, respectively<sup>1</sup>. However, the industries with the greatest number of jobs are social care and retail with 17,000 and 16,000 jobs, respectively<sup>2</sup>. These figures should be considered in conjunction with the types of enterprises where people work. There were 4,750 micro-enterprises (less than nine employees per enterprise) registered in Preston, making this the most common type<sup>3</sup>. The importance of smaller enterprises is well-established, especially their contribution to job creation and local communities.

The University of Central Lancashire is located in Preston; the university has roughly 38,000 students and staff, making it one of the largest providers of graduate education in the UK<sup>4</sup>. This position has also been matched by the university rising 27 places in the Complete University Guide 2020, a respected reference pointed used by prospective university students<sup>5</sup>. It is also set to complete the final stage of the £200 million investment into its Preston Campus in 2021<sup>6</sup>.

### Serviced Accommodation

There are predominantly two types of guests/travellers who would use this short-term let. The first is corporate guests who would occupy the property from Monday afternoon to Friday morning. The second are weekend guests who would occupy the property from Friday afternoon to Monday morning. Weekend guests visit Preston for occasions such as weddings and leisure trips. This is because Preston is one of the largest cities in the county of Lancashire, so visitors from the region have access to more facilities than in the local towns. The city is also home to Preston North End football club who play in the Championship, which is the second tier in England after the Premier League.

The market for short-term lets is dominated by property management firms who have built relationships with large firms or smaller firm who are utilising platforms such as Airbnb and Booking.com. There have also been notable property developments in the city, including the conversion of the old Royal Mail Sorting Office into luxury apartments.

The shift from hotels to serviced accommodation has been material. Occupancy stood at 61.8% in Q1 2020 for serviced accommodation in London<sup>7</sup>. In comparison, the average occupancy rate for hotels in London was 59.4%, a 23.0% decline from the same period a year earlier. In addition, prior to COVID-19, hotels' revenue per available room had been lower than serviced accommodation. The material impact in the short to medium term will be that guests (both corporate and leisure) will be seeking self-contained accommodation or smaller hotels, according to analysis by the Financial Times<sup>8</sup>.

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# Data

## Course Data

Using the FourSquare API and K-Means clustering, this analysis will show the similarities between five different clusters in Preston.

The longitudinal and latitudinal data is from doogal.co.uk; there are 5,945 postcodes in the CSV file but only 3,425 are active postcodes<sup>9</sup>. However, the data has to be sampled due to the limitations placed on the free version of the Four Square API. Also, given that the fictitious independent property developer focuses on properties in PR0, PR1 and PR2 postcodes, the data frame has been limited to these postcodes.

The postcodes will be grouped by the FourSquare API. Following this, the data will be interpreted, highlighting the key differences between the areas. Therefore, knowing what is nearby will allow them to make an informed decisions about where to locate their property.

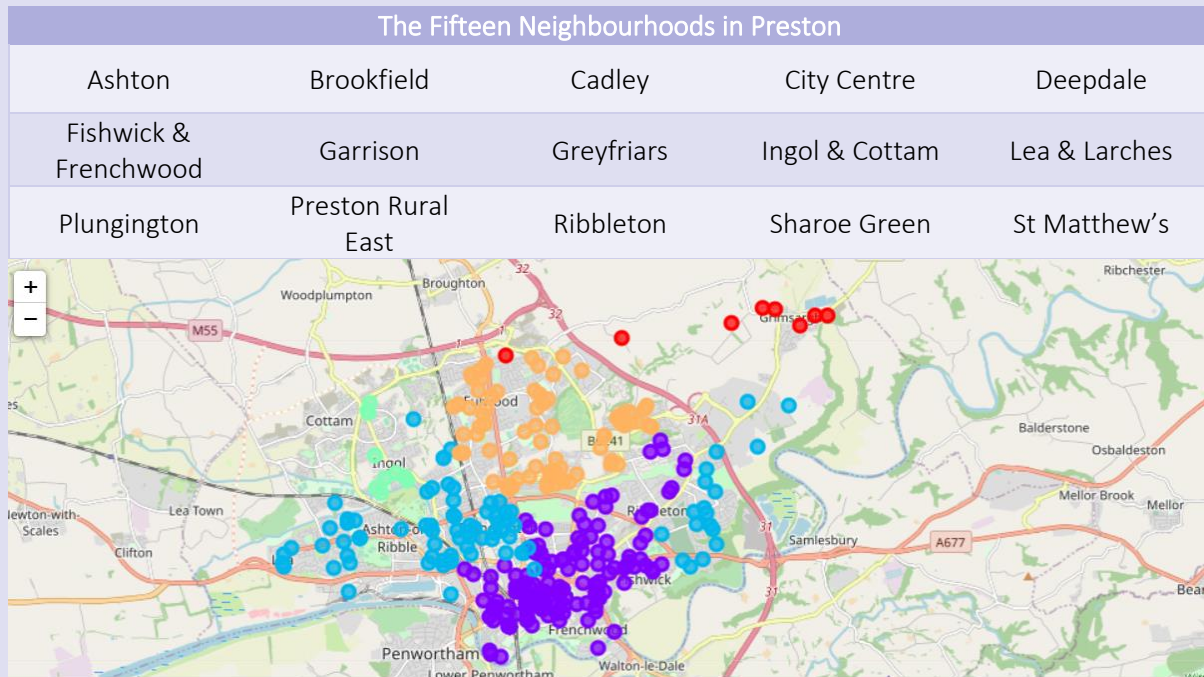
The algorithm will cluster the postcodes based on the categories to which the ten most common venues belong. For example, one of the categories is restaurant. However, the API may not specify the type of restaurant that is located close to the postcode.

## Additional Data

Research from other sources will also be used to support the analysis. For example, the average price of properties will be used in conjunction with k-means clustering. The main source of this data is the HM Land Registry Open Data<sup>10</sup>. This is the UK government website that publishes data on the prices paid for properties, transactions and the changes in the value of residential properties.

## Data Analysis

According to the data source, there are fifteen neighbourhoods in Preston:



### Cluster One

The first cluster in the dataset contains postcodes in the City Centre, Deepdale and Fishwick & Frenchwood. These postcodes have been categorised together because the ten most common venues were similar. In descending order, the venues are as follows: pubs, coffee shops, cafés, sandwich places, fast food restaurants, clothing stores, grocery stores, Indian restaurants, parks and an Italian restaurant.

	Neighbourhood	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
2277	City Centre	Pub	Coffee Shop	Café	Sandwich Place	Fast Food Restaurant	Clothing Store	Grocery Store	Indian Restaurant	Park	Italian Restaurant
2590	City Centre	Pub	Coffee Shop	Café	Sandwich Place	Fast Food Restaurant	Clothing Store	Grocery Store	Indian Restaurant	Park	Italian Restaurant
2815	City Centre	Pub	Coffee Shop	Café	Sandwich Place	Fast Food Restaurant	Clothing Store	Grocery Store	Indian Restaurant	Park	Italian Restaurant
2019	City Centre	Pub	Coffee Shop	Café	Sandwich Place	Fast Food Restaurant	Clothing Store	Grocery Store	Indian Restaurant	Park	Italian Restaurant
1509	Deepdale	Supermarket	Fast Food Restaurant	Pizza Place	Gym / Fitness Center	Coffee Shop	Soccer Stadium	Gym	Clothing Store	Pub	Grocery Store
1038	Fishwick & Frenchwood	Coffee Shop	Bar	Pub	Furniture / Home Store	Supermarket	Athletics & Sports	Discount Store	Nightclub	Burger Joint	Sandwich Place
1365	City Centre	Pub	Coffee Shop	Café	Sandwich Place	Fast Food Restaurant	Clothing Store	Grocery Store	Indian Restaurant	Park	Italian Restaurant

Although most of the data does follow a similar pattern, the entry for Deepdale may be an outlier because its characteristics are not like the others in the cluster. Generally, the Deepdale entry may be better suited to one of the other clusters. Additionally, for most of the postcodes, cafes were the third most common venues whilst this was a pizza place for the Deepdale entry.



## Cluster Two

Postcodes in Plungington and Ashton have been grouped into the second cluster. This cluster has a mixture of dining venues, daytime activities, fitness centres and supermarkets. In terms of the volume of venues, convenience stores were the most common venues followed by pubs. It would therefore be fair to argue that properties in this postcode balance activities with amenities, making it the perfect location for a wider target audience.

With knowledge of the key attraction in this area, the fact the algorithm has not highlighted how close these properties are to the Preston Docks is interesting. The algorithm may not highlight the proximity of the docks because it is one venue whereas the algorithm is looking for the most common venue. It is worth noting that one venue may be responsible for most the foot traffic in an area.

	Neighbourhood	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
2959	Ashton	Convenience Store	Pub	Fish & Chips Shop	Grocery Store	Park	Lebanese Restaurant	Food Truck	Soccer Field	Gym / Fitness Center	Supermarket
3393	Ashton	Convenience Store	Pub	Fish & Chips Shop	Grocery Store	Park	Lebanese Restaurant	Food Truck	Soccer Field	Gym / Fitness Center	Supermarket
1989	Plungington	Grocery Store	Pub	Pizza Place	Sandwich Place	Trail	Liquor Store	Italian Restaurant	Chinese Restaurant	Gym / Fitness Center	Fish & Chips Shop
130	Plungington	Grocery Store	Pub	Pizza Place	Sandwich Place	Trail	Liquor Store	Italian Restaurant	Chinese Restaurant	Gym / Fitness Center	Fish & Chips Shop
3402	Ashton	Convenience Store	Pub	Fish & Chips Shop	Grocery Store	Park	Lebanese Restaurant	Food Truck	Soccer Field	Gym / Fitness Center	Supermarket

## Cluster Three

In cluster three, postcodes from Ingol & Cottam have been grouped together, suggesting that these postcodes have distinguishing features that separate them from the other clusters. The first, second, and eighth most common venues were news agents, grocery stores and convenience stores respectively, suggesting that there are more small stores than large stores.

A distinguishing venue associated with this cluster is the canal lock, which is the third most common venue. The canal lock would be a nice attraction for people who are visiting Preston and want a quieter walk than the Preston Dock. It is also complemented by the presence of gastropubs and parks. There is also an event service, which is the ninth most common venue.

	Neighbourhood	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
3870	Ingol & Cottam	Newsagent	Grocery Store	Soccer Field	Canal Lock	Gastropub	Gas Station	Bakery	Convenience Store	Event Service	Park
3852	Ingol & Cottam	Newsagent	Grocery Store	Soccer Field	Canal Lock	Gastropub	Gas Station	Bakery	Convenience Store	Event Service	Park
3856	Ingol & Cottam	Newsagent	Grocery Store	Soccer Field	Canal Lock	Gastropub	Gas Station	Bakery	Convenience Store	Event Service	Park
4900	Ingol & Cottam	Newsagent	Grocery Store	Soccer Field	Canal Lock	Gastropub	Gas Station	Bakery	Convenience Store	Event Service	Park
3790	Ingol & Cottam	Newsagent	Grocery Store	Soccer Field	Canal Lock	Gastropub	Gas Station	Bakery	Convenience Store	Event Service	Park
3794	Ingol & Cottam	Newsagent	Grocery Store	Soccer Field	Canal Lock	Gastropub	Gas Station	Bakery	Convenience Store	Event Service	Park
3799	Ingol & Cottam	Newsagent	Grocery Store	Soccer Field	Canal Lock	Gastropub	Gas Station	Bakery	Convenience Store	Event Service	Park
4860	Ingol & Cottam	Newsagent	Grocery Store	Soccer Field	Canal Lock	Gastropub	Gas Station	Bakery	Convenience Store	Event Service	Park
3843	Ingol & Cottam	Newsagent	Grocery Store	Soccer Field	Canal Lock	Gastropub	Gas Station	Bakery	Convenience Store	Event Service	Park
4824	Ingol & Cottam	Newsagent	Grocery Store	Soccer Field	Canal Lock	Gastropub	Gas Station	Bakery	Convenience Store	Event Service	Park

## Cluster Four

Some of the postcodes in Sharoe Green, Greyfriars, and Garrison have been clustered together by the algorithm. The categorisation of the most common venues may not have worked well. This is because it has grouped postcodes that have dissimilar venues: coffee shops, gyms, and Indian restaurants. Regardless, the second most common venues are pubs for the postcodes in this cluster. Without understanding how the algorithm forms the clusters, it may not be possible to understand why it has clustered some of the postcodes together. One possibility may be the fact that some of the postcodes may be so dissimilar to the other clusters that this cluster appears to be the closest match.

Overall, including the Garrison entry may not be appropriate because very few of the venues match those of the other venues shown.

	Neighbourhood	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
5009	Sharoe Green	Coffee Shop	Pub	Grocery Store	Trail	Café	Newsagent	Indian Restaurant	Warehouse Store	Pharmacy	Italian Restaurant
4177	Greyfriars	Gym / Fitness Center	Pub	Italian Restaurant	Coffee Shop	Grocery Store	Indian Restaurant	Weight Loss Center	Gym	Sporting Goods Shop	Pharmacy
5068	Garrison	Indian Restaurant	Pub	Sculpture Garden	Grocery Store	Trail	Lake	Italian Restaurant	Rental Car Location	Tennis Court	Spa
4133	Sharoe Green	Coffee Shop	Pub	Grocery Store	Trail	Café	Newsagent	Indian Restaurant	Warehouse Store	Pharmacy	Italian Restaurant
3996	Sharoe Green	Coffee Shop	Pub	Grocery Store	Trail	Café	Newsagent	Indian Restaurant	Warehouse Store	Pharmacy	Italian Restaurant
3643	Greyfriars	Gym / Fitness Center	Pub	Italian Restaurant	Coffee Shop	Grocery Store	Indian Restaurant	Weight Loss Center	Gym	Sporting Goods Shop	Pharmacy

## Cluster Five

Of the clusters that have been discussed so far, postcodes in cluster five are the most rural as suggested by the name Preston Rural East. Therefore, the fact that the postcodes are close together would explain why the algorithm is suggesting that the venues in this cluster shared similar characteristics.

	Neighbourhood	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
4336	Preston Rural East	Pub	Park	Bar	Construction & Landscaping	Cricket Ground	Hotel	Entertainment Service	Cosmetics Shop	Dance Studio	Department Store
4340	Preston Rural East	Pub	Park	Bar	Construction & Landscaping	Cricket Ground	Hotel	Entertainment Service	Cosmetics Shop	Dance Studio	Department Store
4321	Preston Rural East	Pub	Park	Bar	Construction & Landscaping	Cricket Ground	Hotel	Entertainment Service	Cosmetics Shop	Dance Studio	Department Store
4423	Preston Rural East	Pub	Park	Bar	Construction & Landscaping	Cricket Ground	Hotel	Entertainment Service	Cosmetics Shop	Dance Studio	Department Store
4434	Preston Rural East	Pub	Park	Bar	Construction & Landscaping	Cricket Ground	Hotel	Entertainment Service	Cosmetics Shop	Dance Studio	Department Store
4327	Preston Rural East	Pub	Park	Bar	Construction & Landscaping	Cricket Ground	Hotel	Entertainment Service	Cosmetics Shop	Dance Studio	Department Store
4353	Preston Rural East	Pub	Park	Bar	Construction & Landscaping	Cricket Ground	Hotel	Entertainment Service	Cosmetics Shop	Dance Studio	Department Store
5329	Preston Rural East	Pub	Park	Bar	Construction & Landscaping	Cricket Ground	Hotel	Entertainment Service	Cosmetics Shop	Dance Studio	Department Store



## Conclusion

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Having reviewed each of the clusters, the property developer should purchase a property in Cluster Two. This cluster contains postcodes in Ashton or Plungington. The venues are amongst the most diverse and are relatively close to the city and amenities. This would appeal to the developer's dual target market: contractors and weekend guests. For the former, it is close to stores, ranging from convenience stores to large supermarkets. For the weekend guests, it has sufficient nightlife.

If the property developer were only selecting a serviced accommodation property for weekend guests or more broadly recreational travellers, the postcodes in Cluster One would have been more suitable because of the nightlife. However, prominent nightlife would have a detrimental effect on contractors who would probably value sound sleep and limited noise.

Based on the developer's target market, Cluster Three may not be an appropriate choice because it does not offer a mix of venues that would appeal to both markets. If the property developer were considering purchasing a property with the intention of selling it as a family home, properties in Cluster Three would be more suitable because it has sufficient amenities for a smaller area and access to parks and soccer fields, which would be ideal for a family. However, this detracts from the initial specification.

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<sup>1</sup> <https://www.nomisweb.co.uk/reports/localarea?compare=E07000123>

<sup>2</sup> <https://www.nomisweb.co.uk/reports/localarea?compare=E07000123>

<sup>3</sup> <https://www.nomisweb.co.uk/reports/localarea?compare=E07000123>

<sup>4</sup> <https://www.nomisweb.co.uk/reports/localarea?compare=E07000123>

<sup>5</sup> <https://www.uclan.ac.uk/news/uclan-is-uks-biggest-riser-in-new-league-table>

<sup>6</sup> <https://www.uclan.ac.uk/news/uclan-is-uks-biggest-riser-in-new-league-table>

<sup>7</sup> [https://www.savills.co.uk/research\\_articles/229130/301061-0](https://www.savills.co.uk/research_articles/229130/301061-0)

<sup>8</sup> <https://www.ft.com/content/5c1e5b4c-d33d-45dc-a6ae-8f2d1c6baa84>

<sup>9</sup> <https://www.doogal.co.uk/AdministrativeAreas.php?district=E07000123>

<sup>10</sup> <https://landregistry.data.gov.uk/>