

# **Installing New Wireless Hot spots over Public Spaces in Brisbane**

Jipsy Jose

## **1 Introduction**

### ***1.1 Background***

Brisbane is the capital of Queensland, and the most populous city in the Australia. Brisbane's metropolitan area has a population of over 2.5 million and the South East Queensland metropolitan region, centered on Brisbane, encompasses a population of more than 3.6 million. There are many national parks, libraries and public spaces surrounding the Brisbane metropolitan area. Free wireless internet (Wi-Fi) is one way Brisbane City Council is creating a more connected and accessible city. Free Wi-Fi is available in parks and public spaces across Brisbane, but only in certain specific locations. Providing free Wi-Fi to more locations with well equipped infrastructure and amenities like parks, gardens, libraries etc will make the entire Brisbane city more connected, lively and developed.

### ***1.2 Problem Statement***

This project predict some of the suburban areas and public spaces over Brisbane where Hot spots need to be installed. Setting up a new hot spot may depend upon that location's demographic data, infrastructure, status of the inhabitants and so on.

### ***1.3 Audiences***

The Brisbane City Council will be obviously interested in installing new free hot spots across the city of Brisbane since this will make the inhabitants more connected which in turn aids the city's development.

Students will be interested in knowing libraries with free Internet connection and also they will choose parks with free Wi-Fi for studying, doing projects. They will utilize the free resources for academic purpose.

Tourists will be searching for the neighborhoods where they can get better facilities, get to know about the interesting places to explore.

## **2 Data**

### ***2.1 Data Sources***

The datasets used in this project are downloaded from the site of Brisbane City Council which are listed below. They provide wide variety of free datasets in different formats like csv, json, txt etc.

1. Wireless hot spot locations Libraries, Parks and Public spaces This datasets provides the Location of Brisbane City Councils free wireless hotspots in public libraries, parks and public spaces.

2. Library- Locations This dataset contains information about Brisbane City Council's libraries, including contact information, location, facilities, parking and opening times.

3. Park- Locations This dataset identifies Brisbane City Council Parks within the Brisbane area.

The Foursquare location data was also used to explore the suburban area in Brisbane.

### ***2.2 Data Preprocessing***

The library locations dataset was cleaned by removing the columns that are not needed. The original dataset consisted of 33 rows and 9 columns. The unnecessary fields like Opening hours, Parking were deleted since this does not satisfy our purpose of study.

Similarly the park locations dataset was cleaned by deleting columns like shape, area of land and asset id. The original dataset consists of 2167 rows and 12 columns.

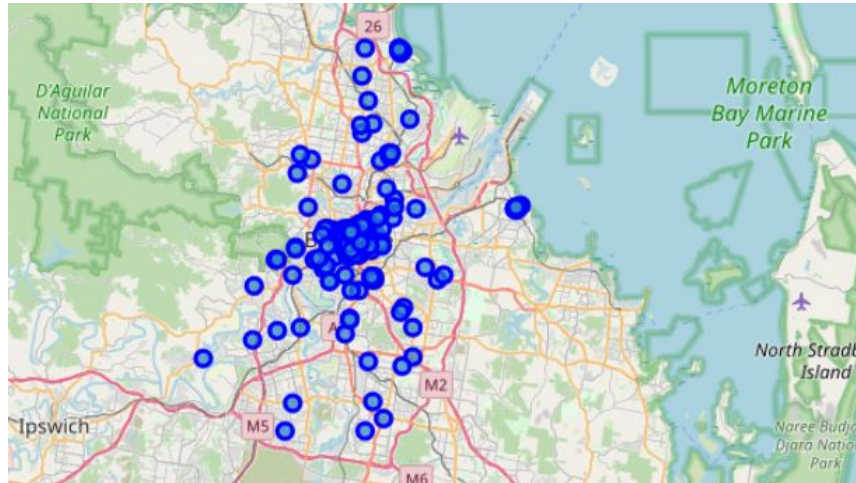
The Wifi dataset was used directly since the data was in perfect format. There were no missing values and inconsistencies on the data.

### 2.3 Feature Selection

All the three datasets used have a common field named 'Suburb' indicating the location where the corresponding facility is available. This project is done incorporating the suburb areas in Brisbane along with the data provided by the Foursquare API.

## 3 Exploratory Data Analysis

Exploring the Wifi dataset revealed that only 57 suburban areas among the total number of suburbs near to 200 have free Internet access. This areas include 21 different types of sites like Libraries, which are a major source, Parks, Gardens, Sanctuaries and so on. We can get the datasets of these sites separately and compare the locations and their Internet activity. Another option is to use the geospatial data incorporating the Foursquare location API to explore the areas.



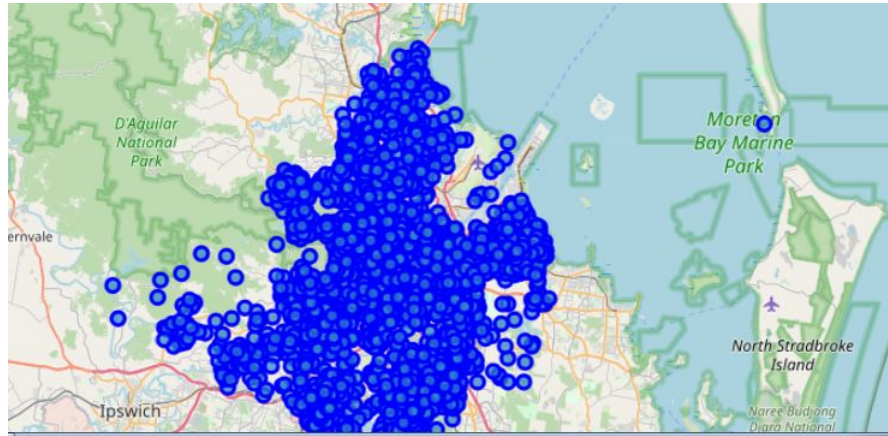
**Fig. 1** Suburbs having free internet access

Here, the datasets corresponding to two different sites: libraries and parks are compared. Performing the steps for all the sites are time consuming and we also have a better option to use the Foursquare API.

The library datasets throws us the insights that almost all of the 33 public libraries in Brisbane provide free Internet Access. So, we can say that, Brisbane is a student friendly city.

When it comes to the Parks dataset, the situation is different. There are about 2167 parks in Brisbane as in the dataset. With regard to the suburban regions covering parks, 188 suburbs contains parks which almost cover the entire region of Bris-

bane. Here 133 suburbs does not have a free Wifi connection. This can become a major problem in the future, In case when new infrastructures need to be developed at that area.



**Fig. 2** Suburbs having parks

This project concentrates on these 133 suburb regions in Brisbane that does not have an internet connection.

The Foursquare location API is used to explore these suburbs with no free internet access and suggest some locations where new hot spots can be successfully installed.

## 4 Methadology

Foursquare API is used to explore the venues or public spaces in the suburban areas of Brisbane by running API queries incorporating the client id and secret.

14574 venues of different categories in Brisbane was identified by running the API query. There are 207 different categories of venues including coffee shops, parks, superstores, bus stops and so on. The table below provides a snapshot of the venues.

The Foursquare API is a blessing, otherwise we could have to analyze all these categories of datasets. The ratings of different venues where identified. The following snapshot gives the details.

	Suburb	Suburb Latitude	Suburb Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	ANNERLEY	-27.509423	153.033322	Dudley St Expresso & Collectables	-27.510716	153.032319	Coffee Shop
1	ANNERLEY	-27.509423	153.033322	Little Clive	-27.511428	153.031300	Café
2	ANNERLEY	-27.509423	153.033322	Kim & Ky Takeaway	-27.506120	153.034960	Burger Joint
3	ANNERLEY	-27.509423	153.033322	Woolworths	-27.511371	153.032032	Supermarket
4	ANNERLEY	-27.509423	153.033322	Crust Gourmet Pizza Bar	-27.510890	153.032550	Pizza Place

Fig. 3 Venues in Brisbane

	Suburb	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
0	ANNERLEY	Café	Pharmacy	Pub	Sporting Goods Shop	Bus Stop	Camera Store	Supermarket
1	ASCOT	Cupcake Shop	Café	Gift Shop	Electronics Store	Grocery Store	Fabric Shop	French Restaurant
2	ASHGROVE	Café	Indian Restaurant	Gym	Ice Cream Shop	Convenience Store	Chinese Restaurant	Fruit & Vegetable Store
3	BALMORAL	Café	Italian Restaurant	Sushi Restaurant	Coffee Shop	Bookstore	Vietnamese Restaurant	BBQ Joint
4	BANYO	Café	Mediterranean Restaurant	Pharmacy	Coffee Shop	Park	Grocery Store	Yoga Studio
5	BELLBOWRIE	Soccer Field	Supermarket	Shopping Mall	Café	Yoga Studio	Fabric Shop	Football Stadium

Fig. 4 Venue Ratings

## 4.1 K Means Clustering

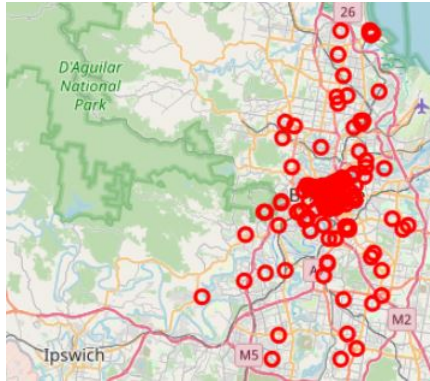
The suburban areas over Brisbane are clustered into groups using K Means clustering Algorithm. On observing the clusters, we can see that people more often visits places like coffee shops, restaurants and so on. But our area of interest is in setting up free wifi hot spot across public spaces like parks, gardens and sanctuaries.

By closely observing the map, we can see that there is hardly a wireless hot spot near the Brisbane International Airport. This area will be highly recommended to install a hot spot since this location is accesses by many people including tourists.

## 5 Results

New wireless hot spots need to be installed in suburban areas like 'ACACIA RIDGE', 'ALBION', 'ALDERLEY', 'ALGESTER', 'BOONDALL', 'BOWEN HILLS', 'CHAPEL HILL', 'CHELMER', 'CHERMSIDE WEST', 'DOOLANDELLA', 'DREWVALE', 'DURACK', 'DUTTON PARK', 'FIG TREE POCKET', 'GAYTHORNE', 'GEEBUNG', 'WACOL', 'WAKERLEY', 'WAVELL HEIGHTS', 'YEERONGPILLY', 'YERONGA'.

The reason for selecting these suburbs is that these are the most populous locations in Brisbane which is surrounded by different sites like parks and gardens.



**Fig. 5** New Locations

## **6 Discussions**

### ***6.1 Future Direction***

New hot spot locations can be accurately identified by incorporating more details about the regions including art museums, botanical gardens etc. Also, merely identifying the locations do not satisfy the needs. The Council or the respected authority should sanction the completion of the projects.

## **7 Conclusion**

The new locations where free Internet access need to be installed was successfully identified using dataset and Foursquare Location API.