# Analysis of opening a new shopping centre in Sydney

Hamid Doost

# Introduction

A shopping centre is a multipurpose place that contributes significantly in liveability of a region. A variety of stores, restaurants, entertaining places, cinemas and sport complex are examples of places in a shopping centre that motivates people go shopping.

In addition to shopping, entertaining activities are of prime importance in these places. Therefore, building a new shopping mall in a region could have a significant impact on people lives in the region.

# Data Source

◈ Data of Sydney suburbs is web scraped from Wikipedia. https://en.wikipedia.org/wiki/Category:Suburbs_of_Sydney [1].

◈ The Geographical data for location of each suburb is obtained from Geocoder [2] Geopy and [3] Python libraries.

◈ Data for venue of shopping centres in Sydney is obtained from Fouresquare [4].

# Methodology

◈ List of neighbourhoods by web scraping I) Creating a list to store neighbourhood data, II) appending the data into the list and III) create a new data frame from the list

◈ Geographical data for neighbours acquiring longitude and latitude of each location using Geocoder Python package.

# Methodology

◈ Defining a function to get coordinates,

◈ Calling the function to get the coordinates,

◈ Storing in a new list using list comprehension,

◈ Creating temporary data frame to populate the coordinates into Latitude and Longitude and finally

◈ Merging the coordinates into the original dataframe

# Data visualisation
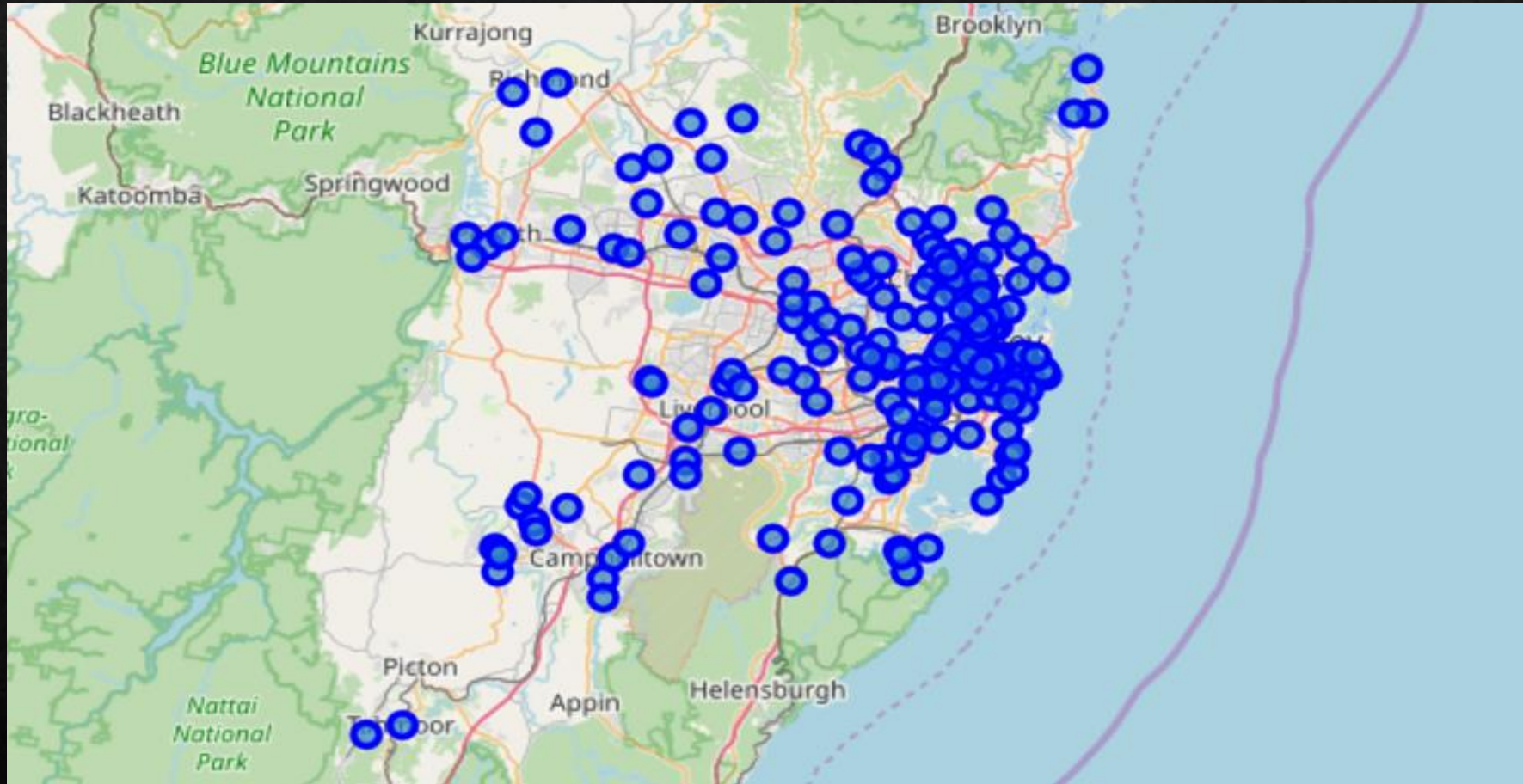


A map of 200 neighbourhood locations in Sydney created by Folium package.

# Data analysis



| | Neighborhood | Latitude | Longitude | VenueName | VenueLatitude | VenueLongitude | VenueCategory |
|---|---|---|---|---|---|---|---|
| 0 | Agnes Banks, New South Wales | -33.61445 | 150.71083 | Wog Mobile | -33.619594 | 150.706412 | Rental Car Location |
| 1 | Agnes Banks, New South Wales | -33.61445 | 150.71083 | Yarramundi Reserve | -33.613377 | 150.698378 | Nature Preserve |
| 2 | Agnes Banks, New South Wales | -33.61445 | 150.71083 | D & V Turf Supplies Pty Ltd | -33.623196 | 150.702574 | Other Repair Shop |
| 3 | Agnes Banks, New South Wales | -33.61445 | 150.71083 | Navua Reserve | -33.608786 | 150.696020 | Park |
| 4 | Agnes Banks, New South Wales | -33.61445 | 150.71083 | Trees Adventure | -33.612809 | 150.692359 | Rock Climbing Spot |

List of neighbourhoods in Sydney with geographical and venue data. First column was scraped from Wikipedia, 2nd and 3rd columns were got from Geocoder and last four columns were obtained from Foursquare.

# Data analysis



| | Neighborhoods | ATM | Accessories Store | Afghan Restaurant | Airport | Airport Lounge | Airport Service | Airport Terminal | American Restaurant | Arepa Restaurant | ... | Warehouse Store | Water Park | Whisky Bar | Wine Bar | Wine Shop |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | Agnes Banks, New South Wales | 0.0 | 0.00 | 0.0 | 0.0 | 0.00 | 0.0 | 0.0 | 0.00 | 0.0 | ... | 0.00 | 0.0 | 0.00 | 0.00 | 0.0 |
| 1 | Alexandria, New South Wales | 0.0 | 0.00 | 0.0 | 0.0 | 0.00 | 0.0 | 0.0 | 0.00 | 0.0 | ... | 0.00 | 0.0 | 0.00 | 0.00 | 0.0 |
| 2 | Allambie Heights, New South Wales | 0.0 | 0.00 | 0.0 | 0.0 | 0.00 | 0.0 | 0.0 | 0.02 | 0.0 | ... | 0.00 | 0.0 | 0.00 | 0.00 | 0.0 |
| 3 | Annandale, New South Wales | 0.0 | 0.00 | 0.0 | 0.0 | 0.00 | 0.0 | 0.0 | 0.00 | 0.0 | ... | 0.00 | 0.0 | 0.00 | 0.01 | 0.0 |
| 4 | Appin, New South Wales | 0.0 | 0.00 | 0.0 | 0.0 | 0.00 | 0.0 | 0.0 | 0.00 | 0.0 | ... | 0.00 | 0.0 | 0.00 | 0.00 | 0.0 |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 195 | Summer Hill, New South Wales | 0.0 | 0.00 | 0.0 | 0.0 | 0.00 | 0.0 | 0.0 | 0.00 | 0.0 | ... | 0.00 | 0.0 | 0.00 | 0.00 | 0.0 |
| 196 | Surry Hills, New South Wales | 0.0 | 0.00 | 0.0 | 0.0 | 0.00 | 0.0 | 0.0 | 0.00 | 0.0 | ... | 0.00 | 0.0 | 0.01 | 0.02 | 0.0 |
| 197 | Sydney Olympic Park | 0.0 | 0.01 | 0.0 | 0.0 | 0.00 | 0.0 | 0.0 | 0.01 | 0.0 | ... | 0.01 | 0.0 | 0.00 | 0.00 | 0.0 |
| 198 | Tahmoor, New South Wales | 0.0 | 0.00 | 0.0 | 0.0 | 0.00 | 0.0 | 0.0 | 0.00 | 0.0 | ... | 0.00 | 0.0 | 0.00 | 0.00 | 0.0 |
| 199 | Tempe, New South Wales | 0.0 | 0.00 | 0.0 | 0.0 | 0.02 | 0.0 | 0.0 | 0.00 | 0.0 | ... | 0.00 | 0.0 | 0.00 | 0.00 | 0.0 |

200 rows × 332 columns

Mean of frequency of occurrence of each venue category

# Data analysis



Venue category for "Shopping Mall" category.

# Results

| | Neighborhood | Shopping Mall | Cluster Labels | Latitude | Longitude |
|---|---|---|---|---|---|
| **0** | Agnes Banks, New South Wales | 0.000000 | 0 | -33.61445 | 150.71083 |
| **112** | Kurraba Point | 0.000000 | 0 | -33.84249 | 151.22256 |
| **113** | Kyeemagh, New South Wales | 0.000000 | 0 | -33.94986 | 151.16380 |
| **114** | La Perouse, New South Wales | 0.000000 | 0 | -33.98795 | 151.23110 |
| **116** | Lane Cove, New South Wales | 0.014493 | 0 | -33.81347 | 151.17017 |
| **...** | ... | ... | ... | ... | ... |
| **160** | Peakhurst, New South Wales | 0.030303 | 2 | -33.96257 | 151.05809 |
| **161** | Penrith, New South Wales | 0.024096 | 2 | -33.75374 | 150.69820 |
| **20** | Bexley, New South Wales | 0.028169 | 2 | -33.95089 | 151.12555 |
| **37** | Campbelltown, New South Wales | 0.050847 | 2 | -34.06408 | 150.81658 |
| **139** | Middle Cove, New South Wales | 0.027778 | 2 | -33.79250 | 151.20731 |

200 rows × 5 columns

Cluster groups of shopping malls for neighbours in Sydney

# Results
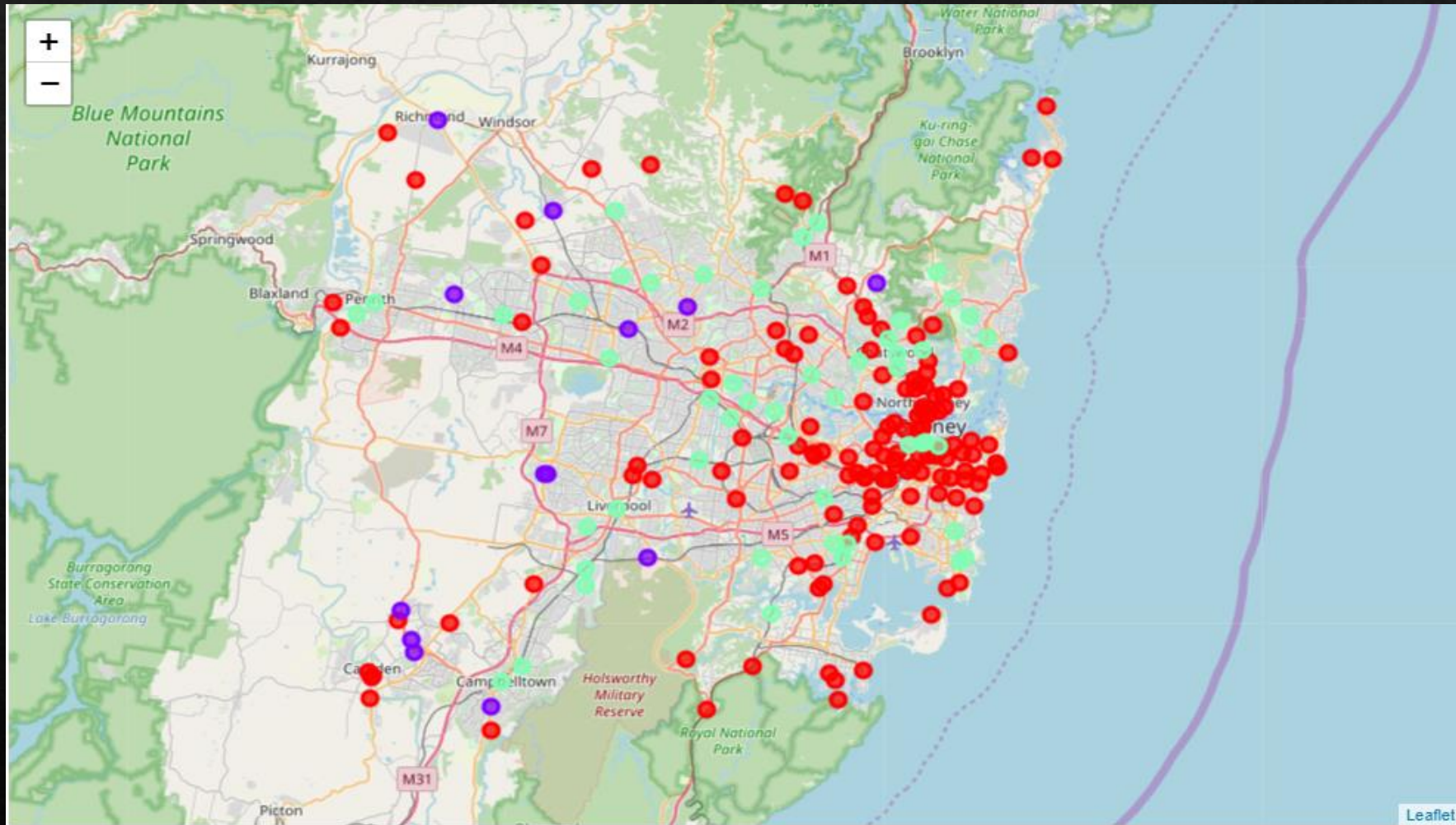


Map of clusters of shopping centres in Sydney. Data from [1-4].

# Conclusion

- This project studies potential possibility of opening a new shopping centre in Sydney. Data for this study were obtained from different sources.

- Based on the results of this study, central parts of Sydney were found to be highly dense of shopping malls and as the distance from centre increases the competition for a new shopping mall decreases.

- Finally, it was suggested that western suburbs of Sydney have lower density of shopping malls and considered to have potential for opening a new mall.

# References

1-https://en.wikipedia.org/wiki/Category:Suburbs_of_Sydney

2- https://pypi.org/project/geocoder/

3- https://pypi.org/project/geopy/

4- https://foursquare.com/