



# ANALYSIS OF SINGAPORE'S TOWNS

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A RELOCATION GUIDE

COURSERA CAPSTONE PROJECT:  
THE BATTLE OF NEIGHBORHOODS

# INTRODUCTION

## Identifying the most livable neighborhoods in Singapore



### Why Live in Singapore:

- Vibrant economy (*ranked as world's most competitive economy by World Economic Forum in 2019*)
- Best quality of life in Asia (*based on Mercer's 2019 Quality of Living Survey*)
- Cosmopolitan society (*immigrant population ~40%; culturally diverse*)

### Concerns:

- High cost of living (*rated as world's most expensive city by Economist Intelligence Unit in 2018*)
- High population density (*~8k people/km<sup>2</sup>; 230x denser than USA, 2,500x denser than Australia*)

### Study Goal:

- Identify the most livable neighborhoods in Singapore for individuals looking to relocate to Singapore and those considering moving within Singapore

### Definition of Livable Neighborhood:

- Affordable median rental price
- Tolerable population density
- Balanced mix of amenities

# DATA DESCRIPTION

Data sources include Data.gov.sg, Wikipedia, Foursquare API



## Singapore Median Rent by Town and Flat Type:

- Data retrieved from Data.gov.sg (<https://data.gov.sg>)
- Data for 2019-Q4 used (*most current data*) for 4-room flats (*available across all towns*)

## Singapore Population Density by Town:

- Data obtained by scraping data from Wikipedia page on 'Planning Areas of Singapore' ([https://en.wikipedia.org/wiki/Planning\\_Areas\\_of\\_Singapore](https://en.wikipedia.org/wiki/Planning_Areas_of_Singapore))

## Singapore Town Location Data:

- Geospatial data retrieved from Data.gov.sg (<https://data.gov.sg>)
- Master Plan 2019 Planning Area Boundary (No Sea) GeoJSON file shows planning area boundaries for visualization on maps

## Singapore Venue Information from Foursquare API:

- Foursquare API (<https://foursquare.com/>) used to explore neighborhoods of each town



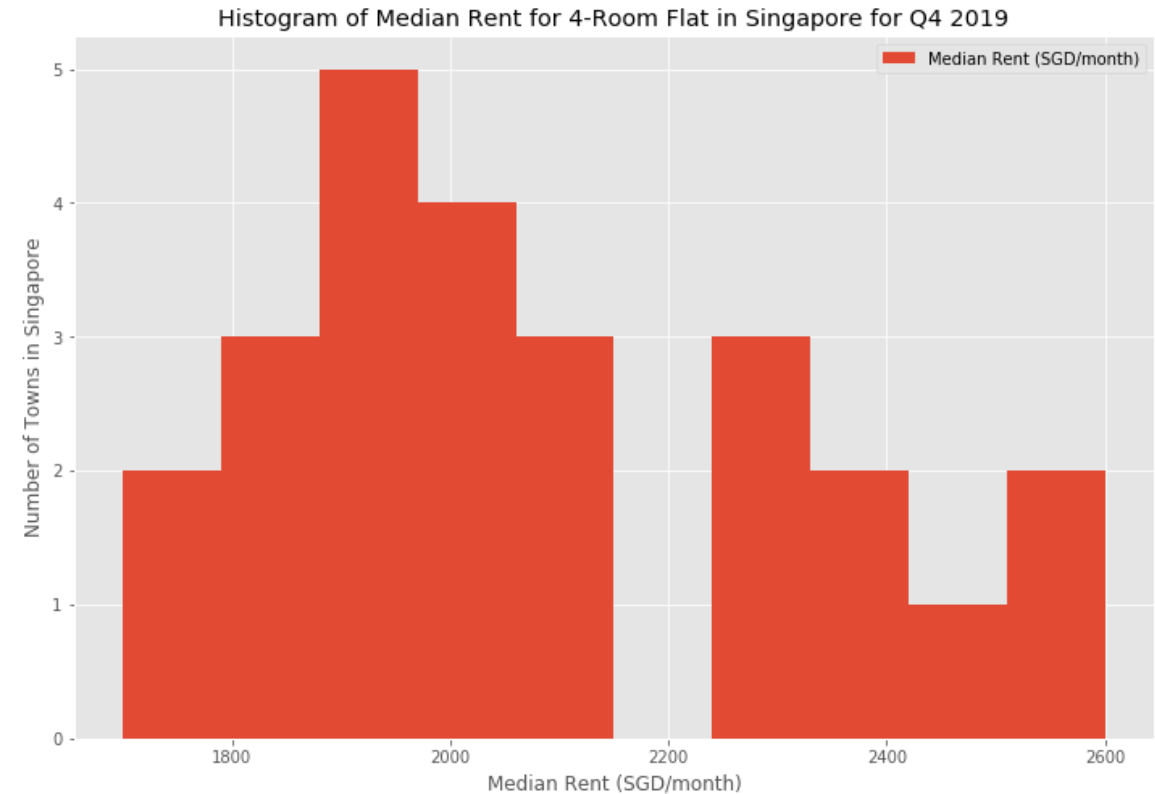
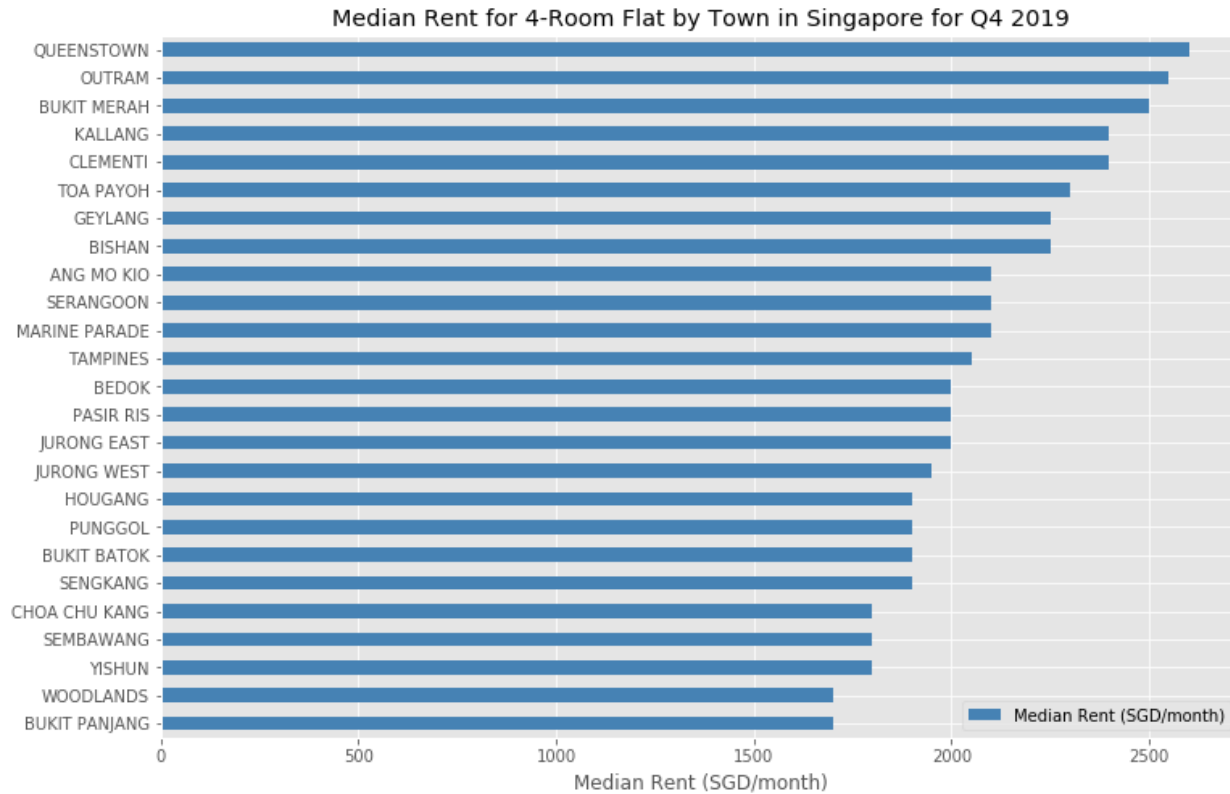
# PLANNING AREAS OF SINGAPORE

Singapore is divided into 55 planning areas



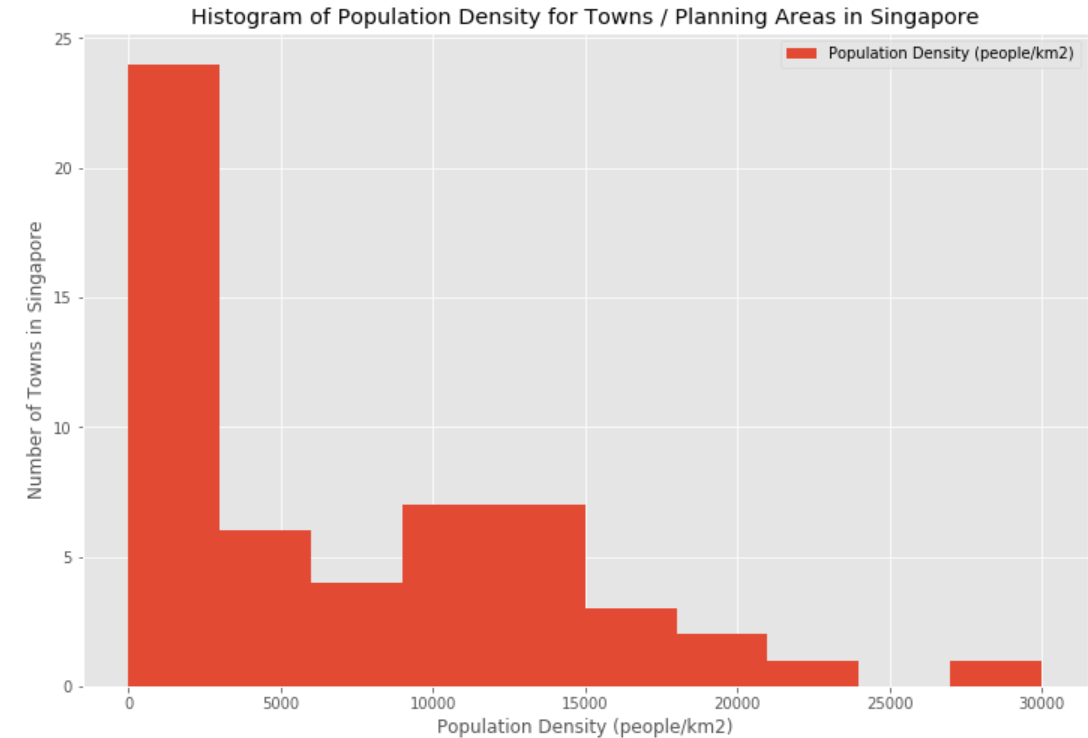
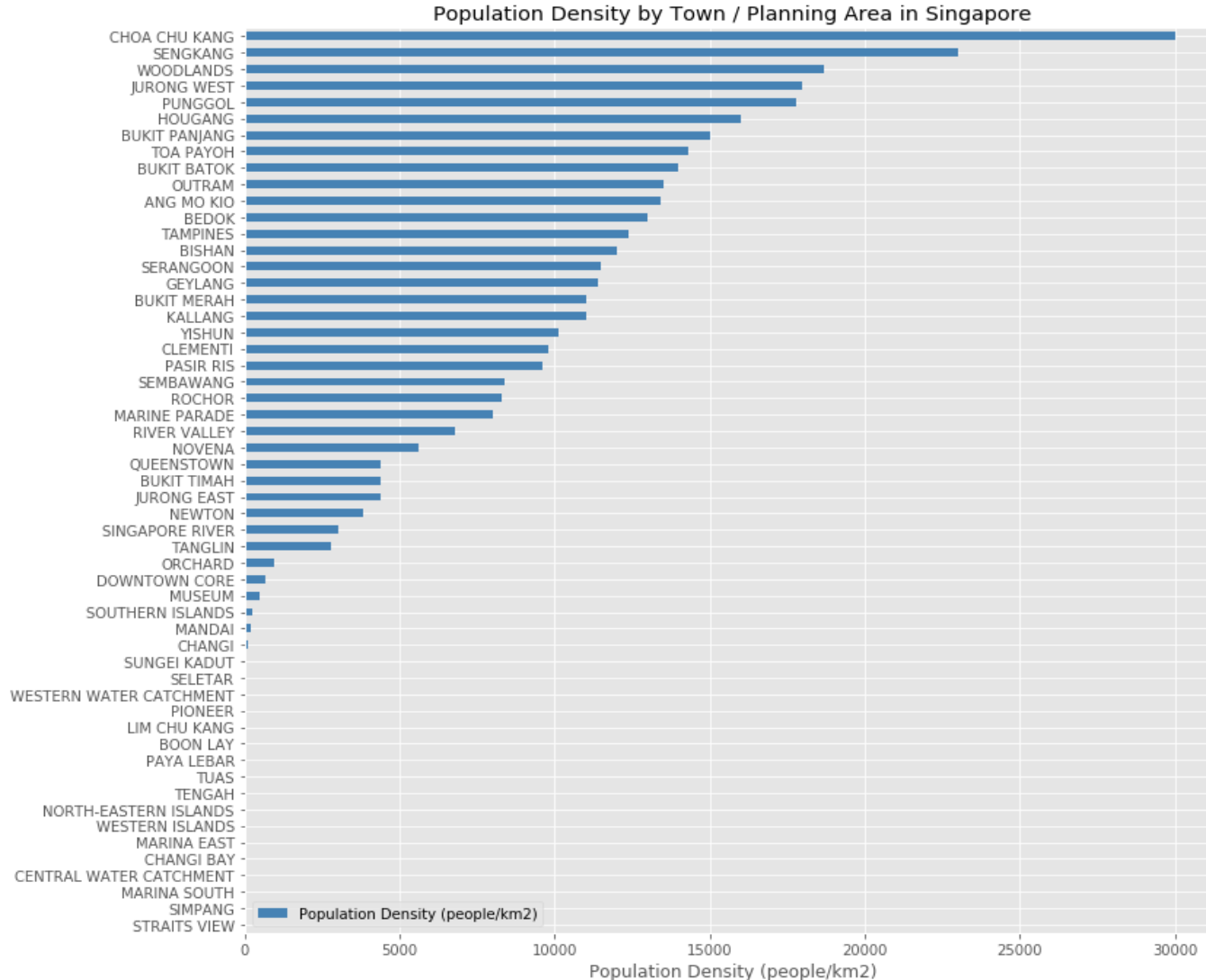
# MEDIAN RENT

Median rent has right-skewed distribution; 64% of towns  $\leq$  SGD 2.1k/month



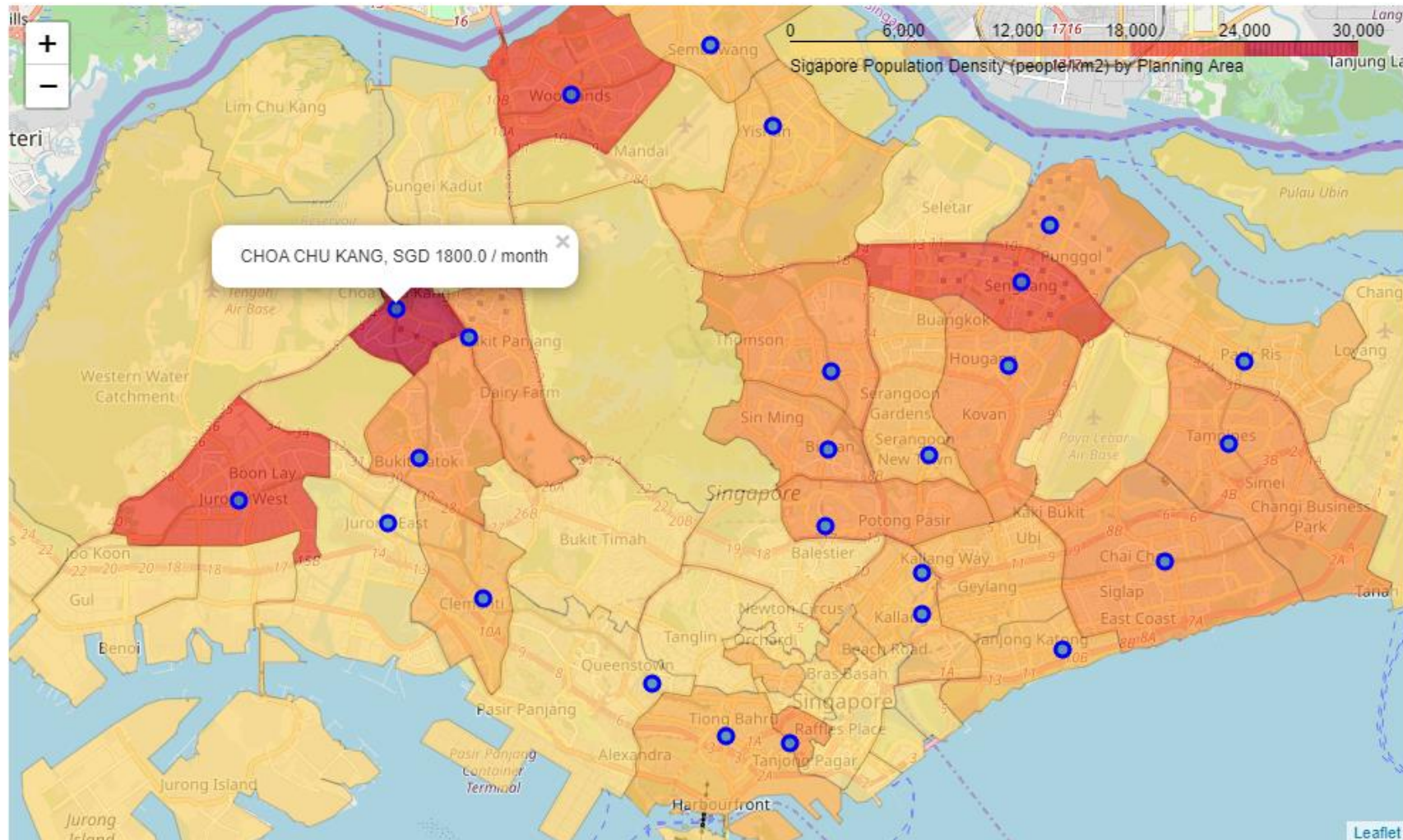
# POPULATION DENSITY (1/2)

Population density is highly right-skewed; majority of towns  $\leq 15\text{k}$  people/km<sup>2</sup>



# POPULATION DENSITY (2/2)

Choa Chu Kang highest population density, followed by Sengkang, Woodlands, Jurong West

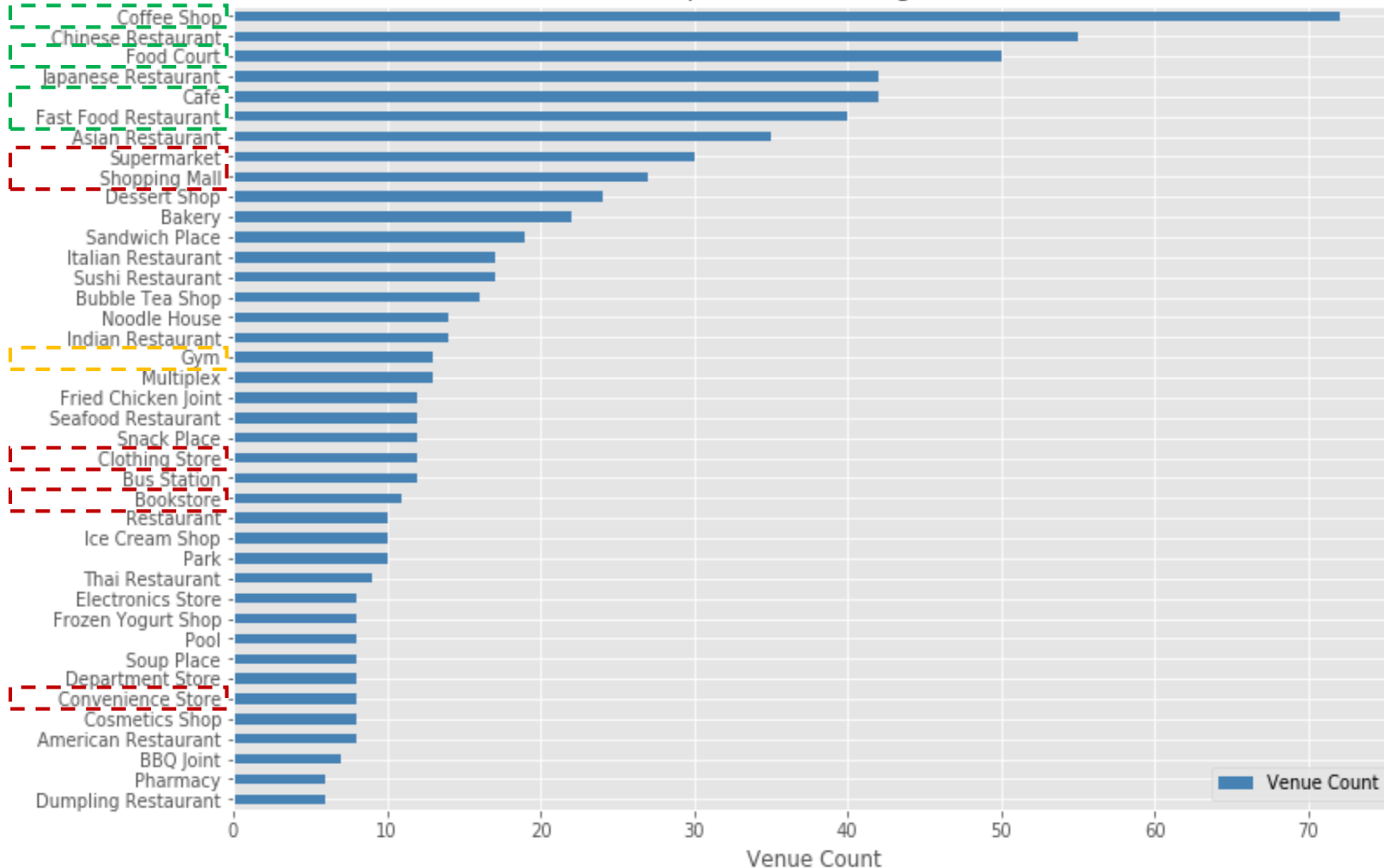




# BALANCED MIX OF AMENITIES (1/2)

Ten key venue categories selected to assess for balanced mix of amenities

Top 40 Venue Categories



## 10 Key Venues Categories for Balanced Mix of Amenities

### Food Options

- Coffee Shop
- Food Court
- Café
- Fast Food Restaurant

### Retail Options

- Supermarket
- Shopping Mall
- Clothing Store
- Bookstore
- Convenience Store

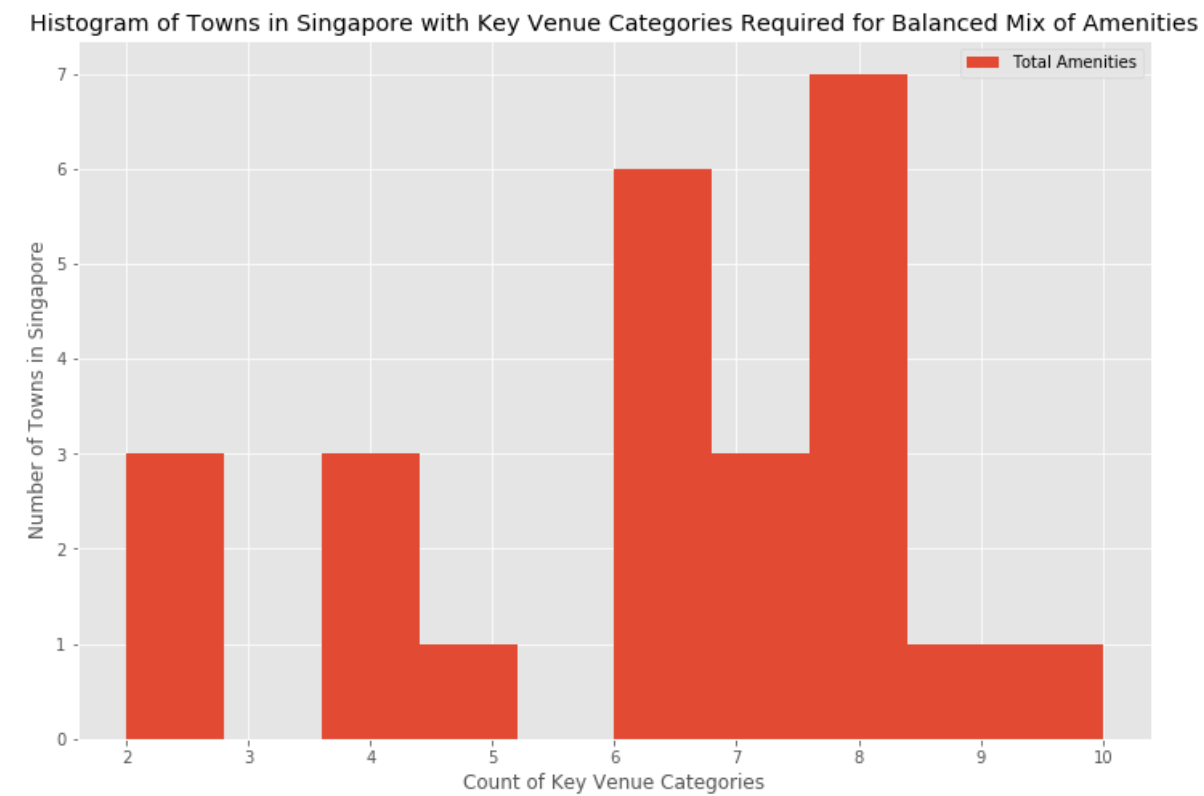
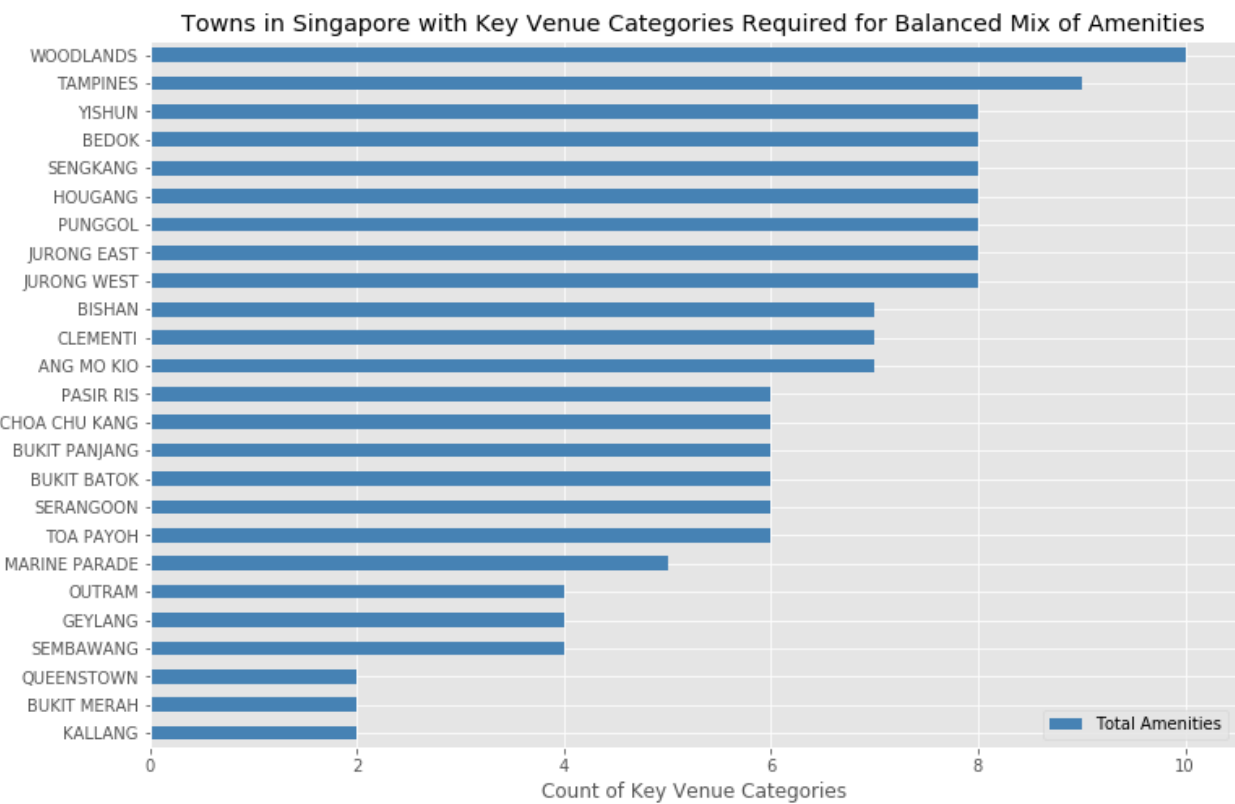
### Fitness Option

- Gym



# BALANCED MIX OF AMENITIES (2/2)

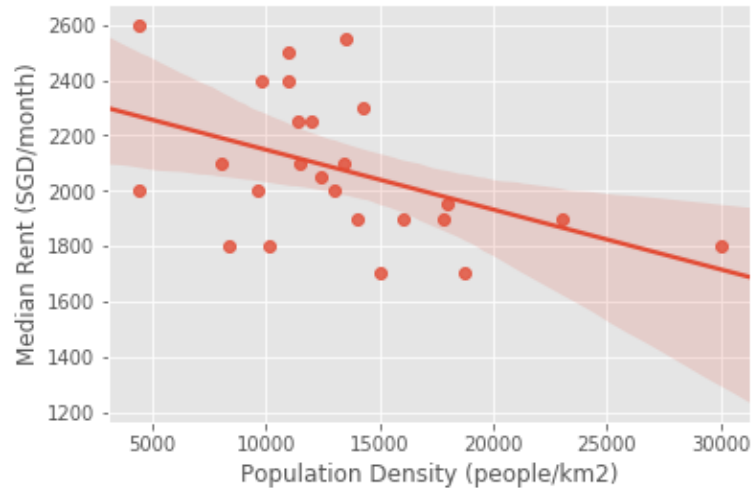
Only 72% of towns have  $\geq 6$  key venue categories that qualify as balanced mix of amenities



# RELATIONSHIP BETWEEN KEY VARIABLES

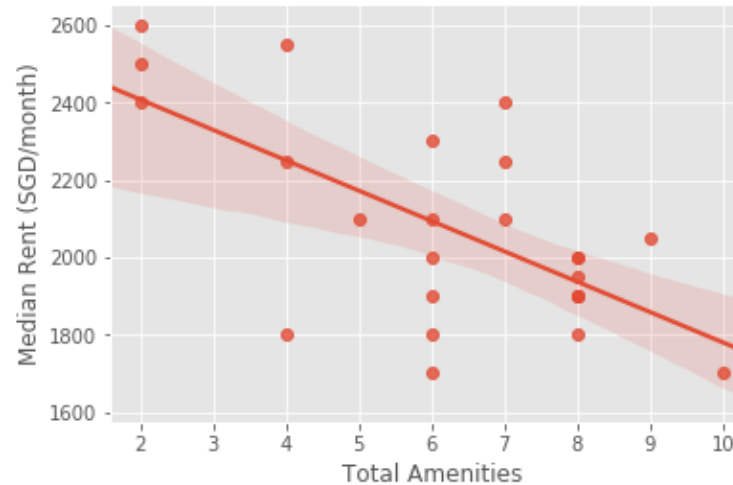
Population Density is fair predictor for Median Rent, especially at higher pop. densities

Median Rent vs. Population Density



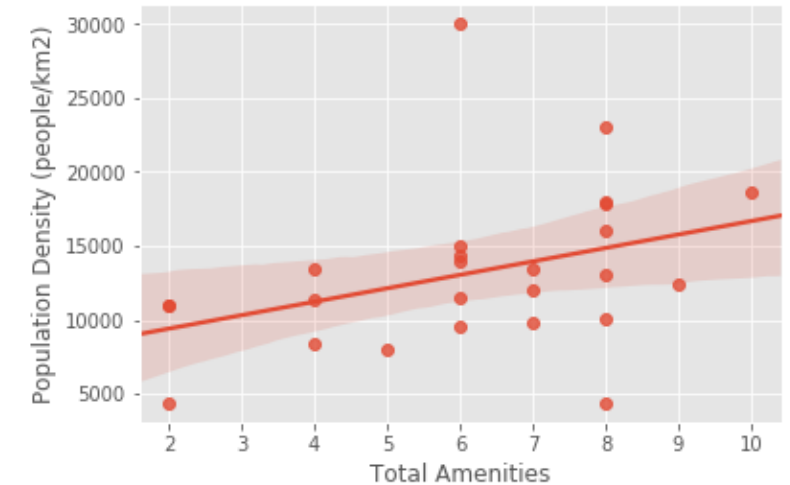
Population Density is fair predictor for Median Rent ( $r = -0.450$ ), especially at higher population densities.

Median Rent vs. Total Amenities



Although Total Amenities is a good predictor for Median Rent ( $r = -0.653$ ), there is wide spread of rent across range of amenities.

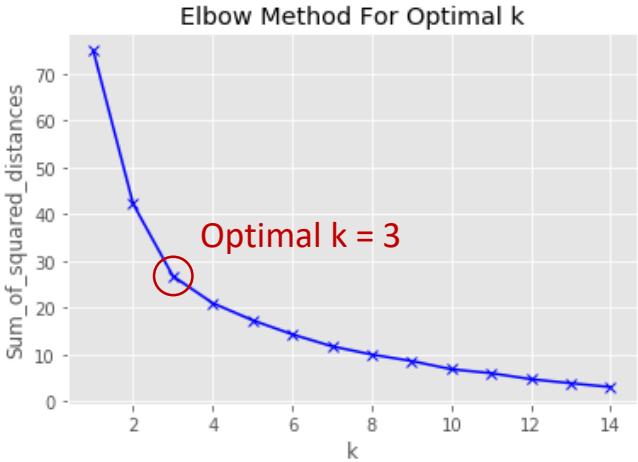
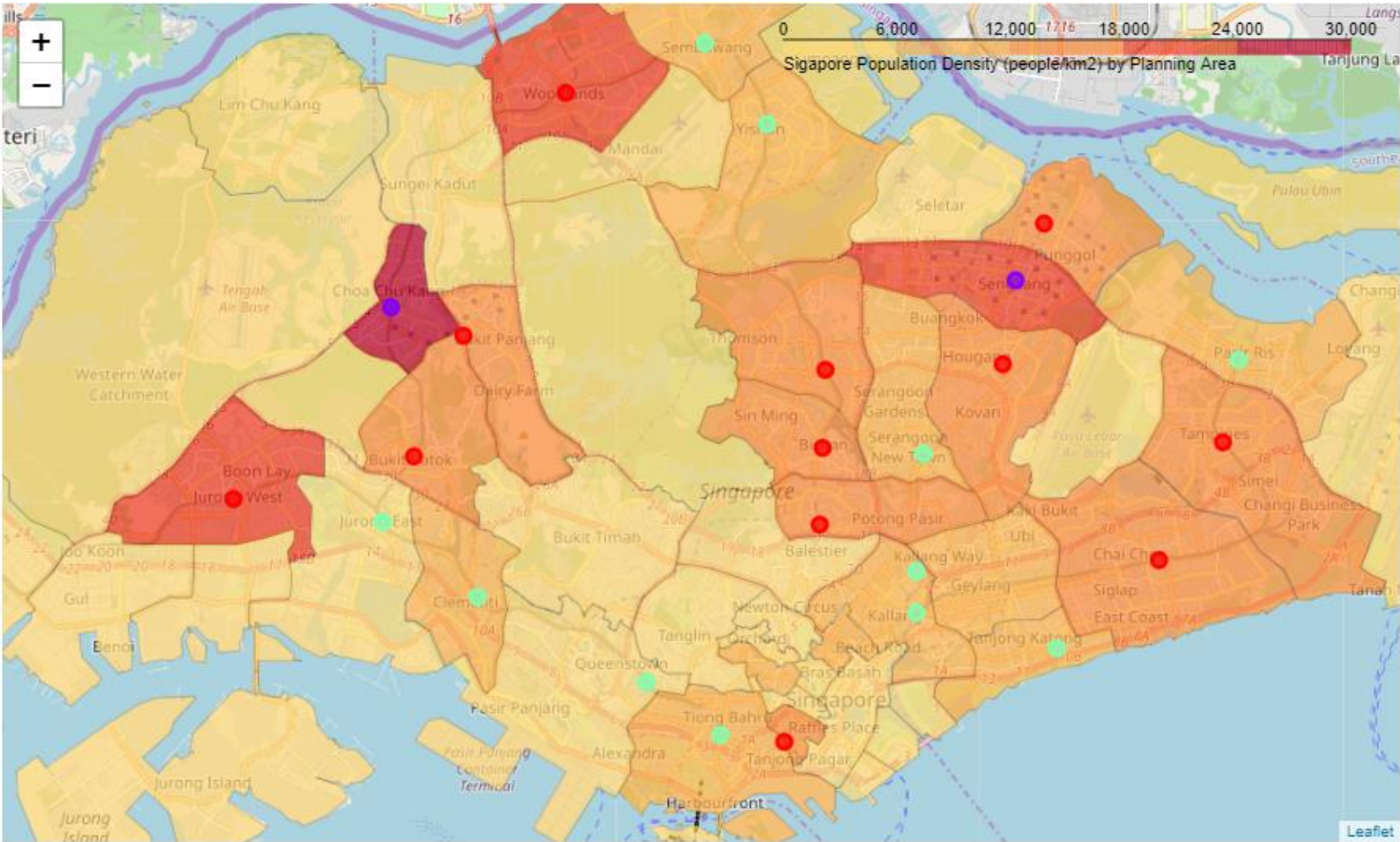
Population Density vs. Total Amenities



There appears to be a trend of increasing Total Amenities with higher Population Density, although  $r = 0.364$ .

# K-MEANS CLUSTERING

Three clusters of towns obtained; Cluster 3 towns most livable



Result Summary	Median Rent	Population Density	Total Amenities
Cluster 1	Low	High	Moderate Balanced
Cluster 2	Variable	Low	Variable
Cluster 3	Variable	Moderate	Most Balanced

# CONCLUSION AND FUTURE DIRECTIONS

Sub-clusters within each main cluster can be further detailed in future work

## Study Summary

- Used K-Means clustering to segment towns in Singapore based on Median Rent, Population Density, Total Amenities
- Population Density appears to be primary parameter used in segmentation
- Of the 3 clusters developed, Cluster 3 towns are most livable neighborhoods in Singapore based on:
  - Affordable median rental price
  - Tolerable population density
  - Balanced mix of amenities

## Limitations of K-Means

- K-Means clustering is unsupervised algorithm, and clusters may differ slightly in different runs
- Can run K-Means clustering multiple times with different starting conditions to assess the consistency of town clusters

## Suggestions for Future Work

- Sub-clusters can be identified within each main cluster to further segment towns based on other criteria, including availability of specific venues, accessibility to top-rated venues, attractions, and workplaces, amongst others
- Segments can then be mapped to different profiles of individuals looking to reside in Singapore