ANALYSIS OF SINGAPORE'S TOWNS

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 EIU in 2018)*
- High population density *(~8k people/km^2; 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)

Singapore Town Location Data:

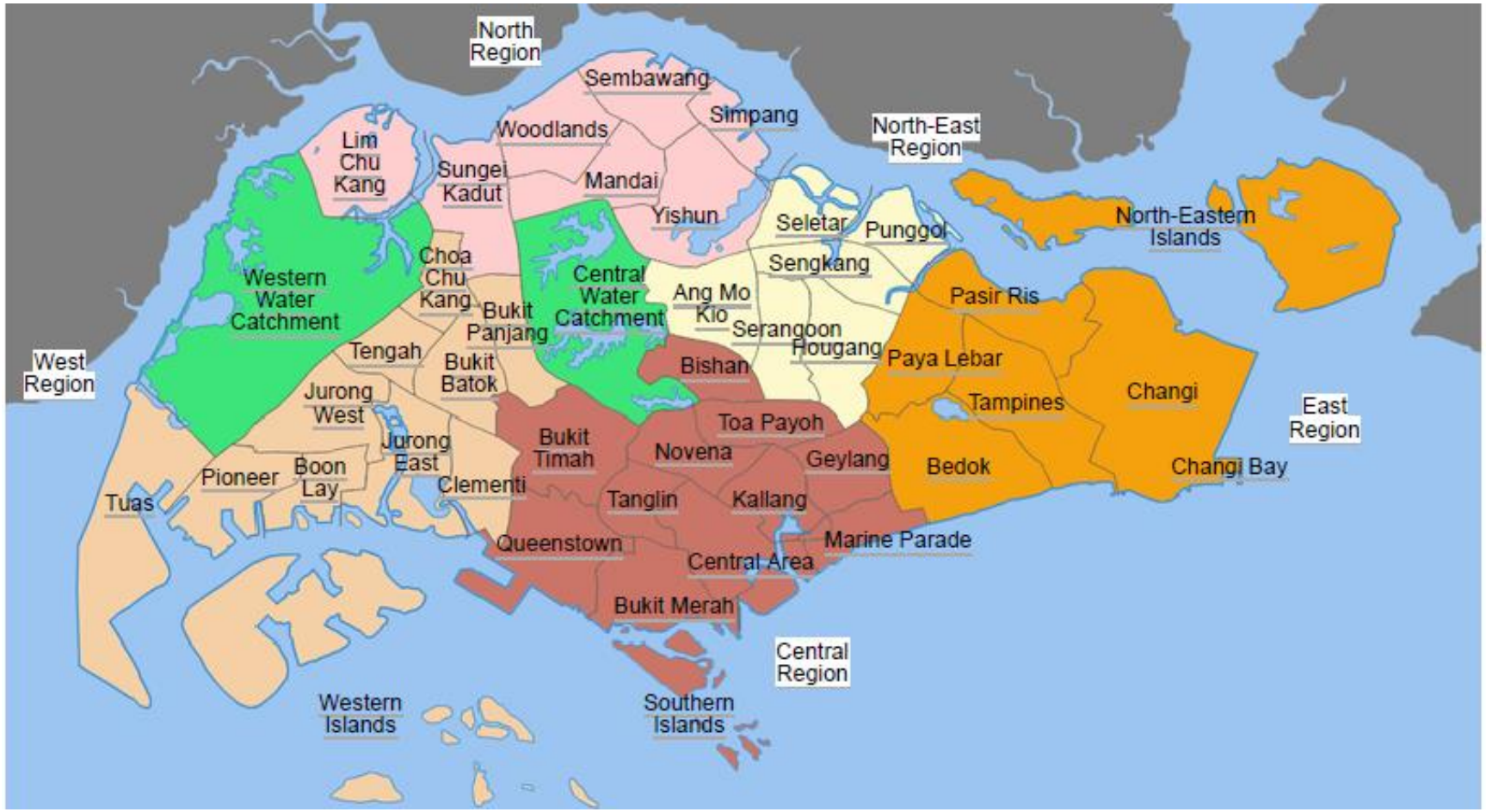
- Geospatial data retrieved from Data.gov.sg (https://data.gov.sg)
- Master Plan 2019 Planning Area Boundary (No Sea) GeoJSON file shows planning area boundaries for visualization on maps

Singapore Venue Information from Foursquare API:

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

PLANNING AREAS OF SINGAPORE

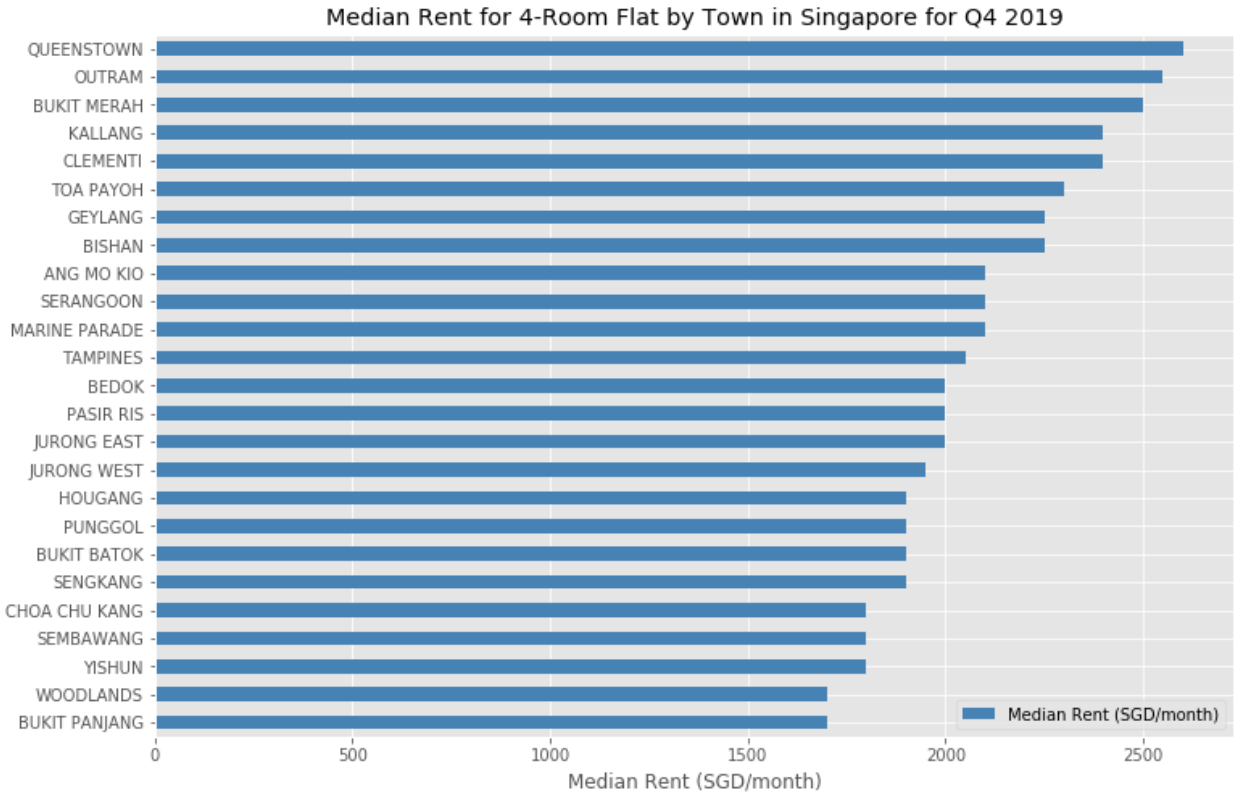
Singapore is divided into 55 planning areas

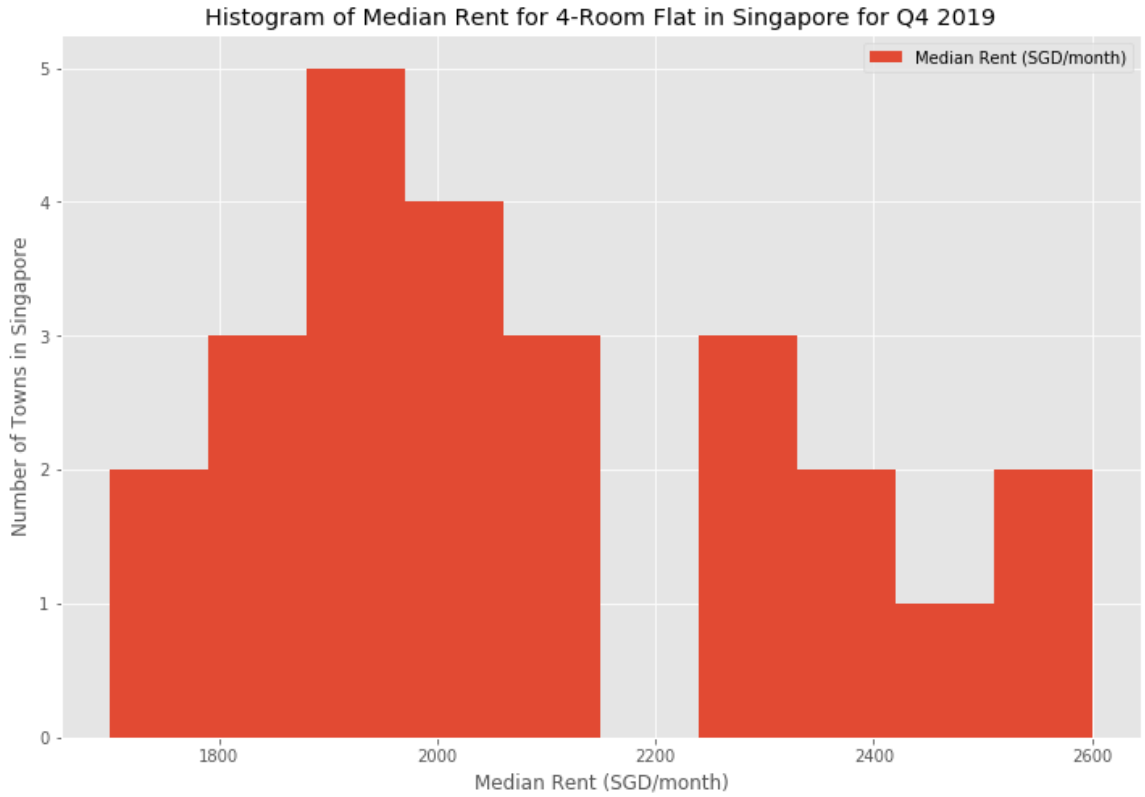


Source: 'Planning Areas of Singapore' Wikipedia page (https://en.wikipedia.org/wiki/Planning_Areas_of_Singapore).

MEDIAN RENT

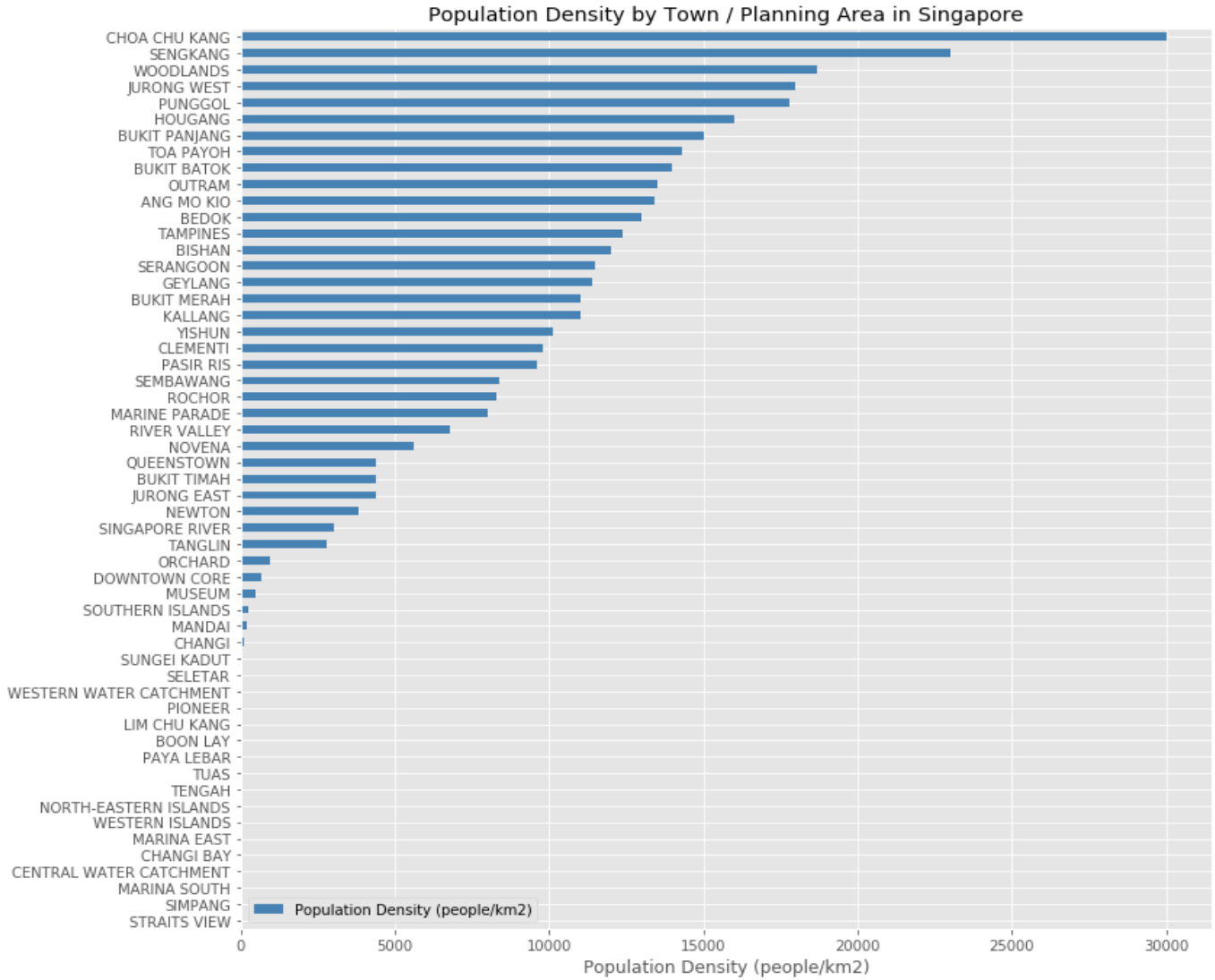
Median rent has left-skewed distribution; 64% of towns ≤ SGD 2.1k/month

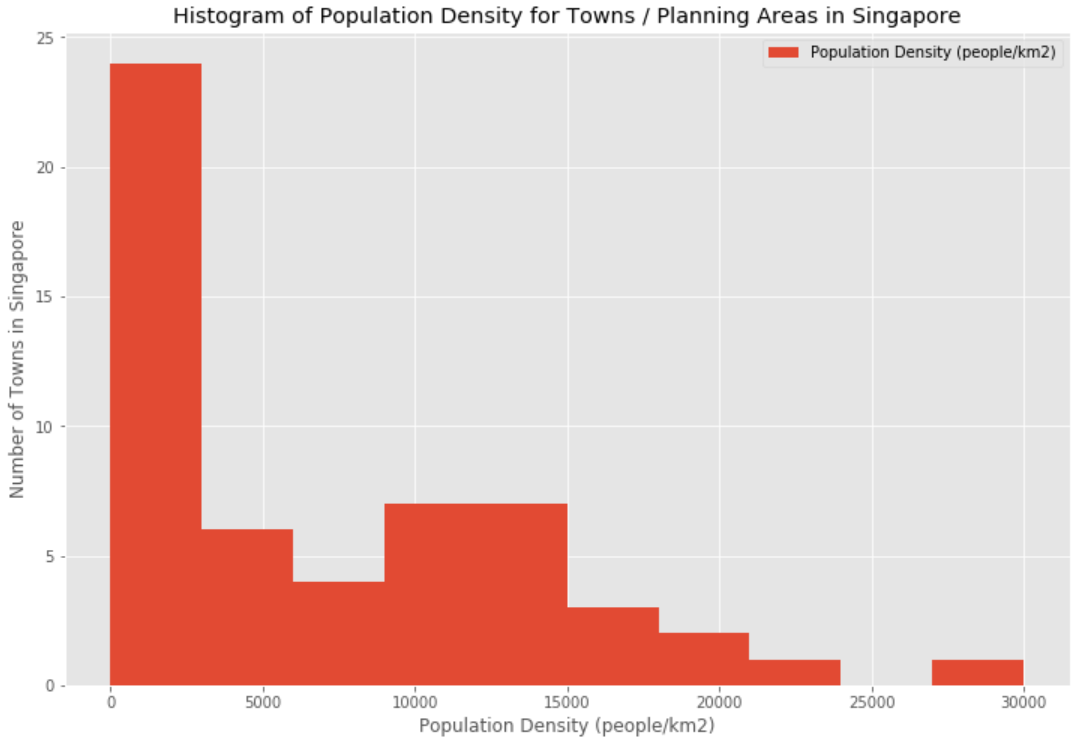




POPULATION DENSITY (1/2)

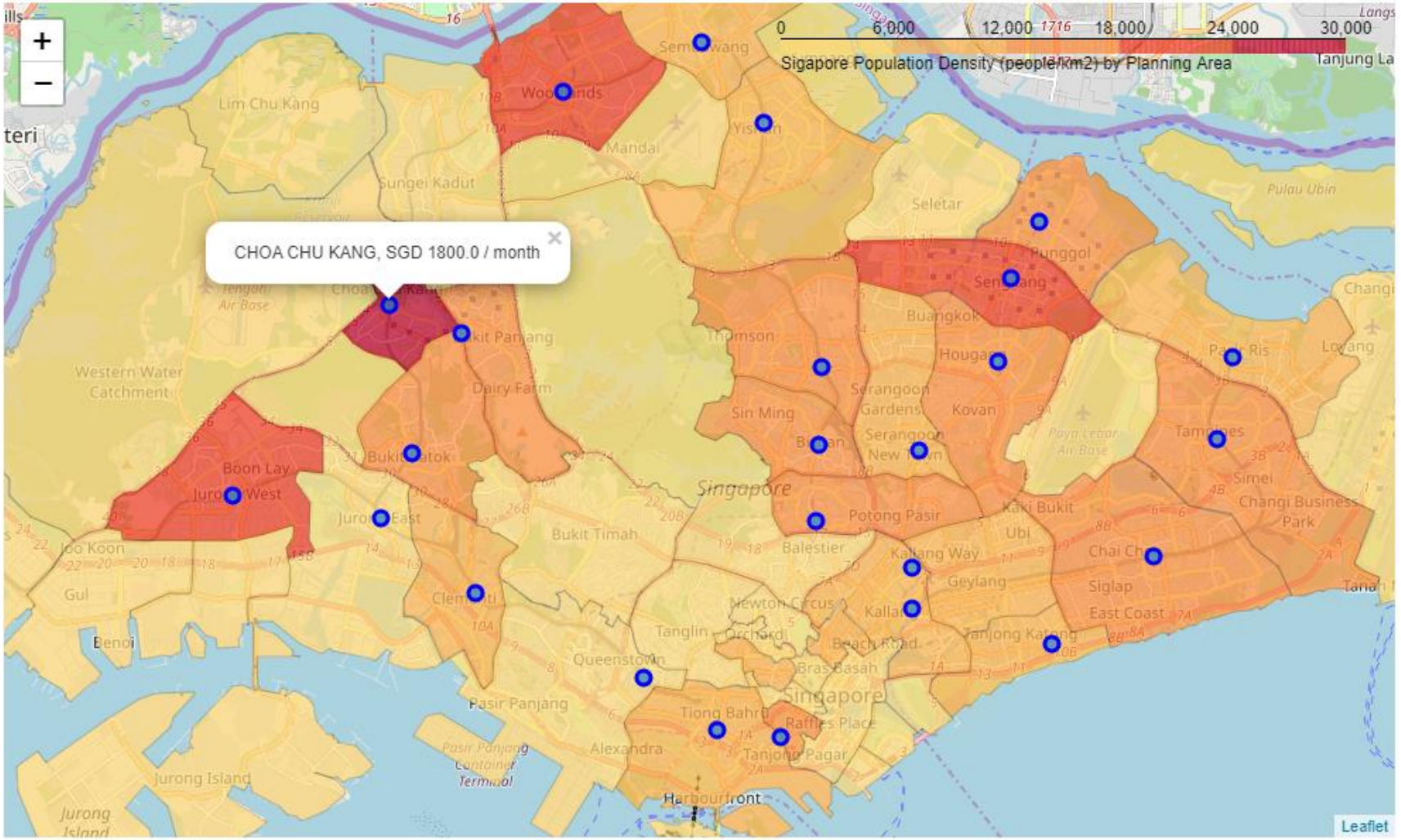
Population density is highly left-skewed; majority of towns ≤ 15k people/km^2





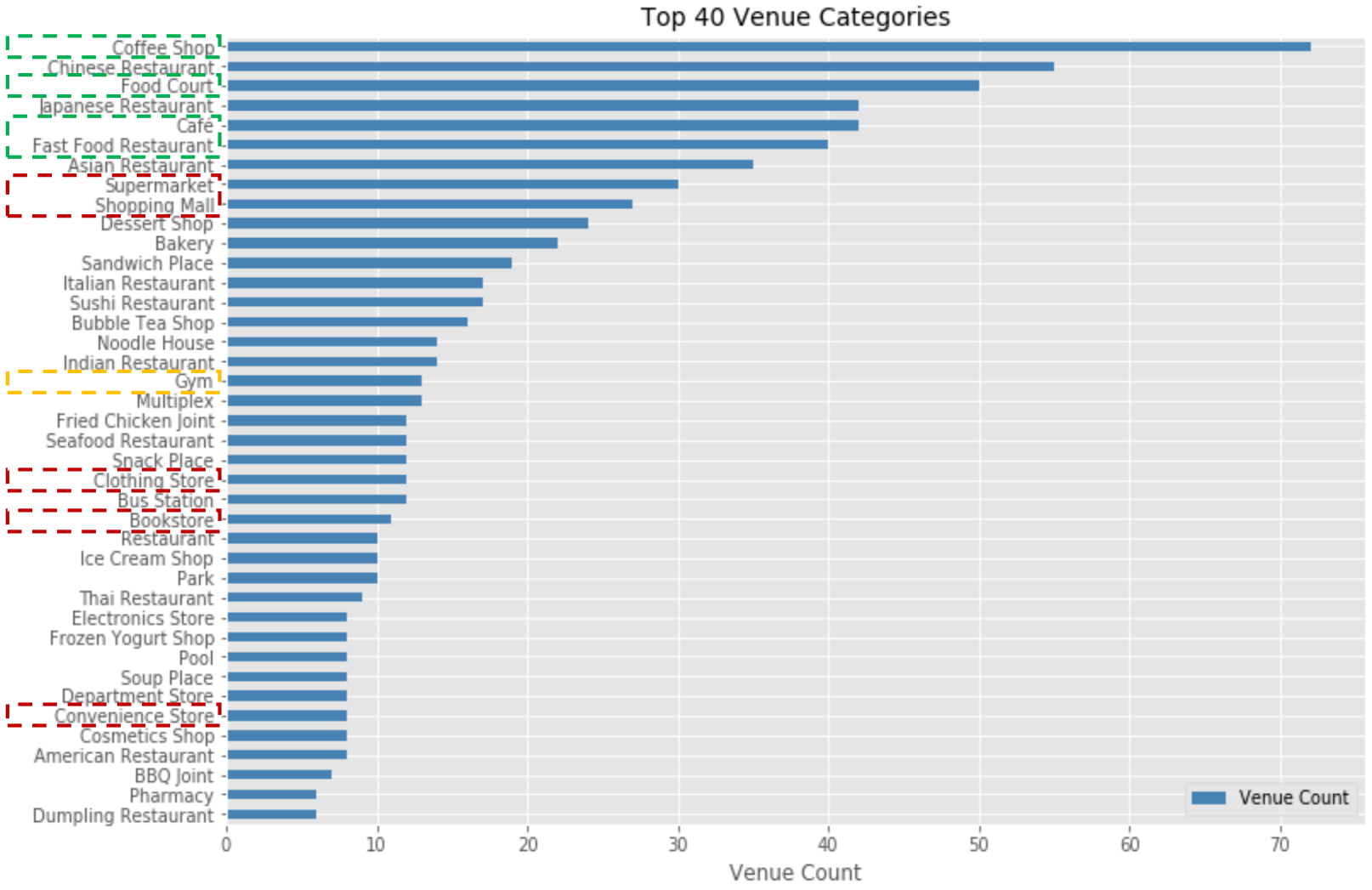
POPULATION DENSITY (2/2)

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



10 Key Venues Categories for Balanced Mix of Amenities

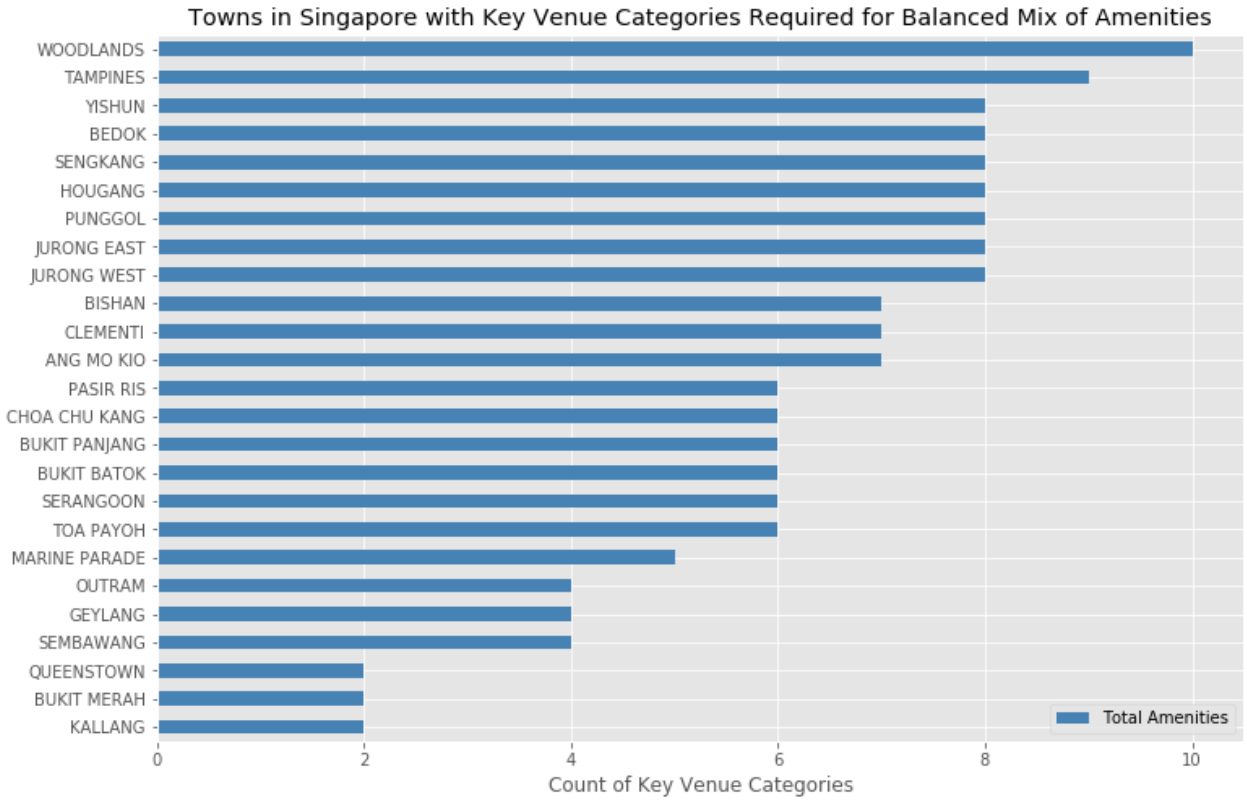
Food Options
- Coffee Shop
- Food Court
- Café
- Fast Food Restaurant

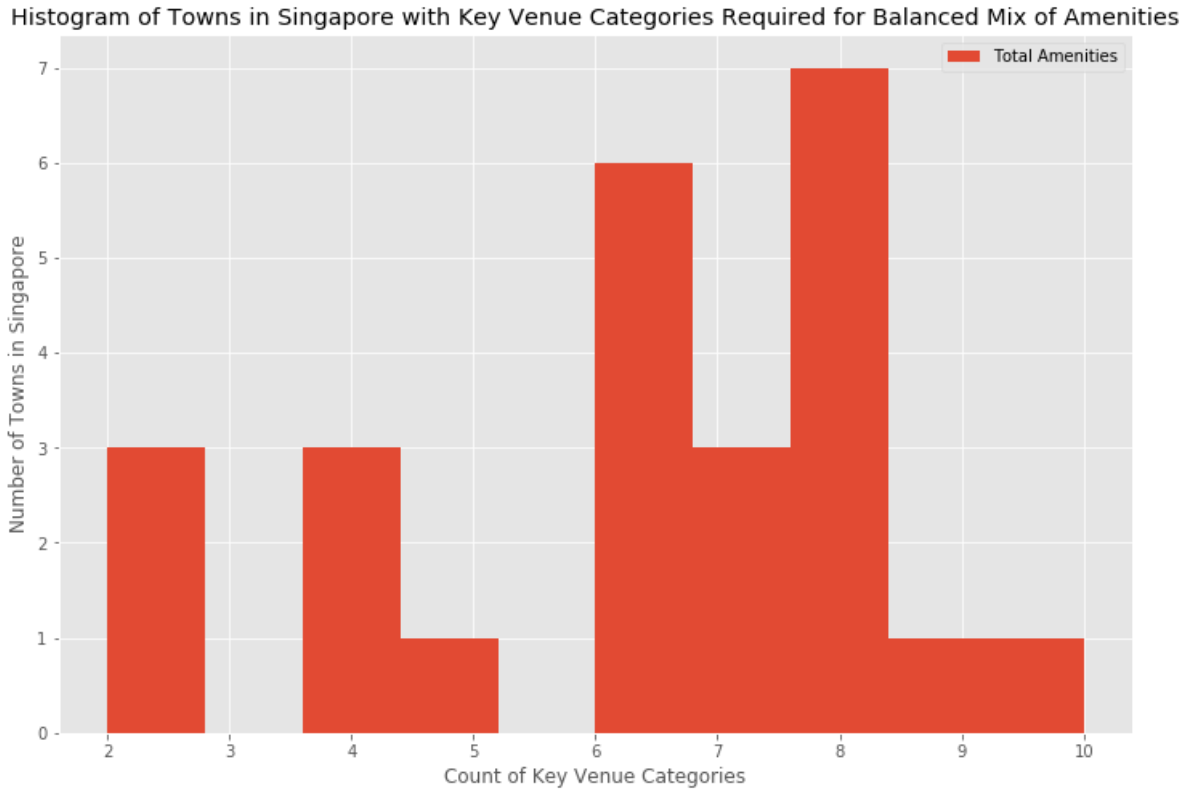
Retail Options
- Supermarket
- Shopping Mall
- Clothing Store
- Bookstore
- Convenience Store

Fitness Option
- Gym

BALANCED MIX OF AMENITIES (2/2)

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

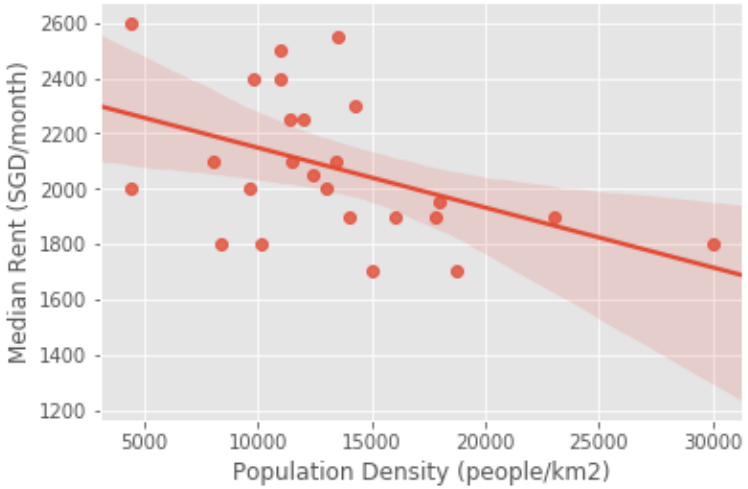




RELATIONSHIP BETWEEN KEY VARIABLES

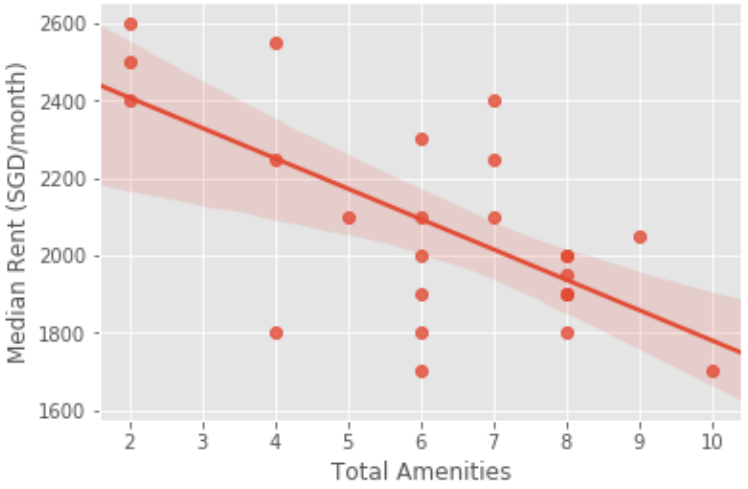
Population Density is fair predictor for Median Rent, especially at higher pop. densities

Median Rent vs. Population Density



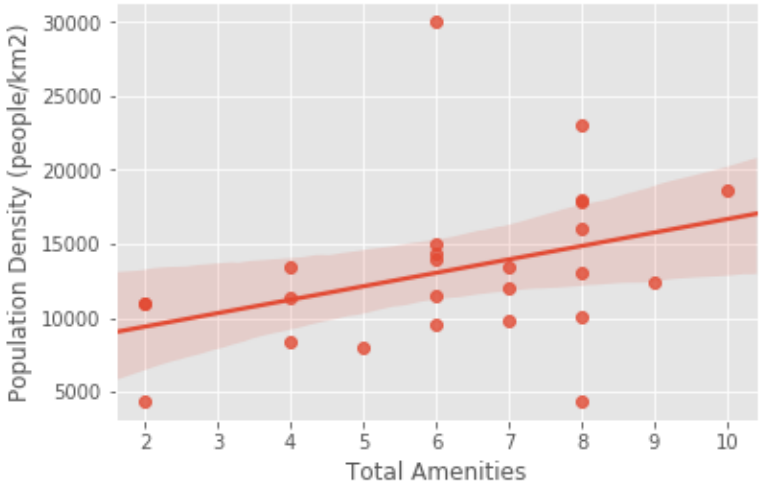
Population Density is fair predictor for Median Rent (r = -0.450), especially at higher population densities.

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.

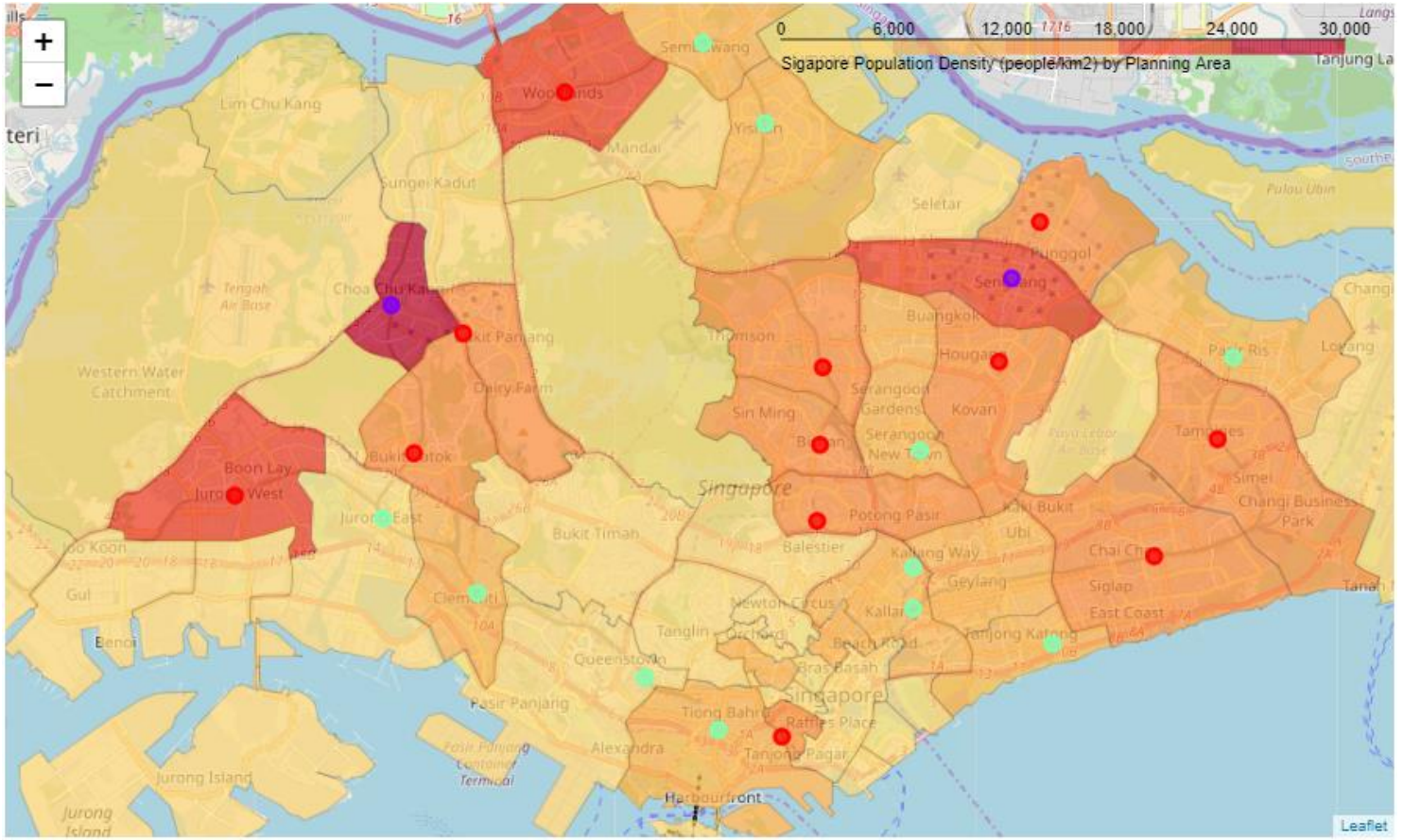
Population Density vs. Total Amenities

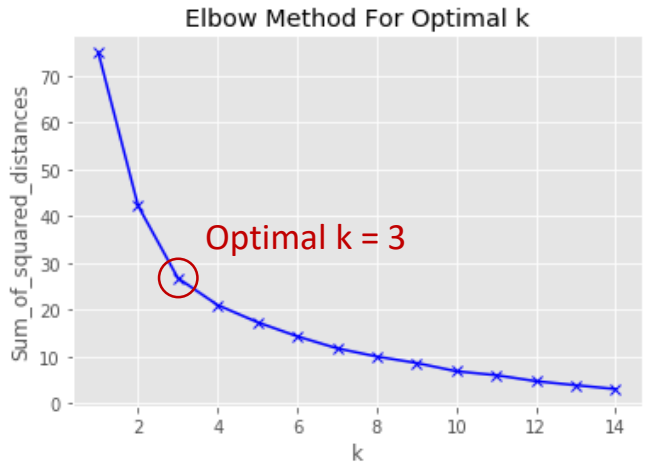


There appears to be a trend of increasing Total Amenities with higher Population Density, although r = 0.364.

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 tows 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