

Penang Island vs Seberang Perai

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1. Problem Description/ Background

Penang is a Malaysian state located on the northwest coast of Peninsular Malaysia, by the Malacca Strait. It has two parts: Penang Island, where the capital city, George Town, is located, and Seberang Perai on the Malay Peninsula. They are connected by Malaysia's two longest road bridges, the Penang Bridge and the Sultan Abdul Halim Muadzam Shah Bridge; the latter is also as of May 2019 the longest overseas bridge in Southeast Asia. The second smallest Malaysian state by land mass, Penang is bordered by Kedah to the north and the east, and Perak to the south.

Penang's population stood at nearly 1.767 million as of 2018, while its population density rose to 1,684/km² (4,360/sq mi). It has among the nation's highest population densities and is one of the country's most urbanised states. Seberang Perai is Malaysia's second largest city by population. Its heterogeneous population is highly diverse in ethnicity, culture, language and religion. Aside from the three main races, the Malays, Chinese, and Indians, Penang is home to significant Eurasian, Siamese and expatriate communities. George Town is also home to a UNESCO World Heritage Site. A resident of Penang is colloquially known as a Penangite or Penang Lâng (in Penang Hokkien).

Housing has long been a problem for Penang residents. Residential overhang in Penang is still a major issue and the overhang in Penang is likely due to unaffordable property prices and financing issues. For Penang, its topographical make-up is divided into a mainland and an island. The dwindling stock of land in Penang Island has inevitably pushed up house prices. Rising prices has inevitably encourage movement of residents from the Island (population density of 2,465.47/km²) to the Mainland (Seberang Perai), which has a population density of 1,089.5/km², less than half of that in Penang Island, and land area of 2.6 times larger thus making the housing there more affordable.

However, the two parts of Penang are not entirely alike. In this project, we will be comparing the similarities and dissimilarities between the neighborhoods in these two parts of Penang and decide the best location to move to if you are coming from Penang Island.

2. Data Description

To solve the problem, we will be using the below:

- Districts and neighborhoods in Penang from <https://www.penang.gov.my> and [https://en.wikipedia.org/wiki/Category:Districts_of Penang](https://en.wikipedia.org/wiki/Category:Districts_of_Penang)
- Latitude and Longitude of the neighborhoods using Python geocoder
- Venues nearby using Foursquare API

I will be compiling a separate utf-8 csv file to structure the districts and neighborhoods due to lack of available data online in tabular form. Penang is made out of 5 main districts, 2 on the Penang Island, and 3 on the Malay Peninsula.

We will explore the available venues within each neighborhood using Foursquare API, then cluster the venues which will give us a view on the similarities and disimilarities specifically between neighborhoods in Penang Island and Seberang Perai.

From the cluster, we will use 2 different examples on where to move to if you are from two different neighborhoods in Penang Island.

3. Methodology/ Analysis

Create a map of Penang with neighborhoods superimposed on top, separating Penang Island and Seberang Perai's Districts

Penang is made out of 5 districts, 2 in Penang Island and 3 in Seberang Perai, Malay Peninsular

Here are the color codes:

- Red - Northeast Penang Island
- Pink - Southwest Penang Island
- Light Blue - North Seberang Perai
- Blue - Central Seberang Perai
- Dark Blue - South Seberang Perai

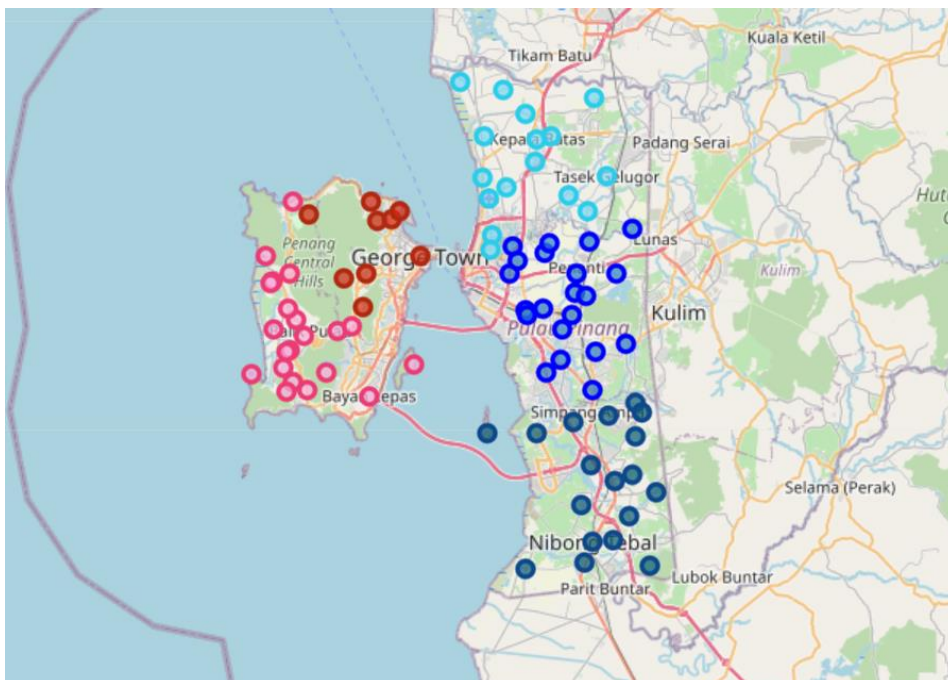


Figure 1

District and Neighborhood list and coordinates of Penang

Latitude and Longitude populated with OpenCage geocoder.

District	Neighborhood	Latitude	Longitude
Northeast Penang Island	George Town	5.414568	100.329803
Northeast Penang Island	Bukit Paya Terubong	5.371381	100.280314
Northeast Penang Island	Ayer Itam	5.395753	100.263293
Northeast Penang Island	Bukit Ayer Itam	5.4	100.28333
Northeast Penang Island	Batu Ferringi	5.450567	100.234297
Northeast Penang Island	Bukit Olivia	5.444543	100.292786
Northeast Penang Island	Tanjung Tokong	5.446139	100.305254
Northeast Penang Island	Seri Tanjung Pinang	5.453909	100.311973
Northeast Penang Island	Tanjung Bungah	5.462163	100.286995
Southwest Penang Island	Kuala Sungai Pinang	5.392797	100.202246
Southwest Penang Island	Kuala Sungai Pinang	5.392797	100.202246
Southwest Penang Island	Jalan Nelayan	5.391122	100.200213
Southwest Penang Island	Jalan Baru	5.352126	100.203193
Southwest Penang Island	Titi Teras	5.359932	100.223006
Southwest Penang Island	SK Kongs	5.346723	100.229592
Southwest Penang Island	Pekan Genting	5.334071	100.217438
Southwest Penang Island	Jalan Sungai Nipah	5.333582	100.214204
Southwest Penang Island	Pulau Betong	5.314215	100.183913
Southwest Penang Island	Jalan Kampung Terang	5.318996	100.211345
Southwest Penang Island	Pantai Aceh	5.415471	100.19635

Southwest Penang Island	Jalan Teluk Bahang	5.461765	100.219926
Southwest Penang Island	Sungai Rusa & Bukit Sungai Pinang	5.4	100.21667
Southwest Penang Island	Jalan Sungai Air Putih	5.370565	100.216118
Southwest Penang Island	The Hill Relau	5.350803	100.258936
Southwest Penang Island	Jalan Tun Sardon	5.355287	100.271265
Southwest Penang Island	Bukit Genting	5.307646	100.219876
Southwest Penang Island	Bukit Pasir Panjang	5.32161	100.32472
Southwest Penang Island	Bukit Gemuruh	5.298721	100.213875
Southwest Penang Island	Bukit Gambir	5.315312	100.248663
Southwest Penang Island	Jalan Teluk Kumbar	5.300484	100.231817
Southwest Penang Island	Bayan Lepas	5.295385	100.285755
North Seberang Perai	Kampung Permatang Rawa	5.563887	100.364172
North Seberang Perai	Lahar Minyak	5.557169	100.401078
North Seberang Perai	Lahar Tiang	5.550943	100.479179
North Seberang Perai	Permatang Pak Maras	5.517505	100.384959
North Seberang Perai	Kampung Padang	5.536658	100.420193
North Seberang Perai	Bertam	5.516909	100.44254
North Seberang Perai	Teluk Air Tawar	5.48176	100.383349
North Seberang Perai	Kampung Permatang Sireh	5.495469	100.428956
North Seberang Perai	TUDM Butterworth	5.464375	100.388785
North Seberang Perai	Permatang Tok Bidan	5.474012	100.404315
North Seberang Perai	Lahar Yooi	5.467553	100.457893
North Seberang Perai	Tasek Gelugor	5.483229	100.490476
North Seberang Perai	Padang Menora	5.453942	100.473899
North Seberang Perai	Kepala Batas	5.515463	100.430545
North Seberang Perai	Taman Dedap, Butterworth	5.432143	100.39173
North Seberang Perai	Mak Mandin, Butterworth	5.419835	100.390162
Central Seberang Perai	Seberang Jaya	5.39945	100.406487
Central Seberang Perai	Sama Gagah	5.423182	100.409586
Central Seberang Perai	Permatang Pasir	5.41781	100.437317
Central Seberang Perai	Permatang Pauh	5.410318	100.413282
Central Seberang Perai	Kubang Semang	5.399563	100.464746
Central Seberang Perai	Taman Pauh	5.368973	100.421195
Central Seberang Perai	Bandar Perda	5.370488	100.436074
Central Seberang Perai	Tanah Liat	5.384046	100.463433
Central Seberang Perai	Berapit	5.380789	100.472745
Central Seberang Perai	Jalan Betek	5.351794	100.452266
Central Seberang Perai	Bukit Tengah	5.364542	100.421602
Central Seberang Perai	Juru	5.315717	100.437975
Central Seberang Perai	Bukit Minyak Industrial Zone	5.32557	100.451281
Central Seberang Perai	Permatang Tinggi	5.299665	100.478587
Central Seberang Perai	Alma	5.333408	100.481474
Central Seberang Perai	Machang Bubok	5.340172	100.507695
Central Seberang Perai	Mertajam Hill	5.364236	100.460996

Central Seberang Perai	Mengkuang	5.399493	100.499342
Central Seberang Perai	Ara Kuda	5.43804	100.513112
Central Seberang Perai	Guar Perahu	5.427962	100.474938
Central Seberang Perai	Bukit Jelutong	5.42649	100.441095
South Seberang Perai	Kampung Seberang Tasik	5.289033	100.515171
South Seberang Perai	Kampung Tasek	5.281608	100.520559
South Seberang Perai	Bukit Degong	5.260482	100.515388
South Seberang Perai	Bukit Tangga Batu	5.228336	100.512796
South Seberang Perai	Sungai Duri	5.21295	100.532838
South Seberang Perai	Taman Halaman Indah	5.192088	100.509316
South Seberang Perai	Kawasan Industri Bukit Panchor, Sungai Jawi	5.172096	100.496624
South Seberang Perai	Bukit Rantai	5.150127	100.527703
South Seberang Perai	Kampung Tok Keramat	5.152461	100.471406
South Seberang Perai	Sungai Acheh	5.14682	100.420951
South Seberang Perai	Changkat	5.201962	100.469116
South Seberang Perai	Kawasan Perindustrian Valdor	5.235604	100.476684
South Seberang Perai	Batu Kawan	5.262596	100.430455
South Seberang Perai	Bukit Tambun, Simpang Ampat	5.272568	100.462103
South Seberang Perai	Bandar Tasek Mutiara	5.277741	100.492478
South Seberang Perai	Pulau Aman	5.26297	100.38821
South Seberang Perai	Nibong Tebal	5.170096	100.478519
South Seberang Perai	Sungai Bakap	5.222816	100.498061

Using Foursquare API, populate top 100 venues within 500 meters radius for each neighborhood.

Neighborhood	Venue Categories
Alma	29
Ara Kuda	4
Ayer Itam	2
Bandar Perda	24
Bandar Tasek Mutiara	6
Batu Kawan	6
Bayan Lepas	9
Berapit	12
Bertam	4
Bukit Ayer Itam	16
Bukit Degong	2
Bukit Gambir	1
Bukit Genting	2
Bukit Jelutong	3
Bukit Minyak Industrial Zone	13
Bukit Pasir Panjang	2
Bukit Paya Terubong	11

Bukit Tambun, Simpang Ampat	25
Bukit Tengah	12
Changkat	4
George Town	57
Guar Perahu	10
Jalan Baru	4
Jalan Betek	9
Jalan Kampung Terang	4
Jalan Nelayan	4
Jalan Sungai Air Putih	9
Jalan Sungai Nipah	15
Jalan Teluk Bahang	1
Jalan Teluk Kumbar	3
Jalan Tun Sardon	3
Juru	20
Kampung Padang	5
Kampung Permatang Sireh	9
Kampung Tasek	7
Kampung Tok Keramat	6
Kawasan Industri Bukit Panchor, Sungai Jawi	3
Kawasan Perindustrian Valdor	2
Kepala Batas	16
Kuala Sungai Pinang	6
Kubang Semang	19
Lahar Minyak	2
Lahar Tiang	1
Lahar Yooi	4
Machang Bubok	14
Mak Mandin, Butterworth	5
Mengkuang	7
Mertajam Hill	43
Nibong Tebal	14
Padang Menora	7
Pantai Aceh	4
Pekan Genting	13
Permatang Pak Maras	5
Permatang Pasir	13
Permatang Pauh	18
Permatang Tinggi	12
Permatang Tok Bidan	4
Pulau Aman	4
SK Kongsu	5
Sama Gagah	4
Seberang Jaya	15

Seri Tanjung Pinang	10
Sungai Acheh	4
Sungai Bakap	19
Sungai Duri	1
Sungai Rusa & Bukit Sungai Pinang	10
TUDM Butterworth	1
Taman Dedap, Butterworth	23
Taman Halaman Indah	5
Taman Pauh	11
Tanah Liat	6
Tanjung Bungah	22
Tanjung Tokong	40
Tasek Gelugor	9
Teluk Air Tawar	13
The Hill Relau	4
Titi Teras	4

Cluster Neighborhoods by their top 6 venues

Run k-means to cluster the Penang Island neighborhoods 6 clusters. Remove neighborhoods with no nearby venues populated from Foursquare API.

Penang Island:

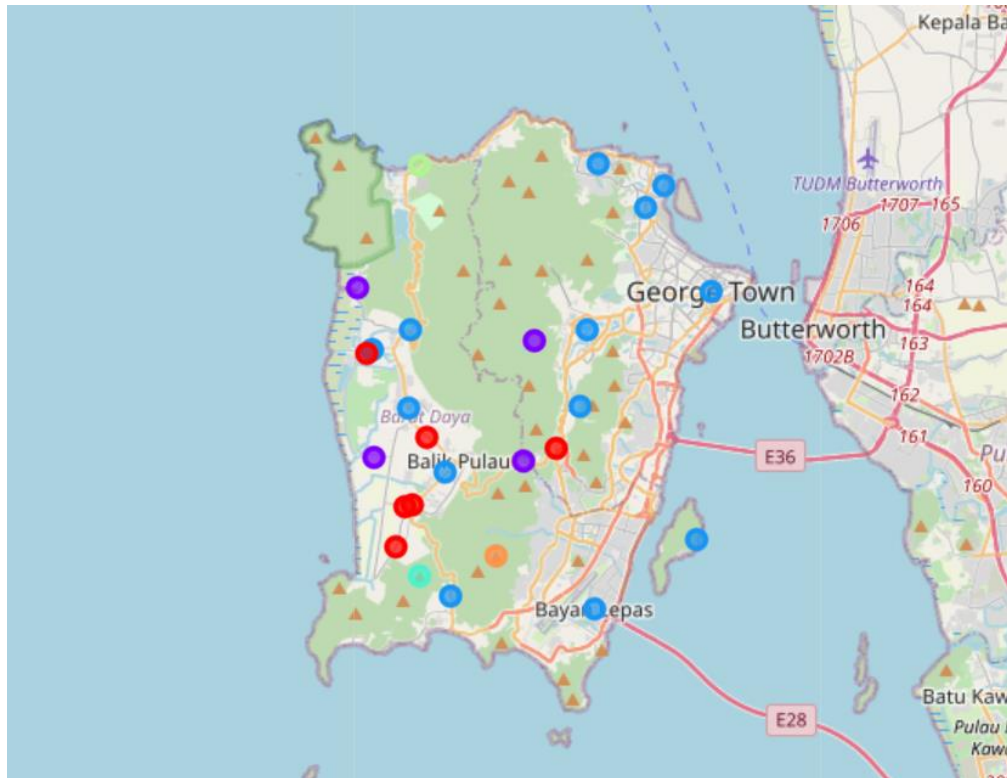


Figure 2

Seberang Perai:

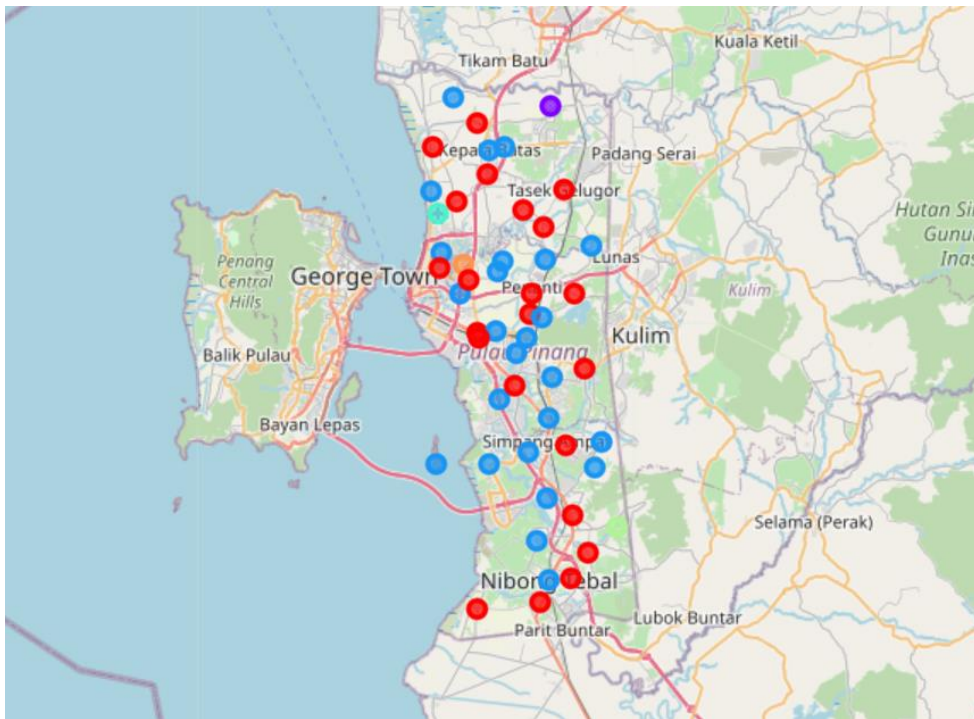


Figure 3

ALL of Penang:

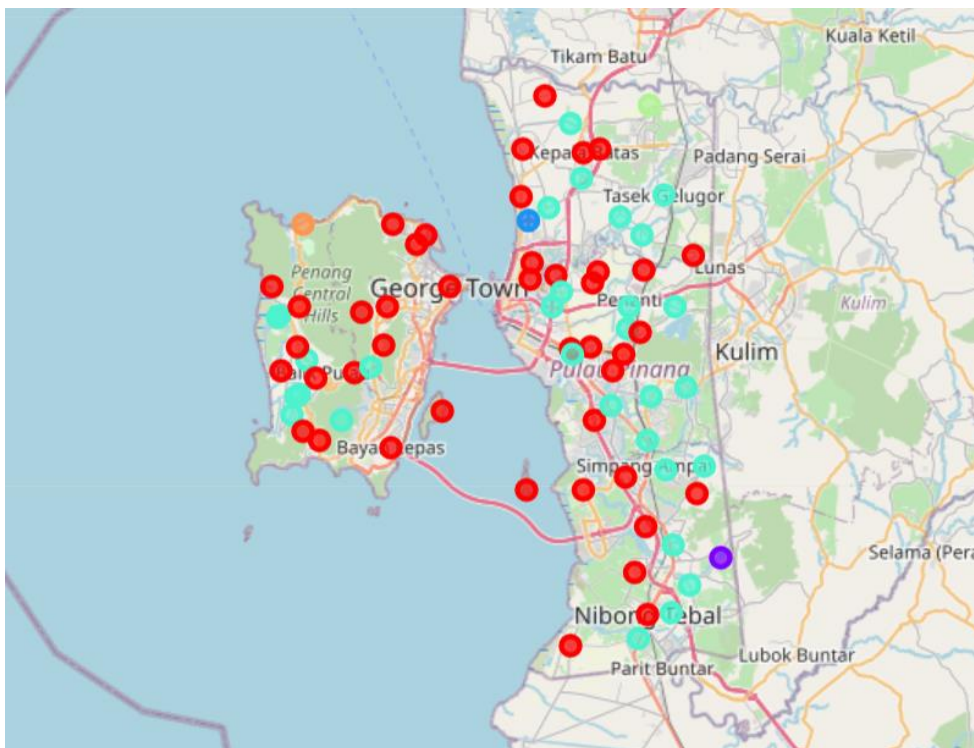


Figure 4

4. Results and Discussion

Penang Island vs Seberang Perai

Before we proceed further, we have to note that Foursquare provides venues that are mainly food related especially for locations in Asia. Thus, our following discussion and conclusion will be somewhat skewed based on types of food which indicates culture.

Penang Island is divided into 6 clusters with the biggest clusters being cluster 3 and 1. Their make ups from biggest to smallest:

- Cluster 3- Mix Asian/ Dessert places
- Cluster 1 - Malay/ Track and Field
- Cluster 2 - Chinese/ Seafood/ Nature
- Cluster 4,5,6 - etc

Seberang Perai is divided into 6 clusters with the biggest clusters being cluster 3 and 1. Their make ups from biggest to smallest:

- Cluster 3 - Mix Asian/ Dessert places
- Cluster 1 - Malay/ Outdoors
- Cluster 2,4,5,6 - etc

Similarities:

1. Both have mix cultural area with dessert and entertainment places
2. Both have the biggest cluster in diverse cultured neighborhoods

Dissimilarities:

1. Penang Island has a Chinese seafood majority cluster which is not seen in Seberang Perai

All of Penang

As a whole, Penang has 6 clusters with the biggest cluster in cluster 1 and 4. The general theme of the clusters from biggest to smallest are:

- Cluster 1 - Mix Asian
- Cluster 4 - Malay/ Outdoors
- Cluster 2,3,5,6 – etc

5. Conclusion

Based on the Penang clusters, a young couple in George Town, one of the 17 neighborhoods in Penang Island can move to 26 neighborhoods in Seberang Perai within the same cluster, specifically Bandar Perda and Jalan Betek in Central Seberang Perai which contains 2 of its top 3 venues.

Similarly, someone from Titi Teras, one of the 9 neighborhoods in Penang Island, will find it easier to blend into the surrounding of the 22 neighborhoods in Seberang Perai, specifically Kubang Semang, which has 3 of its top 4 venues.

Overall, the accuracy and suitability of Penang Island to Seberang Perai migration depends heavily on choices of food because Foursquare API mostly provides food related venues, especially in Asia region.

Source:

- <https://en.wikipedia.org/wiki/Penang>
- https://en.wikipedia.org/wiki/Seberang_Perai
- https://en.wikipedia.org/wiki/Penang_Island