



Neighbourhoods of Bali Island

Clustering with k-means

Why Bali?

Introduction & Problem



Problem?

segment and
cluster Bali
neighbourhoods
based on given
data about Bali
administrative area
and venues

1

The world's top
destination in Traveller's
Choice award

2

Accounted for 40% of
Indonesia tourism sector

3

You can simply impress
your audience and add a
unique zing.

***Focus on 2 top destinations:
Denpasar & Badung city**

Data

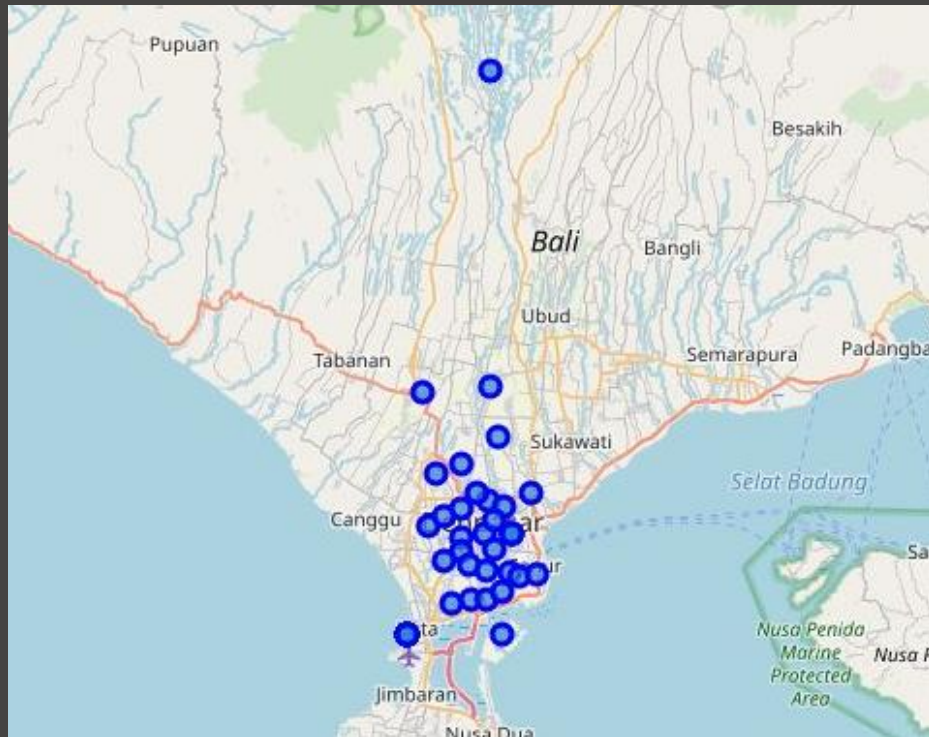
In order to do the prediction, several data required including:

- List of Bali's boroughs, neighbourhoods and cities from local government. (2 Cities, 10 Boroughs, 105 Neighbourhoods)
- Latitudes and longitudes of each neighbourhoods obtained from Google Geocoding API.
- Nearby venues for each neighbourhood will be obtained using Foursquare API. (887 Nearby venues)

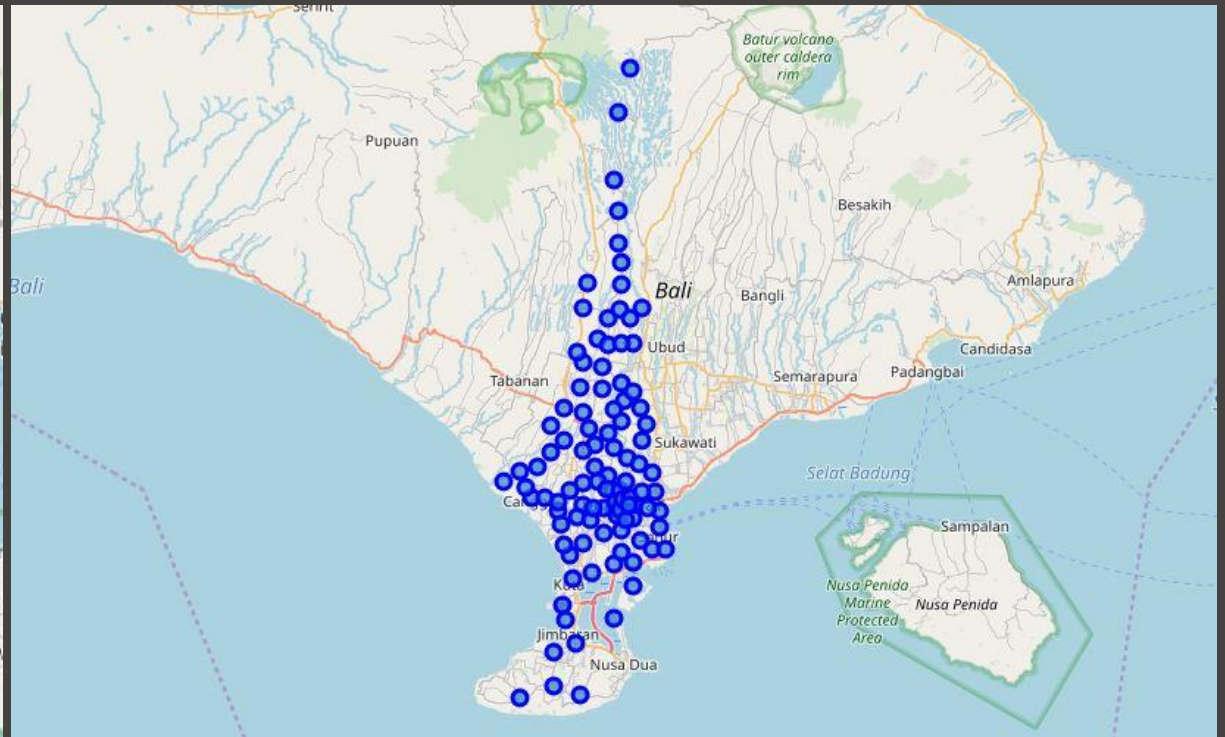
6 Neighbourhoods dropped because no nearby venues

Postal Code dropped

Initially, postal code are used as focal points but later found not spread evenly and switch focal points to neighbourhood.



Postal code distribution



Neighbourhood distribution

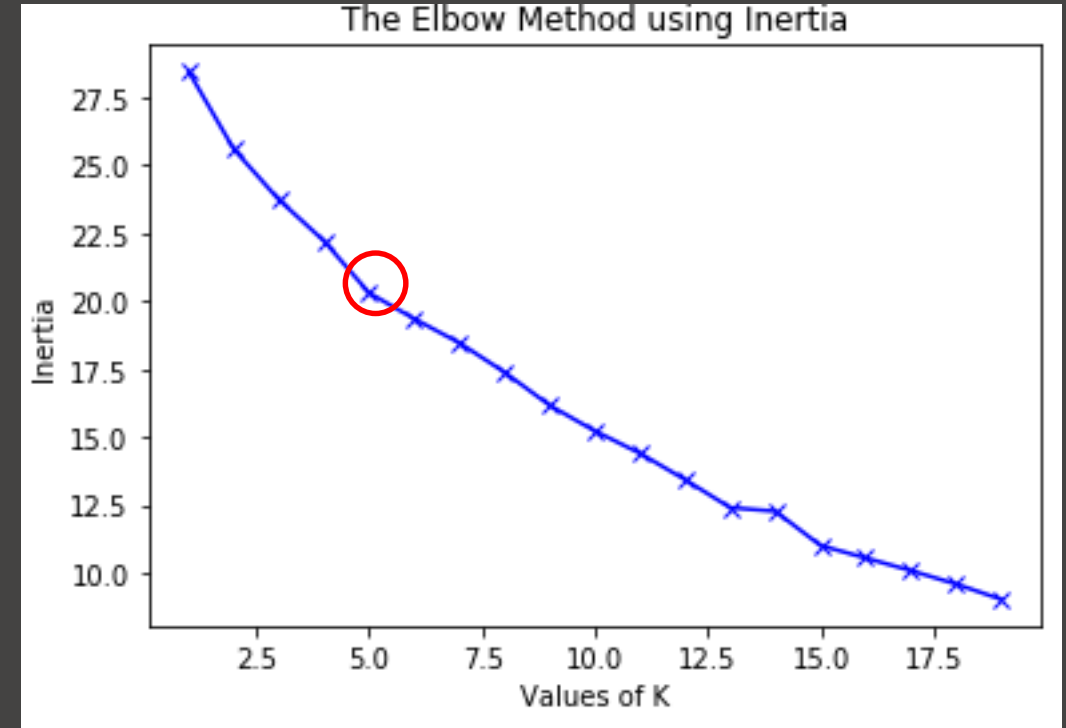
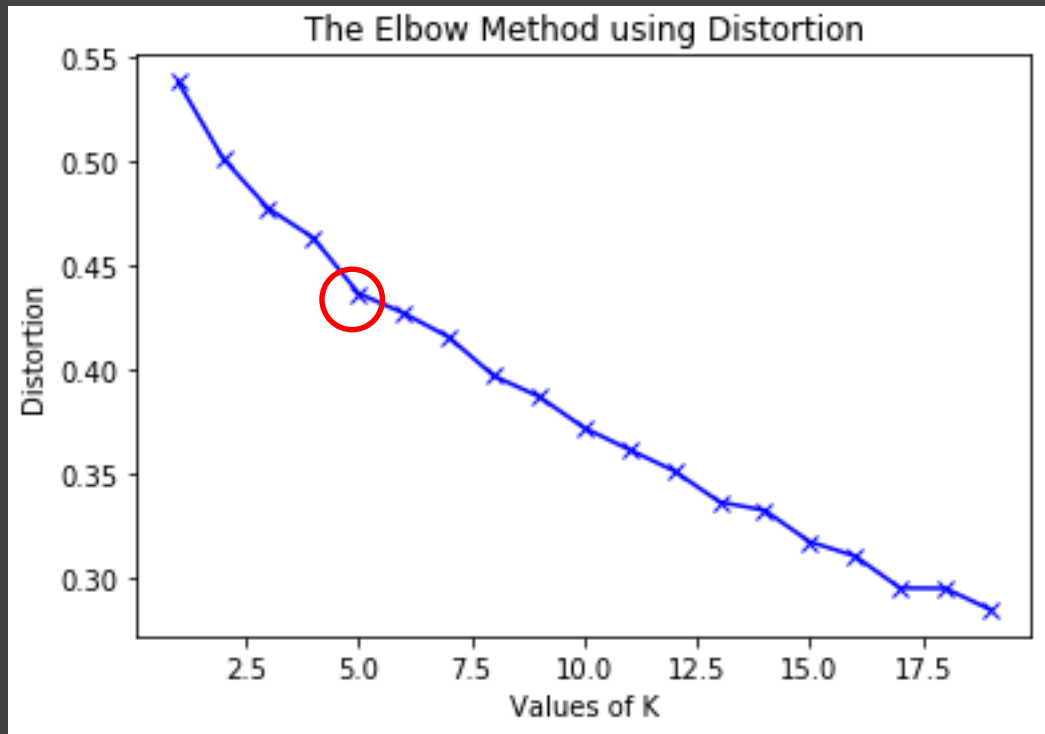
Geocoding neighbourhood

	Neighbourhood	Borough	City	Latitude	Longitude	Address
0	Dauh Puri Kaja	Denpasar Utara	Denpasar	-8.641273	115.214111	Dauh Puri Kaja, North Denpasar, Denpasar City,...
1	Dauh Puri Kangin	Denpasar Barat	Denpasar	-8.658289	115.214852	Dauh Puri Kangin, West Denpasar, Denpasar City...
2	Dauh Puri	Denpasar Barat	Denpasar	-8.663823	115.217075	Dauh Puri, West Denpasar, Denpasar City, Bali,...
3	Dauh Puri Kauh	Denpasar Barat	Denpasar	-8.679832	115.205219	Dauh Puri Kauh, West Denpasar, Denpasar City, ...
4	Dauh Puri Klod/Kelod	Denpasar Barat	Denpasar	-8.677422	115.221521	Dauh Puri Klod, West Denpasar, Denpasar City, ...

Methodology

- Using foursquare API to find nearby venues of each neighbourhood within radius 1km and limit 100
- Using the elbow method with inertia and distortion to decide number of clusters

The Elbow Method



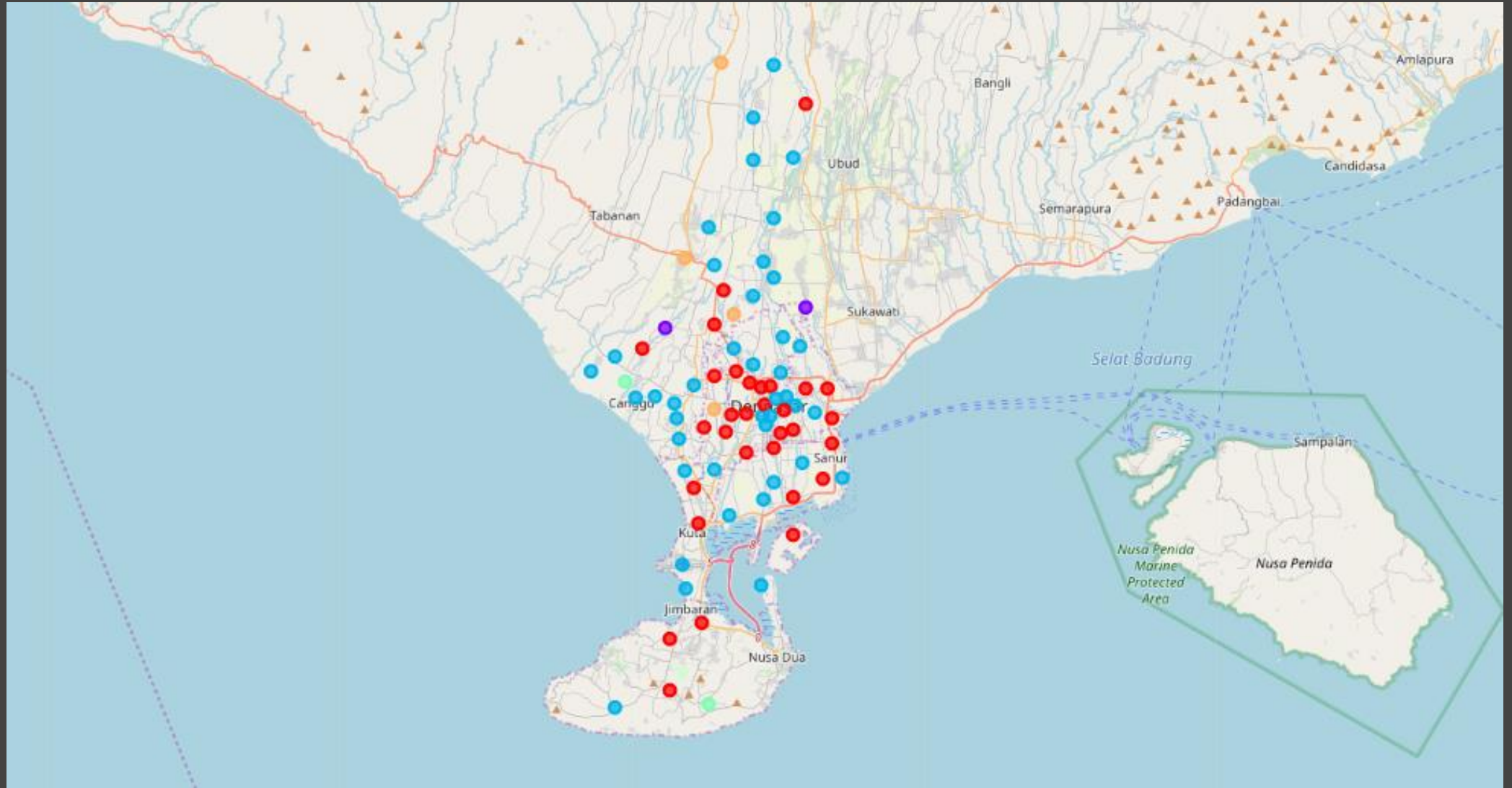
Both distortion nor inertia really showed optimum k.
K of 5 was chosen for showing refraction.

Clustering

Neighbourhoods clustered into 5 clusters.

	Neighbourhood	Borough	City	Latitude	Longitude	Address	Cluster Labels	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	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Dauh Puri Kaja	Denpasar Utara	Denpasar	-8.641273	115.214111	Dauh Puri Kaja, North Denpasar, Denpasar City,...	0.0	Soccer Field	Coffee Shop	Snack Place	Hotel	Fast Food Restaurant	Middle School	Electronics Store	Flea Market	Fish Market	Fish & Chips Shop
1	Dauh Puri Kangin	Denpasar Barat	Denpasar	-8.658289	115.214852	Dauh Puri Kangin, West Denpasar, Denpasar City,...	2.0	Jewelry Store	Asian Restaurant	Coffee Shop	Dessert Shop	Office	Chinese Restaurant	Monument / Landmark	Fast Food Restaurant	Flea Market	Food Truck
2	Dauh Puri	Denpasar Barat	Denpasar	-8.663823	115.217075	Dauh Puri, West Denpasar, Denpasar City, Bali,...	2.0	Kids Store	Spa	Accessories Store	Indonesian Restaurant	Food Truck	Juice Bar	Food & Drink Shop	Noodle House	Dessert Shop	Department Store
3	Dauh Puri Kauh	Denpasar Barat	Denpasar	-8.679832	115.205219	Dauh Puri Kauh, West Denpasar, Denpasar City, ...	0.0	Electronics Store	Indonesian Restaurant	Bakery	Restaurant	Asian Restaurant	Karaoke Bar	Bistro	Bed & Breakfast	Javanese Restaurant	Japanese Restaurant
4	Dauh Puri Klod/Kelod	Denpasar Barat	Denpasar	-8.677422	115.221521	Dauh Puri Klod, West Denpasar, Denpasar City, ...	0.0	Indonesian Restaurant	Snack Place	Paper / Office Supplies Store	Bookstore	Noodle House	Vegetarian / Vegan Restaurant	Print Shop	Diner	Asian Restaurant	University

Map of Clustering





Discussions

Tourist attraction

Denpasar only belong to Cluster 0 and 2 (Blue and red dots). So does, neighbourhoods in Badung with most tourist attractions.

Residential

The other clusters tend to spread over residential area with less tourist destinations.

Future research is also possible by improving venues data with other APIs sources and by adding other variables such as distance from tourist attraction for tourism purpose or hotel rooms price and rating for accommodation purpose.

Conclusions

Even though both Denpasar and Badung are close to each other, characteristics of both cities are different. Denpasar as the capital of Bali tends to be more organized and similar in all its neighbourhoods. Meanwhile, Badung is more diverse in form and characteristics of each neighbourhoods.



Diverse