

***Tourist  
Recommendation  
Based on K-means  
Clustering***

***In Bangkok, Thailand***



# ***Introduction***

- Bangkok is a big and abundant capital city of Thailand which it has food, entertainment, night-life and etc.
- This project points to solve problem for tourists who want to prepare their plan for visiting Bangkok
  - Providing district which suit with their travel styles.

# Data

- **Districts in Bangkok, Thailand**

- **Wikipedia:** [https://en.wikipedia.org/wiki/List\\_of\\_districts\\_of\\_Bangkok](https://en.wikipedia.org/wiki/List_of_districts_of_Bangkok)

- **Information of venues in each district**

- **Foursquare:** <https://developer.foursquare.com/>

	District	Post-code	Popu-lation	Latitude	Longitude
0	Bang Bon	10150	105161	13.659200	100.399100
1	Bang Kapi	10240	148465	13.765833	100.647778
2	Bang Khae	10160	191781	13.696111	100.409444
3	Bang Khen	10220	189539	13.873889	100.596389
4	Bang Kho Laem	10120	94956	13.693333	100.502500

	District	District Latitude	District Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Bang Bon	13.6592	100.3991	ชาหมูบางหว้า	13.657136	100.395230	Thai Restaurant
1	Bang Bon	13.6592	100.3991	Irashaimase Japanese Restaurant	13.658358	100.401403	Japanese Restaurant
2	Bang Bon	13.6592	100.3991	Lotus Express (โลตัส เอ็กซ์เพรส)	13.657839	100.397243	Convenience Store
3	Bang Bon	13.6592	100.3991	บ้านพลูหลวง	13.658532	100.398442	Thai Restaurant
4	Bang Bon	13.6592	100.3991	Lotus Express Bongbon	13.657630	100.397325	Grocery Store

# Methodology

- Data cleaning
    - Grouping synonym
    - Remove irrelevant category
- 
- Japanese Restaurant
  - Shabu-Shabu Restaurant
  - Ramen Restaurant
  - Sushi Restaurant
  - Udon Restaurant
  - Tonkatsu Restaurant
  - Donburi Restaurant
  - Japanese Curry Restaurant
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- Japanese Restaurant



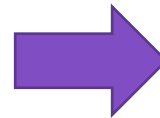
Building	2
Soccer Field	2
Neighborhood	2
Lounge	2
Tour Provider	2
Soccer Stadium	1
Recording Studio	1
Speakeasy	1
Roof Deck	1
Medical Center	1
Wings Joint	1
Veterinarian	1
Coworking Space	1
Rest Area	1

To reduce feature which can help to reduce hardware requirement and easier for analysis

# Methodology

- Constructing Feature Lists
  - One hot technique
  - Grouping districts and calculate mean for each venue

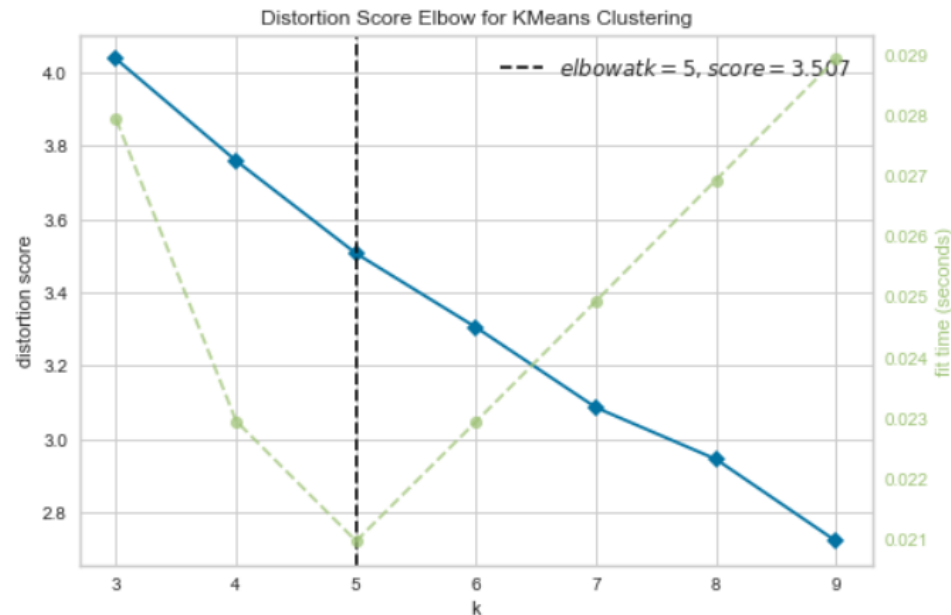
	District	Asian Restaurant	BBQ Joint	Bar	Chinese Restaurant	Coffee	Convenience Store	Dessert	Entertainment	Healthcare
0	Bang Bon	0	0	0	0	0	0	0	0	0
1	Bang Bon	0	0	0	0	0	0	0	0	0
2	Bang Bon	0	0	0	0	0	1	0	0	0
3	Bang Bon	0	0	0	0	0	0	0	0	0
4	Bang Bon	0	0	0	0	0	0	0	0	0



	District	Asian Restaurant	BBQ Joint	Bar	Chinese Restaurant	Coffee	Convenience Store	Dessert	Entertainment	Healthcare
0	Bang Bon	0.000000	0.000000	0.0	0.000000	0.000000	0.142857	0.142857	0.0	0.000000
1	Bang Kapi	0.000000	0.055556	0.0	0.000000	0.055556	0.111111	0.000000	0.0	0.055556
2	Bang Khae	0.100000	0.100000	0.0	0.000000	0.100000	0.200000	0.000000	0.0	0.000000
3	Bang Khen	0.230769	0.000000	0.0	0.000000	0.000000	0.153846	0.000000	0.0	0.000000
4	Bang Kho Laem	0.058824	0.000000	0.0	0.117647	0.117647	0.058824	0.000000	0.0	0.000000

# Methodology

- Clustering
  - Using K-means clustering
  - Elbow technique to find the optimum K



	District	Post-code	Popu-lation	Latitude	Longitude	Cluster Labels
0	Bang Bon	10150	105161	13.659200	100.399100	0
1	Bang Kapi	10240	148465	13.765833	100.647778	1
2	Bang Khae	10160	191781	13.696111	100.409444	0
3	Bang Khen	10220	189539	13.873889	100.596389	1
4	Bang Kho Laem	10120	94956	13.693333	100.502500	1

# Analysis

- Cluster 1
  - These districts suit for people who want to try western food in Thailand and these areas also have coffee cafes for chilling after your meal.

	District	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	Bang Bon	0	Thai Restaurant	Japanese Restaurant	Small Shop	Convenience Store	Noodle House
2	Bang Khae	0	Convenience Store	Western Restaurant	Noodle House	BBQ Joint	Coffee
5	Bang Khun Thian	0	Small Shop	Western Restaurant	Dessert	Japanese Restaurant	Sport place
14	Chom Thong	0	Western Restaurant	Thai Restaurant	Coffee	Hotpot Restaurant	BBQ Joint
19	Khan Na Yao	0	Japanese Restaurant	Western Restaurant	Dessert	Thai Restaurant	Coffee
23	Lak Si	0	Coffee	Western Restaurant	Thai Restaurant	Market	Japanese Restaurant
28	Nong Khaem	0	Western Restaurant	Thai Restaurant	Dessert	Market	Hotpot Restaurant
29	Pathum Wan	0	Convenience Store	Noodle House	Thai Restaurant	Dessert	Asian Restaurant
30	Phasi Charoen	0	Japanese Restaurant	Western Restaurant	Small Shop	Coffee	BBQ Joint
32	Phra Khanong	0	Western Restaurant	Convenience Store	Residence	Coffee	Dessert
34	Pom Prap Sattru Phai	0	Noodle House	Chinese Restaurant	Small Shop	Western Restaurant	Coffee
47	Wang Thonglang	0	Coffee	Western Restaurant	Asian Restaurant	Sport place	Small Shop
49	Yan Nawa	0	Western Restaurant	Thai Restaurant	Coffee	Hotpot Restaurant	Chinese Restaurant

# Analysis

- Cluster 2
  - These districts suit for people who want to taste street food and traditional Thai.

	District	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
1	Bang Kapi	1	Noodle House	Japanese Restaurant	Thai Restaurant	Convenience Store	Market
3	Bang Khen	1	Asian Restaurant	Park	Noodle House	Convenience Store	Thai Restaurant
4	Bang Kho Laem	1	Noodle House	Thai Restaurant	Chinese Restaurant	Coffee	Western Restaurant
6	Bang Na	1	Asian Restaurant	Coffee	Noodle House	Chinese Restaurant	Seafood Restaurant
8	Bang Rak	1	Noodle House	Residence	Thai Restaurant	Chinese Restaurant	Bar
10	Bangkok Noi	1	Noodle House	Coffee	Thai Restaurant	Western Restaurant	Park
11	Bangkok Yai	1	Noodle House	Asian Restaurant	Coffee	Dessert	Market
12	Bueng Kum	1	Asian Restaurant	Small Shop	Other Restaurant	Noodle House	Healthcare
17	Dusit	1	Noodle House	Asian Restaurant	Thai Restaurant	Coffee	Convenience Store
18	Huai Khwang	1	Noodle House	Residence	Asian Restaurant	Thai Restaurant	Other Restaurant
41	Sathon	1	Noodle House	Asian Restaurant	Dessert	Coffee	Thai Restaurant
42	Suan Luang	1	Noodle House	Asian Restaurant	Thai Restaurant	Coffee	Convenience Store
43	Taling Chan	1	Noodle House	Seafood Restaurant	Coffee	Convenience Store	Other Restaurant
45	Thon Buri	1	Noodle House	Other Restaurant	Healthcare	Seafood Restaurant	Western Restaurant



# Analysis

- Cluster 3
  - These districts suit for people who want to taste coffee and other kinds of beverages in Thailand, and this area also has Thai restaurants to welcome visitors.

	District	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
7	Bang Phlat	2	Convenience Store	Bar	Western Restaurant	Coffee	Residence
9	Bang Sue	2	Thai Restaurant	Noodle House	Coffee	Sport place	Seafood Restaurant
13	Chatuchak	2	Coffee	Thai Restaurant	Sport place	Bar	Residence
20	Khlong Sam Wa	2	Japanese Restaurant	Thai Restaurant	Bar	Chinese Restaurant	Coffee
21	Khlong San	2	Small Shop	Coffee	Dessert	Thai Restaurant	Chinese Restaurant
22	Khlong Toei	2	Bar	Tourist_attraction	Western Restaurant	Thai Restaurant	Hotpot Restaurant
24	Lat Krabang	2	Thai Restaurant	Western Restaurant	Other Restaurant	Coffee	Market
25	Lat Phrao	2	Thai Restaurant	Coffee	Noodle House	Small Shop	Western Restaurant
26	Min Buri	2	Coffee	Thai Restaurant	Small Shop	Western Restaurant	Hotpot Restaurant
27	Nong Chok	2	Small Shop	Market	Thai Restaurant	Park	Convenience Store
31	Phaya Thai	2	Coffee	Thai Restaurant	Japanese Restaurant	Bar	Western Restaurant
33	Phra Nakhon	2	Coffee	Residence	Tourist_attraction	Thai Restaurant	Bar
36	Rat Burana	2	Thai Restaurant	Asian Restaurant	Sport place	Other Restaurant	Noodle House
37	Ratchathewi	2	Coffee	Residence	Western Restaurant	Thai Restaurant	Other Restaurant
38	Sai Mai	2	Bar	Western Restaurant	Thai Restaurant	Small Shop	Other Restaurant
39	Samphanthawong	2	Tourist_attraction	Bar	Coffee	Chinese Restaurant	Residence
46	Thung Khru	2	Coffee	Convenience Store	Thai Restaurant	Sport place	Small Shop
48	Watthana	2	Coffee	Japanese Restaurant	Thai Restaurant	BBQ Joint	Small Shop

# Analysis

- Cluster 4
  - These areas are not recommended on visiting, however, this cluster has Healthcare-service (i.e, massage and spa), so this would be matched for travelers who want to try famous Thai massage in its origin

	District	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
16	Don Mueang	3	Other Restaurant	Convenience Store	Healthcare	Thai Restaurant	Residence
35	Prawet	3	Convenience Store	Other Restaurant	Noodle House	Western Restaurant	Hotpot Restaurant
44	Thawi Watthana	3	Convenience Store	Asian Restaurant	Other Restaurant	Healthcare	Thai Restaurant

# Analysis

- Cluster 5
  - These areas are not recommended for visiting.

	District	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
15	Din Daeng	4	Sport place	Convenience Store	Residence	Park	Western Restaurant
40	Saphan Sung	4	Japanese Restaurant	Thai Restaurant	Sport place	Convenience Store	Hotpot Restaurant

# ***Results***

- Cluster 1: Western restaurant
- Cluster 2: Street food and traditional Thai food
- Cluster 3: Beverage
- Cluster 4: Healthcare (Massage and spa)
- Cluster 5: -

# Discussion

- Clustering information based on restaurant categories?
  - imbalanced data
- Is it the nature of Bangkok city?
  - The city of food
  - Much less tourist attraction than restaurant?

	Venue Category
Coffee	135
Noodle House	126
Thai Restaurant	103
Western Restaurant	72
Convenience Store	70
Small Shop	61
Japanese Restaurant	59
Dessert	55
Asian Restaurant	49
Other Restaurant	45

# ***Conclusion***

- This project point to solve the problem of tourists who want to plan their visit to Bangkok, Thailand
  - Using results of cluster analysis (K-means where  $k = 5$ )
  - Assistance in making decisions on planning their vacation
- The result provides outstanding attributes of each cluster
  - Tourist can pick the cluster that suits for their traveling style.