Restaurants in Sierra Vista, Arizona

Opportunities and Obstacles

Question

- What is the best location for a new restaurant in Sierra Vista, Arizona?
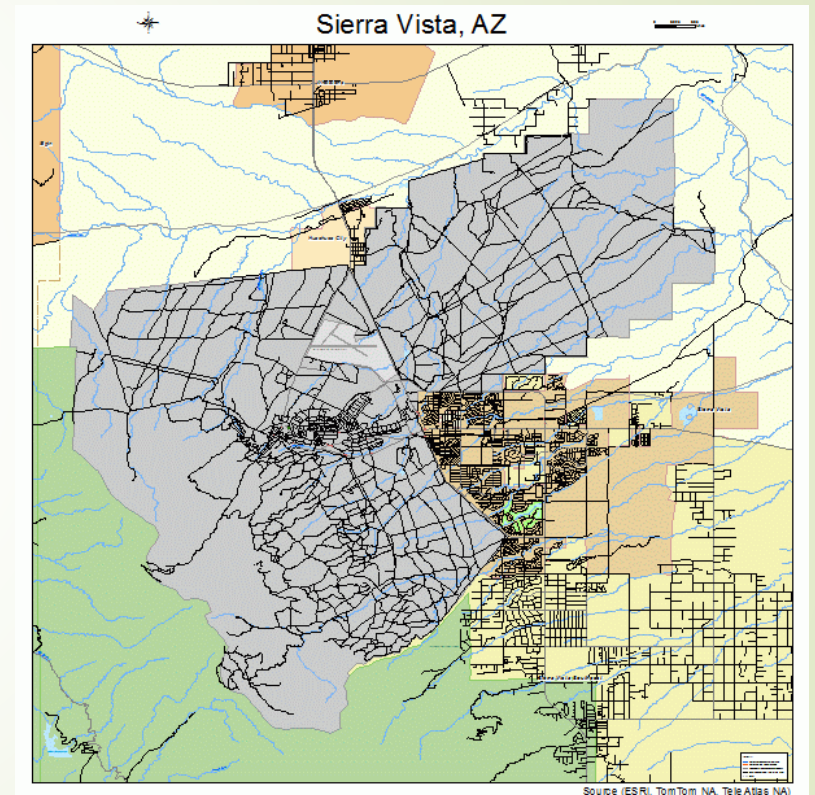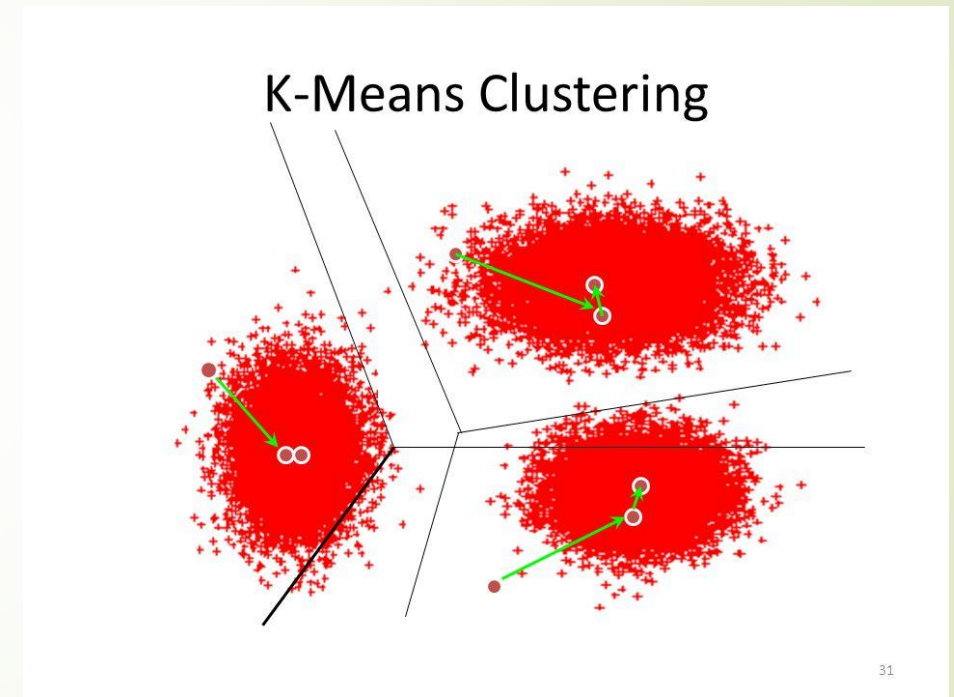
Sierra Vista

Population: 44,000

The map on the right shows the three main areas in Sierra Vista:
- Fort Hauchuca, 85635 (gray)
- Sierra Vista, Center, 85613 (tan)
- Sierra Vista, South, 85650 (yellow)

Sierra Vista, AZ

Source (ESRI, TomTom NA, Tele Atlas NA)

Methodology

- Use FourSquare to access information about existing restaurants, including the genre and geographical location (Latitude/Longitude)

- Cluster the restaurants using K-Means clustering to determine the distribution of restaurants across the three main geographical areas represented by the three postal codes covering Sierra Vista

- Determine which area has the least restaurants.

K-Means Clustering

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Restaurant Data

FourSquare API was utilized to access the restaurants in and around Sierra Vista. This resulted in the identification of 26 venues.

t[12]:

	venue.name	venue.categories	venue.location.lat	venue.location.lng
0	Culvers	Fast Food Restaurant	31.549338	-110.257940
1	Tanuki Sushi Bar Garden	Sushi Restaurant	31.555063	-110.285828
2	SONIC Drive In	Fast Food Restaurant	31.554105	-110.260642
3	Hana Tokyo Hibachi Sushi Bar	Sushi Restaurant	31.538875	-110.256726
4	Fresh	Salad Place	31.528866	-110.259976
5	SUBWAY	Sandwich Place	31.559322	-110.256768
6	Native Grill Wings	Wings Joint	31.558144	-110.257872
7	Mod Pizza	Pizza Place	31.555179	-110.254598
8	Vinnys New York Pizza	Wings Joint	31.534207	-110.256246
9	Arbys	Fast Food Restaurant	31.555063	-110.278035
10	Texas Roadhouse	Steakhouse	31.530422	-110.257834
11	Schlotzskys	Restaurant	31.554106	-110.258634
12	Hibachi Grill Super Buffet	Asian Restaurant	31.559619	-110.255784
13	Carls Jr	Fast Food Restaurant	31.554247	-110.277125
14	Bunbuku Restaurant	Korean Restaurant	31.554824	-110.302070
15	Papa Murphys	Pizza Place	31.555611	-110.274812
16	Fresh	American Restaurant	31.561230	-110.254655
17	Landmark Cafe	American Restaurant	31.553918	-110.304333
18	Sunnas Korean Restaurant	Korean Restaurant	31.554116	-110.301985
19	The German Cafe	German Restaurant	31.536245	-110.254367
20	Chipotle Mexican Grill	Mexican Restaurant	31.559865	-110.257939
21	Pizzeria Mimosa	Pizza Place	31.436553	-110.247714
22	Charleys Grilled Subs	Sandwich Place	31.565683	-110.337331
23	Ricardos Mexican Restaurant	Mexican Restaurant	31.438601	-110.249261
24	Taco Bell	Fast Food Restaurant	31.565752	-110.337357
25	Jeannies Diner	Diner	31.557635	-110.353442

Clustering

The following Python code was used to perform a K-Means clustering analysis to separate the 26 restaurants into 3 clusters. The geographical center of each of the 3 postal codes in Sierra Vista was used as the initial location of the center of each cluster:
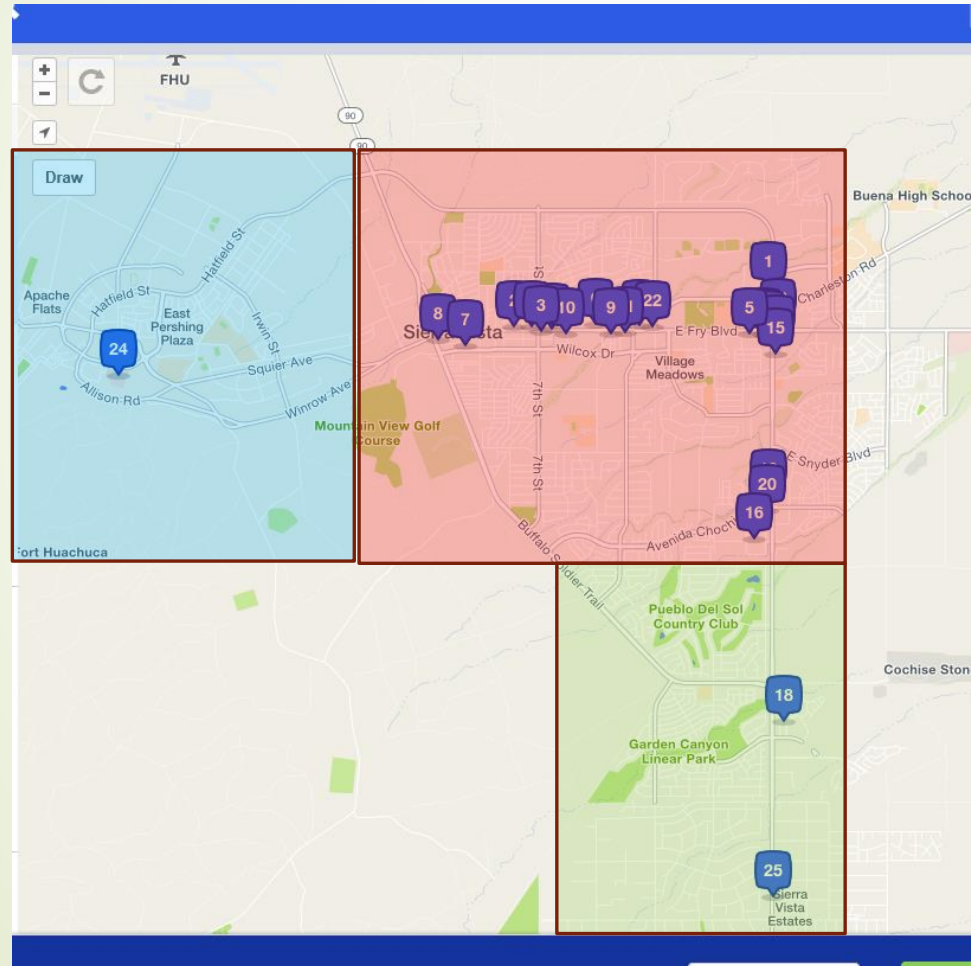
```
# cluster restaurants by postal code

my_centers = np.ndarray(shape=(3,2),dtype=float,buffer=llarray)

kmeans = sklearn.cluster.KMeans(n_clusters=3, init=my_centers, n_init=1,
max_iter=300, tol=0.0001)

points = venues.filter(['venue.location.lat','venue.location.lng'])

venues['venue.cluster'] = kmeans.fit_predict(points)
```

Resulting clusters

The K-Means clustering resulted in the formation of three clusters. Each of the restaurants was assigned to one of these clusters (0 through 2) based upon proximity. The results of this assignment is shown in the table on the right.

	venue.name	venue.categories	venue.location.lat	venue.location.lng	venue.cluster
0	Culvers	Fast Food Restaurant	31.549338	-110.257940	1
1	Tanuki Sushi Bar Garden	Sushi Restaurant	31.555063	-110.285828	1
2	SONIC Drive In	Fast Food Restaurant	31.554105	-110.260642	1
3	Hana Tokyo Hibachi Sushi Bar	Sushi Restaurant	31.538875	-110.256726	1
4	Fresh	Salad Place	31.528866	-110.259976	1
5	SUBWAY	Sandwich Place	31.559322	-110.256768	1
6	Native Grill Wings	Wings Joint	31.558144	-110.257872	1
7	Mod Pizza	Pizza Place	31.555179	-110.254598	1
8	Vinnys New York Pizza	Wings Joint	31.534207	-110.256246	1
9	Arbys	Fast Food Restaurant	31.555063	-110.278035	1
10	Texas Roadhouse	Steakhouse	31.530422	-110.257834	1
11	Schlotzskys	Restaurant	31.554106	-110.258634	1
12	Hibachi Grill Super Buffet	Asian Restaurant	31.559619	-110.255784	1
13	Carls Jr	Fast Food Restaurant	31.554247	-110.277125	1
14	Bunbuku Restaurant	Korean Restaurant	31.554824	-110.302070	1
15	Papa Murphys	Pizza Place	31.555611	-110.274812	1
16	Fresh	American Restaurant	31.561230	-110.254655	1
17	Landmark Cafe	American Restaurant	31.553918	-110.304333	1
18	Sunnas Korean Restaurant	Korean Restaurant	31.554116	-110.301985	1
19	The German Cafe	German Restaurant	31.536245	-110.254367	1
20	Chipotle Mexican Grill	Mexican Restaurant	31.559865	-110.257939	1
21	Pizzeria Mimosa	Pizza Place	31.436553	-110.247714	2
22	Charleys Grilled Subs	Sandwich Place	31.565683	-110.337331	0
23	Ricardos Mexican Restaurant	Mexican Restaurant	31.438601	-110.249261	2
24	Taco Bell	Fast Food Restaurant	31.565752	-110.337357	0
25	Jeannies Diner	Diner	31.557635	-110.353442	0

Cluster Map

Restaurants were grouped into 3 clusters, with the bulk (21 of 26) being assigned to cluster 1, corresponding to postal code 85613.

Conclusions

- Postal code 85613 contains 21 of 26 restaurants in Sierra Vista,

- Population is fairly evenly distributed across the 3 postal codes

- Postal code 85635 is a federal military post, so opportunities there are somewhat limited

- Postal code 85650 is under-represented with restaurants (2 of the 26 restaurants are in cluster 2)

- Population is growing primarily in the 85650 postal code area

- 85650 postal code is the optimal area for a new restaurant