RECOMMENDING LOCATIONS FOR A NEW RESTAURANT USING SPATIAL ANALYTICS
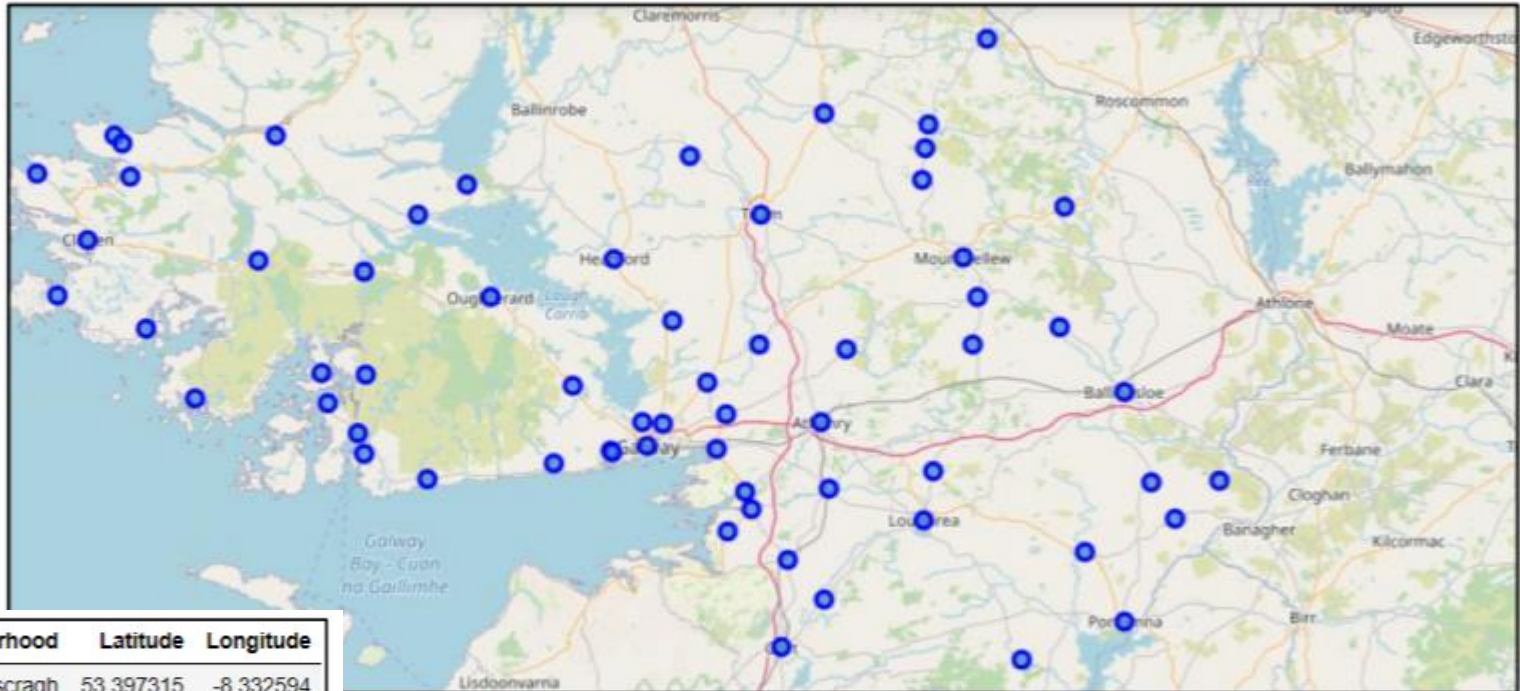
EXPLORING NEIGHBORHOODS IN CO. GALWAY USING GEOPY

	Neighborhood	Latitude	Longitude
0	Ahascragh	53.397315	-8.332594
1	Ardrahan	53.156750	-8.805991
2	Athenry	53.299190	-8.746830
3	Ballinasloe	53.330272	-8.221376
4	Ballinderreen	53.186252	-8.908921
...	...	...	...
62	Tully	53.595796	-9.975448
63	Tully Cross	53.588201	-9.962930
64	Tuam	53.514792	-8.851287
65	Turloughmore	53.380699	-8.856270
66	Woodford	53.052181	-8.399454

EXPLORING VENUES IN CO. GALWAY USING FOURSQUARE API

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Ahascragh	53.397315	-8.332594	Cahill's	53.397293	-8.335465	Irish Pub
1	Ardrahan	53.156750	-8.805991	Ardrahan Bus Stop	53.156631	-8.806193	Bus Stop
2	Ardrahan	53.156750	-8.805991	Joyces	53.157442	-8.806357	Gastropub
3	Ardrahan	53.156750	-8.805991	Tarpeys	53.160487	-8.806054	Bar
4	Athenry	53.299190	-8.746830	Athenry Castle	53.299940	-8.745710	Castle

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Ahascragh	1	1	1	1	1	1
1	Ardrahan	3	3	3	3	3	3
2	Athenry	4	4	4	4	4	4
3	Ballinasloe	5	5	5	5	5	5
4	Ballinderreen	2	2	2	2	2	2
5	Ballyconneely	2	2	2	2	2	2
6	Ballygar	3	3	3	3	3	3
7	Barna	4	4	4	4	4	4
8	Carna	2	2	2	2	2	2
9	Casla	3	3	3	3	3	3
10	Castlegar	1	1	1	1	1	1

Business Requirements

- The neighbourhood should be a busy area with plenty of foot traffic.
- The region should have enough bars and pubs nearby
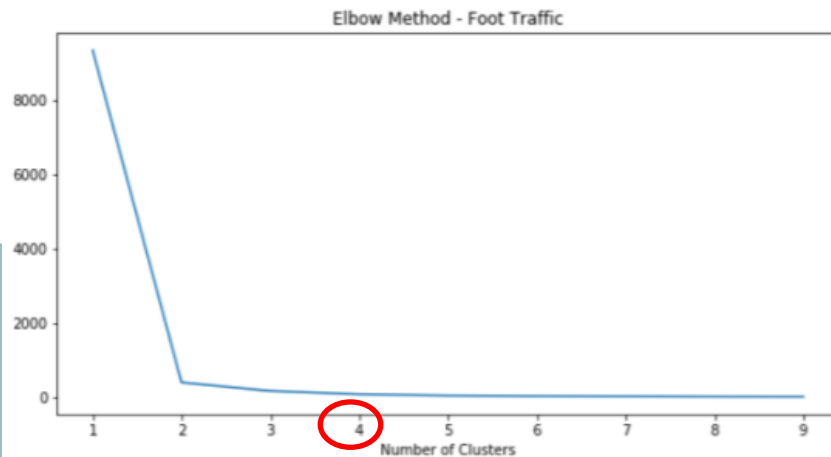- Should have relatively less number of restaurants opened in the same spot

Assumptions:

- Venue Category (**Figure 11**) is directly proportional to Foot traffic
- **Positive Venues Categories**: Bars and Pubs (desired venues)
- **Negative Venues Categories**: Restaurant, Fast Food Restaurant, Seafood Restaurant, Vegan Restaurant, Middle Eastern Restaurant, Chinese Restaurant, Mexican Restaurant, Indian Restaurant, Asian Restaurant, French Restaurant, Japanese Restaurant and Italian Restaurant (the location should not have many restaurants)

K-MEANS CLUSTERING – FOOT TRAFFIC

A neighborhood is assumed to have higher foot traffic if there are a higher number of venues located in that area. Therefore, we cluster neighborhoods based on the count of places under each city.

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Ahascragh	1	1	1	1	1	1
1	Ardrahan	3	3	3	3	3	3
2	Athenry	4	4	4	4	4	4
3	Ballinasloe	5	5	5	5	5	5
4	Ballinderreen	2	2	2	2	2	2
5	Ballyconneely	2	2	2	2	2	2

Elbow Method - Foot Traffic

CONTD..

Venue Traffic Cluster	count	mean	std	min	25%	50%	75%	max
0	17.0	1.882353	0.781213	1.0	1.00	2.0	2.00	3.0
1	22.0	5.227273	1.377777	4.0	4.00	5.0	6.00	9.0
2	2.0	14.500000	3.535534	12.0	13.25	14.5	15.75	17.0
3	1.0	100.000000	NaN	100.0	100.00	100.0	100.00	100.0

Cluster 3 is the most desirable as neighborhoods under this cluster has an average of 100 venues (mean=100), whereas, Cluster 1 is the least desirable cluster with locations having almost two venues

	Neighborhood	Latitude	Longitude	Venue Traffic Cluster
0	Ahascragh	53.397315	-8.332594	0
1	Ardrahan	53.156750	-8.805991	0
2	Athenry	53.299190	-8.746830	1
3	Ballinasloe	53.330272	-8.221376	1
4	Ballinderreen	53.186252	-8.908921	0
5	Ballyconneely	53.431491	-10.074751	0
6	Ballygar	53.522323	-8.326138	0
7	Barna	53.270434	-9.112482	1
8	Carna	53.324842	-9.835653	0
9	Casla	53.288519	-9.552989	0

COUNT OF POSITIVE AND NEGATIVE VENUES

```
array(['Irish Pub', 'Bus Stop', 'Gastropub', 'Bar', 'Castle', 'Café',
        'Train Station', 'Restaurant', 'Hotel', 'Fast Food Restaurant',
        'Pub', 'Auto Workshop', 'Beach', 'Pharmacy', 'Grocery Store',
        'Gym', 'Home Service', 'Business Service', 'Food Service',
        'Waste Facility', 'Convenience Store',
        'Financial or Legal Service', 'Shopping Mall',
        'Gym / Fitness Center', 'Tea Room', 'Steakhouse',
        'Construction & Landscaping', 'Boat or Ferry', 'Bakery',
        'Supermarket', 'Breakfast Spot', 'Harbor / Marina',
        'Bed & Breakfast', 'Trail', 'History Museum', 'Rest Area',
        'RV Park', 'Other Great Outdoors', 'Ice Cream Shop', 'Pizza Place',
        'Department Store', 'Plaza', 'Clothing Store', 'Food & Drink Shop',
        'Asian Restaurant', 'French Restaurant', 'Japanese Restaurant',
        'Bistro', 'Hostel', 'Coffee Shop', 'Italian Restaurant',
        'Bookstore', 'Sculpture Garden', 'Pie Shop', 'Spanish Restaurant',
        'Flea Market', 'Cheese Shop', 'Theater', 'Outdoor Sculpture',
        'Mexican Restaurant', 'Indian Restaurant',
        'Middle Eastern Restaurant', 'Chinese Restaurant', 'Nightclub',
        'Molecular Gastronomy Restaurant', 'Hotel B
        'Vegetarian / Vegan Restaurant', 'Pet Store
        'Souvenir Shop', 'National Park', 'Gift Sho
        'Tourist Information Center', 'Playground',
        'Health & Beauty Service', 'Jewelry Store',
        'Farmers Market', 'Sandwich Place', 'Gas St
```

	Neighborhood	Latitude	Longitude	Negative Venues	Positive Venues
0	Ahascragh	53.397315	-8.332594	0	0
1	Ardrahan	53.156750	-8.805991	0	1
2	Athenry	53.299190	-8.746830	0	1
3	Ballinasloe	53.330272	-8.221376	2	0
4	Ballinderreen	53.186252	-8.908921	0	0
5	Ballyconneely	53.431491	-10.074751	0	1
6	Ballygar	53.522323	-8.326138	1	0
7	Barna	53.270434	-9.112482	0	0
8	Carna	53.324842	-9.835653	0	0
9	Casla	53.288519	-9.552989	0	0
10	Castlegar	53.298620	-9.022817	0	0

K-MEANS CLUSTERING – NEGATIVE VENUES

Negative Venues Cluster	count	mean	std	min	25%	50%	75%	max
0	1.0	22.000000	NaN	22.0	22.0	22.0	22.0	22.0
1	7.0	2.428571	0.534522	2.0	2.0	2.0	3.0	3.0
2	5.0	1.000000	0.000000	1.0	1.0	1.0	1.0	1.0
3	29.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.0

Cluster 3 is most desirable as it comprises of locations that have no restaurants (mean=0), whereas, Cluster 1 is not profitable as it includes sites that have nearly 22 restaurants on an average

	Neighborhood	Latitude	Longitude	Venue Traffic Cluster	Negative Venues Cluster
0	Ahascragh	53.397315	-8.332594	0	3
1	Ardrahan	53.156750	-8.805991	0	3
2	Athenry	53.299190	-8.746830	1	3
3	Ballinasloe	53.330272	-8.221376	1	3
4	Ballinderreen	53.186252	-8.908921	0	3
5	Ballyconneely	53.431491	-10.074751	0	3
6	Ballygar	53.522323	-8.326138	0	3
7	Barna	53.270434	-9.112482	1	3
8	Carna	53.324842	-9.835653	0	3
9	Casla	53.288519	-9.552989	0	3

K-MEANS CLUSTERING - FAVORABLE VENUES

	count	mean	std	min	25%	50%	75%	max
Positive Venues Cluster								
0	31.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	7.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0
2	2.0	2.0	0.0	2.0	2.0	2.0	2.0	2.0
3	2.0	3.0	0.0	3.0	3.0	3.0	3.0	3.0

Cluster 3 is most desirable as it comprises of locations that have the maximum number of favorable venues like pubs and bars, whereas, Cluster 0 has locations with no promising sites (mean=0)

	Neighborhood	Latitude	Longitude	Venue Traffic Cluster	Negative Venues Cluster	Positive Venues Cluster
0	Ahascragh	53.397315	-8.332594	0	3	0
1	Ardrahan	53.156750	-8.805991	0	3	0
2	Athenry	53.299190	-8.746830	1	3	0
3	Ballinasloe	53.330272	-8.221376	1	3	0
4	Ballinderreen	53.186252	-8.908921	0	3	0
5	Ballyconneely	53.431491	-10.074751	0	3	0
6	Ballygar	53.522323	-8.326138	0	3	0
7	Barna	53.270434	-9.112482	1	3	0
8	Carna	53.324842	-9.835653	0	3	0
9	Casla	53.288519	-9.552989	0	3	0
10	Castlegar	53.298620	-9.022817	0	3	0

OVERALL SCORING

Overall Score	Venue Traffic Cluster	Positive Venues Cluster	Negative Venues Cluster
2	0.500000	0.500000	1.000000
3	0.176471	0.176471	2.647059
4	1.062500	0.250000	2.687500
5	1.000000	1.666667	2.333333
6	2.000000	1.500000	2.500000

(Overall score for record highlighted in Orange 1+3+0 = 4)

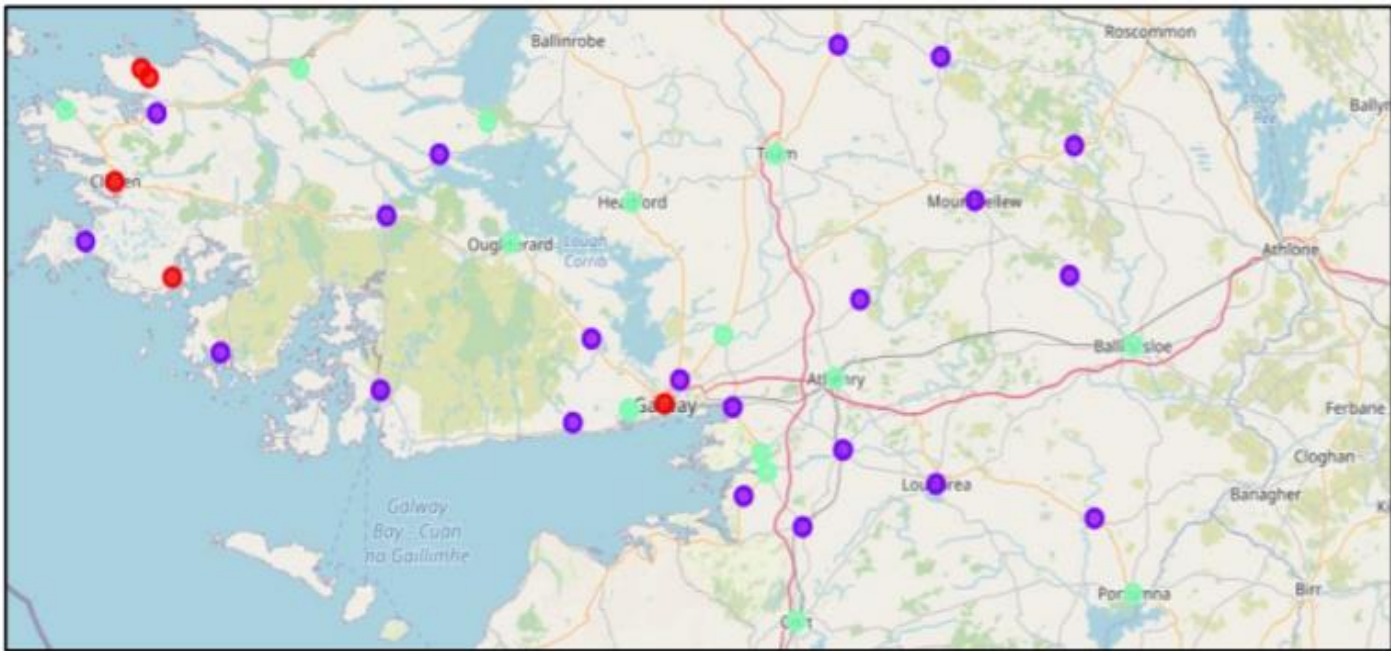|	Neighborhood	Latitude	Longitude	Venue Traffic Cluster	Negative Venues Cluster	Positive Venues Cluster	Overall Score
0	Ahascragh	53.397315	-8.332594	0	3	0	3
1	Ardrahan	53.156750	-8.805991	0	3	0	3
2	Athenry	53.299190	-8.746830	1	3	0	4
3	Ballinasloe	53.330272	-8.221376	1	3	0	4
4	Ballinderreen	53.186252	-8.908921	0	3	0	3
5	Ballyconneely	53.431491	-10.074751	0	3	0	3
6	Ballygar	53.522323	-8.326138	0	3	0	3
7	Barna	53.270434	-9.112482	1	3	0	4
8	Carna	53.324842	-9.835653	0	3	0	3
9	Casla	53.288519	-9.552989	0	3	0	3

SEGMENTATION

```
cluster_data['Segment'] = 'Low-Value'
cluster_data.loc[cluster_data['Overall Score']>3,'Segment'] = 'Mid-Value'
cluster_data.loc[cluster_data['Overall Score']>4,'Segment'] = 'High-Value'
cluster_data
```

	Neighborhood	Latitude	Longitude	Venue Traffic Cluster	Negative Venues Cluster	Positive Venues Cluster	Overall Score	Segment
0	Ahascragh	53.397315	-8.332594	0	3	0	3	Low-Value
1	Ardrahan	53.156750	-8.805991	0	3	0	3	Low-Value
2	Athenry	53.299190	-8.746830	1	3	0	4	Mid-Value
3	Ballinasloe	53.330272	-8.221376	1	3	0	4	Mid-Value
4	Ballinderreen	53.186252	-8.908921	0	3	0	3	Low-Value
5	Ballyconneely	53.431491	-10.074751	0	3	0	3	Low-Value
6	Ballygar	53.522323	-8.326138	0	3	0	3	Low-Value
7	Barna	53.270434	-9.112482	1	3	0	4	Mid-Value
8	Carna	53.324842	-9.835653	0	3	0	3	Low-Value
9	Casla	53.288519	-9.552989	0	3	0	3	Low-Value
10	Castlegar	53.298620	-9.022817	0	3	0	3	Low-Value
11	Claregalway	53.340482	-8.946239	1	3	0	4	Mid-Value
12	Clarinbridge	53.228065	-8.880166	1	3	0	4	Mid-Value
13	Cleggan	53.556459	-10.110690	1	3	0	4	Mid-Value
14	Clifden	53.488492	-10.021067	2	3	0	5	High-Value
15	Clonbur	53.544594	-9.363610	1	3	0	4	Mid-Value

OUTPUT

Cluster Output (**Red**: High-value, **Green**: Mid-value, **Purple**: Low-value)

POTENTIAL NEIGHBORHOODS FOR STARTING RESTAURANTS

The Potential Neighborhoods for setting up a Restaurant are:

1. Clifden
2. Galway City
3. Roundstone
4. Tully
5. Tully Cross

	Neighborhood	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
14	Clifden	Bar	Pub	Restaurant	Café	Breakfast Spot	Fast Food Restaurant	Bakery	Harbor / Marina	Bed & Breakfast	Supermarket
21	Galway	Pub	Coffee Shop	Hotel	Café	Restaurant	Hostel	Italian Restaurant	Pizza Place	Bakery	Bookstore
38	Roundstone	Pub	Seafood Restaurant	Waste Facility	Construction & Landscaping	Department Store	Diner	Farmers Market	Fast Food Restaurant	Financial or Legal Service	Flea Market
40	Tully	Farmers Market	Grocery Store	Waste Facility	French Restaurant	Diner	Fast Food Restaurant	Financial or Legal Service	Flea Market	Food & Drink Shop	Food Service
41	Tully Cross	Hotel	Pub	Bar	Bed & Breakfast	Gas Station	Farmers Market	Fast Food Restaurant	Financial or Legal Service	Flea Market	Food & Drink Shop

THANK YOU