# Capstone Project - The Battle of Neighbourhoods

## Introduction

Kolkata is on of the metro cities of India. Once it was the capital of India. The city has a population of 1.49 crores.

The language of Kolkata and the one that is most widely spoken is Bangla. However, English and hindi are also spoken as a formal language within businesses and government agencies.

With it’s diverse culture , comes diverse food items. There are many restaurants in Kolkata, each belonging to different categories like Chinese, Italian, North Indian, South Indian etc. So as a part of this project, we will list and visualise all major parts of Kolkata.

## Questions that can be asked using the above mentioned datasets

1) What is best location in Kolkata for Chinese Cuisine?

2) Which areas have large number of Chinese Resturant Market?

3) Which all areas have less number of resturant?

4) Which is the best place to stay if I prefer Chinese Cuisine?

5) What places are have best restaurant in Kolkata?

## Data

Kolkata restaurant data from Kaggle Zomato dataset Nearby locality information of locations obtained using Foursquare API

In [3]:
```
import pandas as pd
import numpy as np
import requests
from pandas.io.json import json_normalize
import matplotlib.cm as cm
import matplotlib.colors as colors
from sklearn.cluster import KMeans
import folium
import geocoder
```

In [4]:
```
df = pd.read_csv('https://raw.githubusercontent.com/haanjiankur/Capstone-Project---The-Battle-of-Neighborhoods/m
df.head()
```

Out[4]:

| | Restaurant ID | Restaurant Name | Country Code | City | Address | Locality | Locality Verbose | Longitude | Latitude | Cuisines | ... | Currency |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 6317637 | Le Petit Souffle | 162 | Makati City | Third Floor, Century City Mall, Kalayaan Avenu... | Century City Mall, Poblacion, Makati City | Century City Mall, Poblacion, Makati City, Mak... | 121.027535 | 14.565443 | French, Japanese, Desserts | ... | Botswana Pula(P) |
| **1** | 6304287 | Izakaya Kikufuji | 162 | Makati City | Little Tokyo, 2277 Chino Roces Avenue, Legaspi... | Little Tokyo, Legaspi Village, Makati City | Little Tokyo, Legaspi Village, Makati City, Ma... | 121.014101 | 14.553708 | Japanese | ... | Botswana Pula(P) |
| **2** | 6300002 | Heat - Edsa Shangri-La | 162 | Mandaluyong City | Edsa Shangri-La, 1 Garden Way, Ortigas, Mandal... | Edsa Shangri-La, Ortigas, Mandaluyong City | Edsa Shangri-La, Ortigas, Mandaluyong City, Ma... | 121.056831 | 14.581404 | Seafood, Asian, Filipino, Indian | ... | Botswana Pula(P) |
| **3** | 6318506 | Ooma | 162 | Mandaluyong City | Third Floor, Mega Fashion Hall, SM Megamall, O... | SM Megamall, Ortigas, Mandaluyong City | SM Megamall, Ortigas, Mandaluyong City, Mandal... | 121.056475 | 14.585318 | Japanese, Sushi | ... | Botswana Pula(P) |
| **4** | 6314302 | Sambo Kojin | 162 | Mandaluyong City | Third Floor, Mega Atrium, SM Megamall, Ortigas... | SM Megamall, Ortigas, Mandaluyong City | SM Megamall, Ortigas, Mandaluyong City, Mandal... | 121.057508 | 14.584450 | Japanese, Korean | ... | Botswana Pula(P) |

5 rows × 21 columns

In [6]:
```
india = df[df['Country Code'] == 1]
kolkata = india[india['City'] == 'Kolkata']
kolkata.reset_index(drop=True, inplace=True)
kolkata.head()
```

Out[6]:

| | Restaurant ID | Restaurant Name | Country Code | City | Address | Locality | Locality Verbose | Longitude | Latitude | Cuisines | ... | Currency | T boo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 18217475 | Asia Kitchen by Mainland China | 1 | Kolkata | 4th Floor, Acropolis Mall, 1858/1, Rajdanga Ma... | Acropolis Mall, Kasba | Acropolis Mall, Kasba , Kolkata | 88.393294 | 22.514688 | Asian, Chinese | ... | Indian Rupees(Rs.) | |
| **1** | 18249144 | Hoppipola | 1 | Kolkata | 4th Floor, Acropolis Mall, 1858/1, Rajdanga Ma... | Acropolis Mall, Kasba | Acropolis Mall, Kasba , Kolkata | 88.393310 | 22.514585 | Italian, Mexican, American, Mediterranean | ... | Indian Rupees(Rs.) | |
| **2** | 18017612 | Spice Kraft | 1 | Kolkata | 54/1/2A, Hazra Road, Ballygunge Phari, Near Ha... | Ballygunge | Ballygunge, Kolkata | 88.364453 | 22.526461 | Continental, Middle Eastern, Asian | ... | Indian Rupees(Rs.) | |
| **3** | 18377112 | Nawwarah | 1 | Kolkata | 48A, Syed Amir Ali Avenue, Ballygunge, Kolkata | Ballygunge | Ballygunge, Kolkata | 88.364878 | 22.538731 | Chinese, Cafe, North Indian, Desserts | ... | Indian Rupees(Rs.) | |
| **4** | 20002 | 6 Ballygunge Place | 1 | Kolkata | 6, Ballygunge Place, Ballygunge, Kolkata | Ballygunge | Ballygunge, Kolkata | 88.368628 | 22.527893 | Bengali | ... | Indian Rupees(Rs.) | |

5 rows × 21 columns

In [8]:
```
Res = kolkata[kolkata.Longitude !=0.000000][['Restaurant Name','Locality','Longitude','Latitude','Cuisines','Agg
```

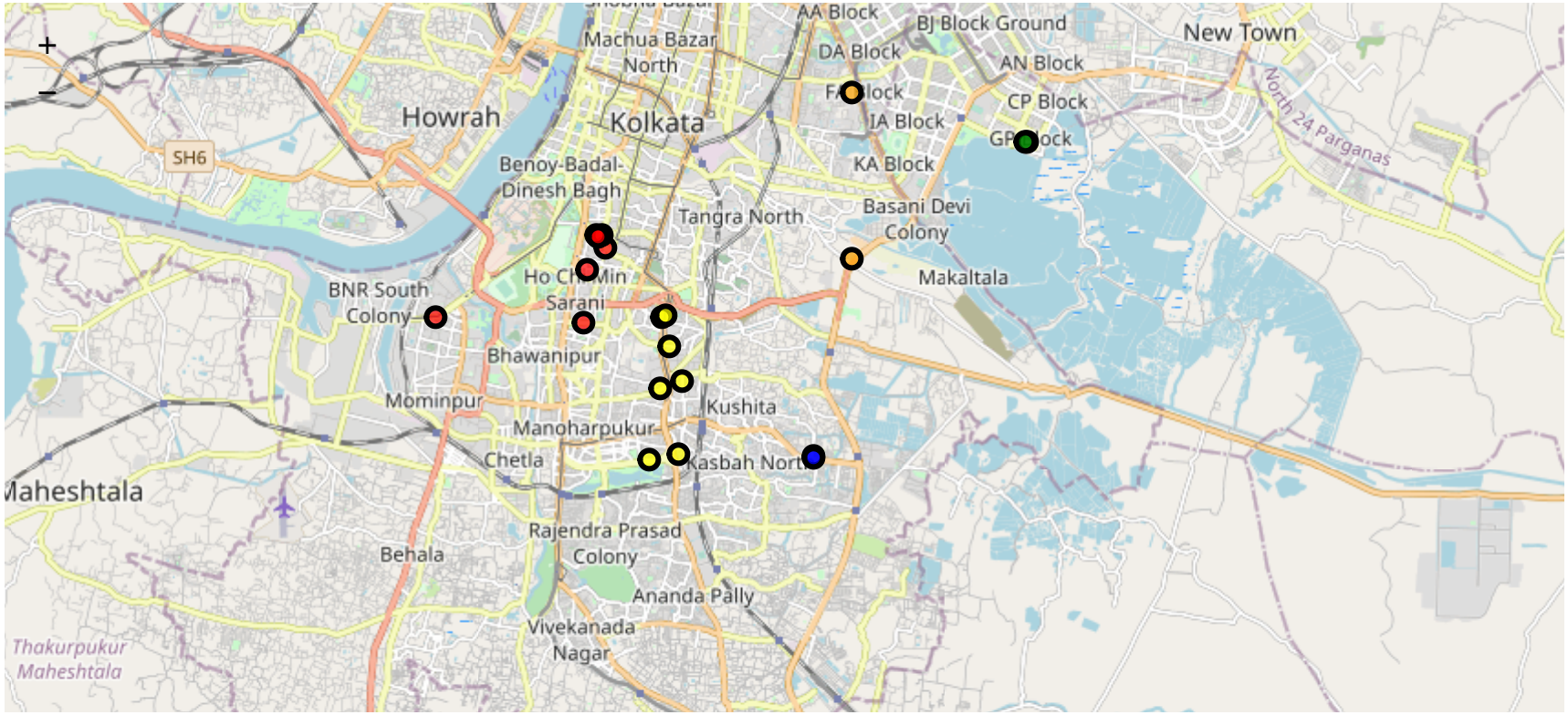
In [9]:
```
Res = Res[Res['Aggregate rating'] !=0.0]
Res.head()
```

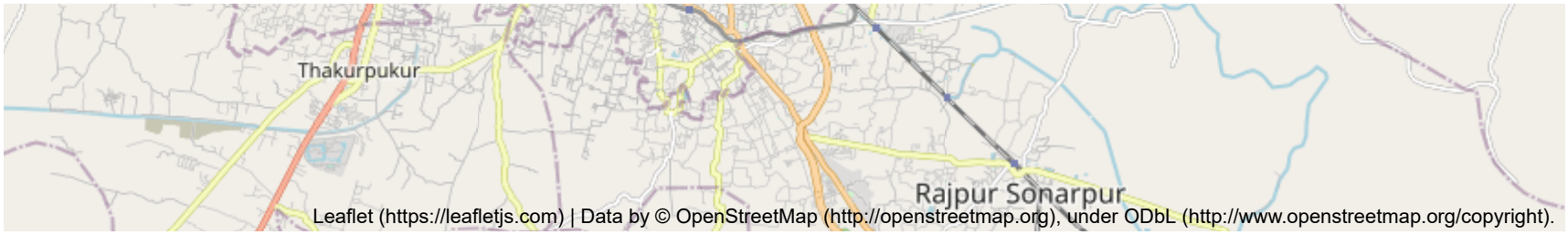
Out[9]:

| | Restaurant Name | Locality | Longitude | Latitude | Cuisines | Aggregate rating | Rating text | Votes |
|---|---|---|---|---|---|---|---|---|
| **0** | Asia Kitchen by Mainland China | Acropolis Mall, Kasba | 88.393294 | 22.514688 | Asian, Chinese | 4.6 | Excellent | 945 |
| **1** | Hoppipola | Acropolis Mall, Kasba | 88.393310 | 22.514585 | Italian, Mexican, American, Mediterranean | 4.2 | Very Good | 1103 |
| **2** | Spice Kraft | Ballygunge | 88.364453 | 22.526461 | Continental, Middle Eastern, Asian | 4.8 | Excellent | 1424 |
| **3** | Nawwarah | Ballygunge | 88.364878 | 22.538731 | Chinese, Cafe, North Indian, Desserts | 3.9 | Good | 326 |
| **4** | 6 Ballygunge Place | Ballygunge | 88.368628 | 22.527893 | Bengali | 4.4 | Very Good | 1778 |

In [10]:
```
Kolkata_Rest = folium.Map(location=[22.50, 88.41], zoom_start=12)
X = Res['Latitude']
Y = Res['Longitude']
Z = np.stack((X, Y), axis=1)
kmeans = KMeans(n_clusters=5, random_state=0).fit(Z)
clusters = kmeans.labels_
colors = ['red', 'green', 'blue', 'yellow','orange']
Res['Cluster'] = clusters
for latitude, longitude, Locality, cluster in zip(Res['Latitude'], Res['Longitude'], Res['Locality'], Res['Clust
    label = folium.Popup(Locality, parse_html=True)
    folium.CircleMarker(
        [latitude, longitude],
        radius=5,
        popup=label,
        color='black',
        fill=True,
        fill_color=colors[cluster],
        fill_opacity=0.7).add_to(Kolkata_Rest)
Kolkata_Rest
```

Out[10]:






In [11]:
```
Res.head()
```

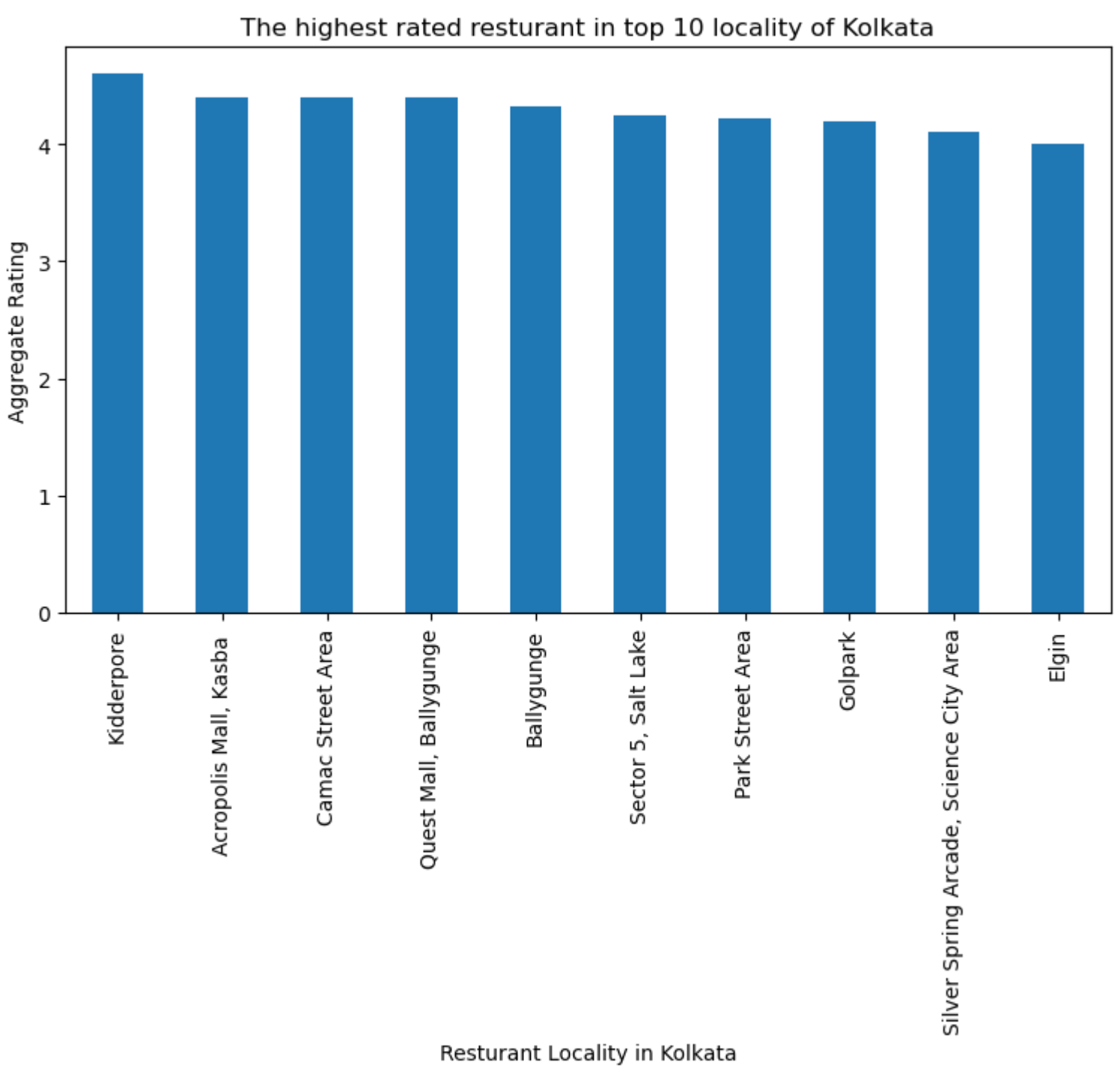
Out[11]:

| | Restaurant Name | Locality | Longitude | Latitude | Cuisines | Aggregate rating | Rating text | Votes | Cluster |
|---|---|---|---|---|---|---|---|---|---|
| **0** | Asia Kitchen by Mainland China | Acropolis Mall, Kasba | 88.393294 | 22.514688 | Asian, Chinese | 4.6 | Excellent | 945 | 2 |
| **1** | Hoppipola | Acropolis Mall, Kasba | 88.393310 | 22.514585 | Italian, Mexican, American, Mediterranean | 4.2 | Very Good | 1103 | 2 |
| **2** | Spice Kraft | Ballygunge | 88.364453 | 22.526461 | Continental, Middle Eastern, Asian | 4.8 | Excellent | 1424 | 3 |
| **3** | Nawwarah | Ballygunge | 88.364878 | 22.538731 | Chinese, Cafe, North Indian, Desserts | 3.9 | Good | 326 | 3 |
| **4** | 6 Ballygunge Place | Ballygunge | 88.368628 | 22.527893 | Bengali | 4.4 | Very Good | 1778 | 3 |

# Question 1 : What places have the best restaurants in Kolkata?

In [12]:

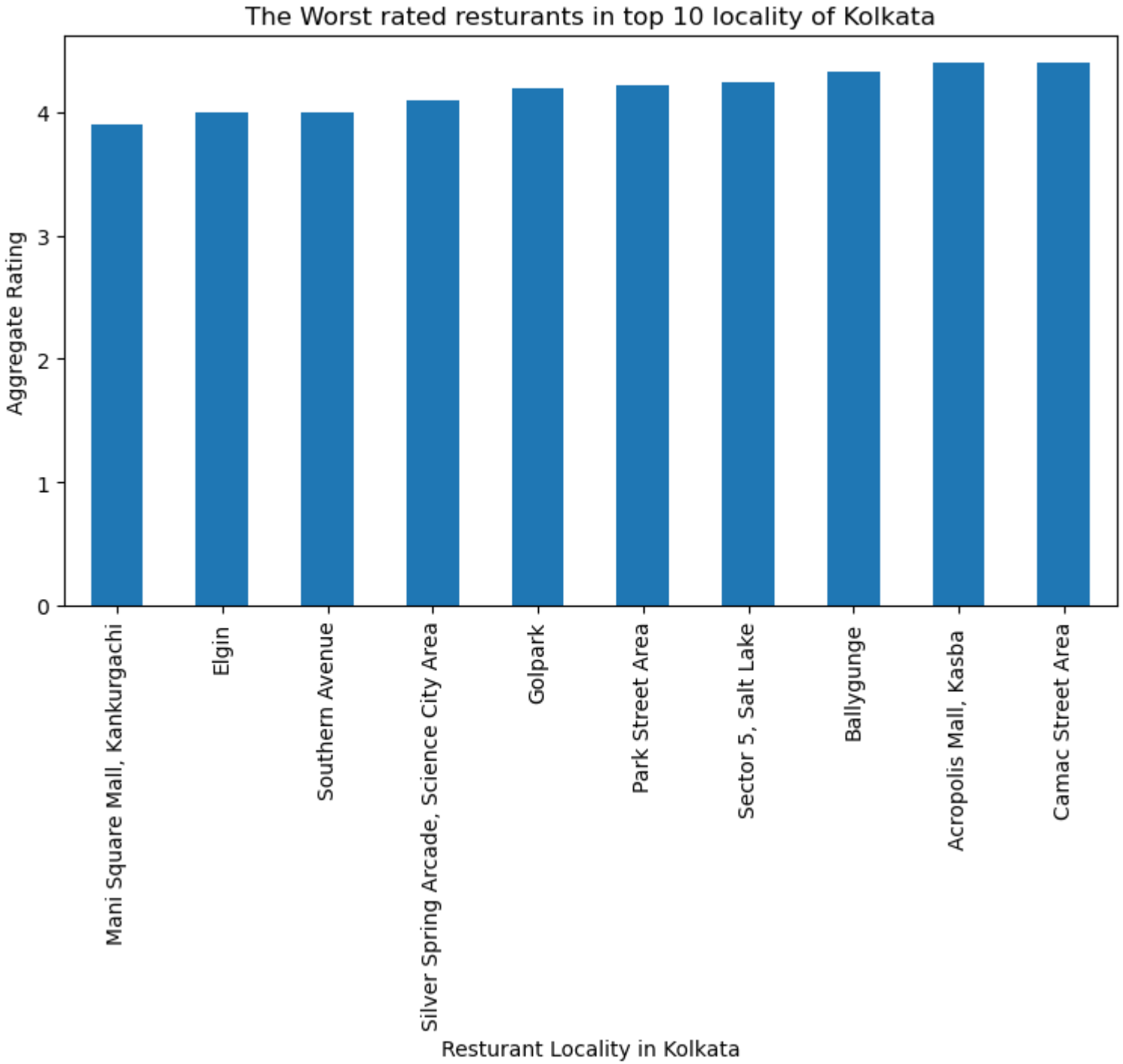
```
import matplotlib.pyplot as plt
plt.figure(figsize=(9,5), dpi = 100)
plt.title('The highest rated resturant in top 10 locality of Kolkata')
Res.groupby('Locality')['Aggregate rating'].mean().nlargest(10).plot(kind='bar')
plt.xlabel('Resturant Locality in Kolkata')
plt.ylabel('Aggregate Rating')
plt.show()
```


The highest rated resturant in top 10 locality of Kolkata
Aggregate Rating
0
1
2
3
4
Kidderpore
Acropolis Mall, Kasba
Camac Street Area
Quest Mall, Ballygunge
Ballygunge
Sector 5, Salt Lake
Park Street Area
Golpark
Silver Spring Arcade, Science City Area
Elgin
Resturant Locality in Kolkata

The best restarants are available in Kidderpore area.

## Question 2 : Which place have the worst restaurants in Kolkata?

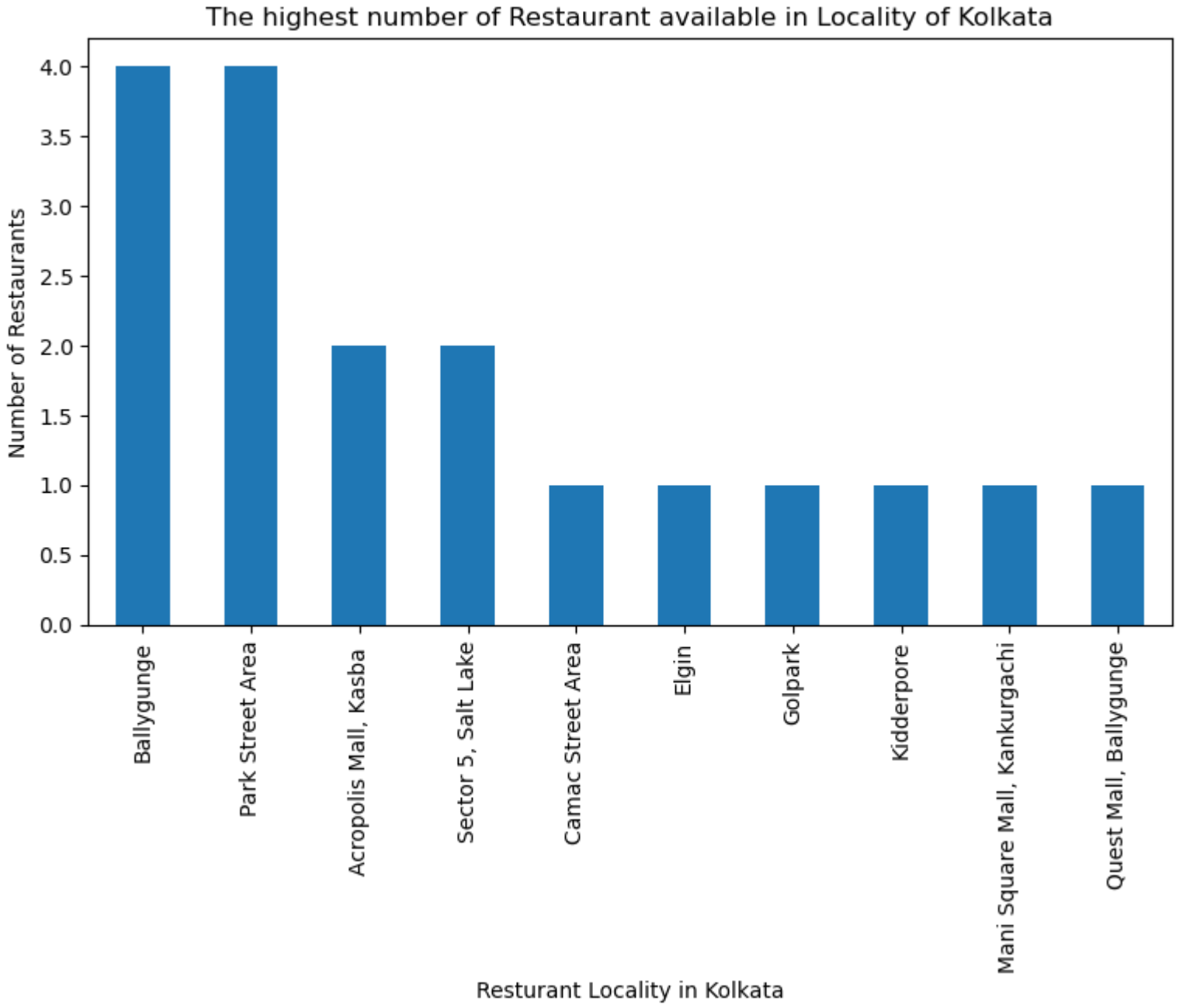
In [13]:
```
import matplotlib.pyplot as plt
plt.figure(figsize=(9,5), dpi = 100)
plt.title('The Worst rated resturants in top 10 locality of Kolkata')
Res.groupby('Locality')['Aggregate rating'].mean().nsmallest(10).plot(kind='bar')
plt.xlabel('Resturant Locality in Kolkata')
plt.ylabel('Aggregate Rating')
plt.show()
```


The Worst rated resturants in top 10 locality of Kolkata
Aggregate Rating
0
1
2
3
4
Mani Square Mall, Kankurgachi
Elgin
Southern Avenue
Silver Spring Arcade, Science City Area
Golpark
Park Street Area
Sector 5, Salt Lake
Ballygunge
Acropolis Mall, Kasba
Camac Street Area
Resturant Locality in Kolkata

The worst restaurants are located at Mani Square Mall, Kankurgachi

## Question 3 : Which place have most number of restaurants?

In [41]:
```
import matplotlib.pyplot as plt
plt.figure(figsize=(9,5), dpi = 100)
plt.title('The highest number of Restaurant available in Locality of Kolkata')
Res.groupby('Locality')['Restaurant Name'].count().nlargest(10).plot(kind='bar')
plt.xlabel('Resturant Locality in Kolkata')
plt.ylabel('Number of Restaurants')
plt.show()
```

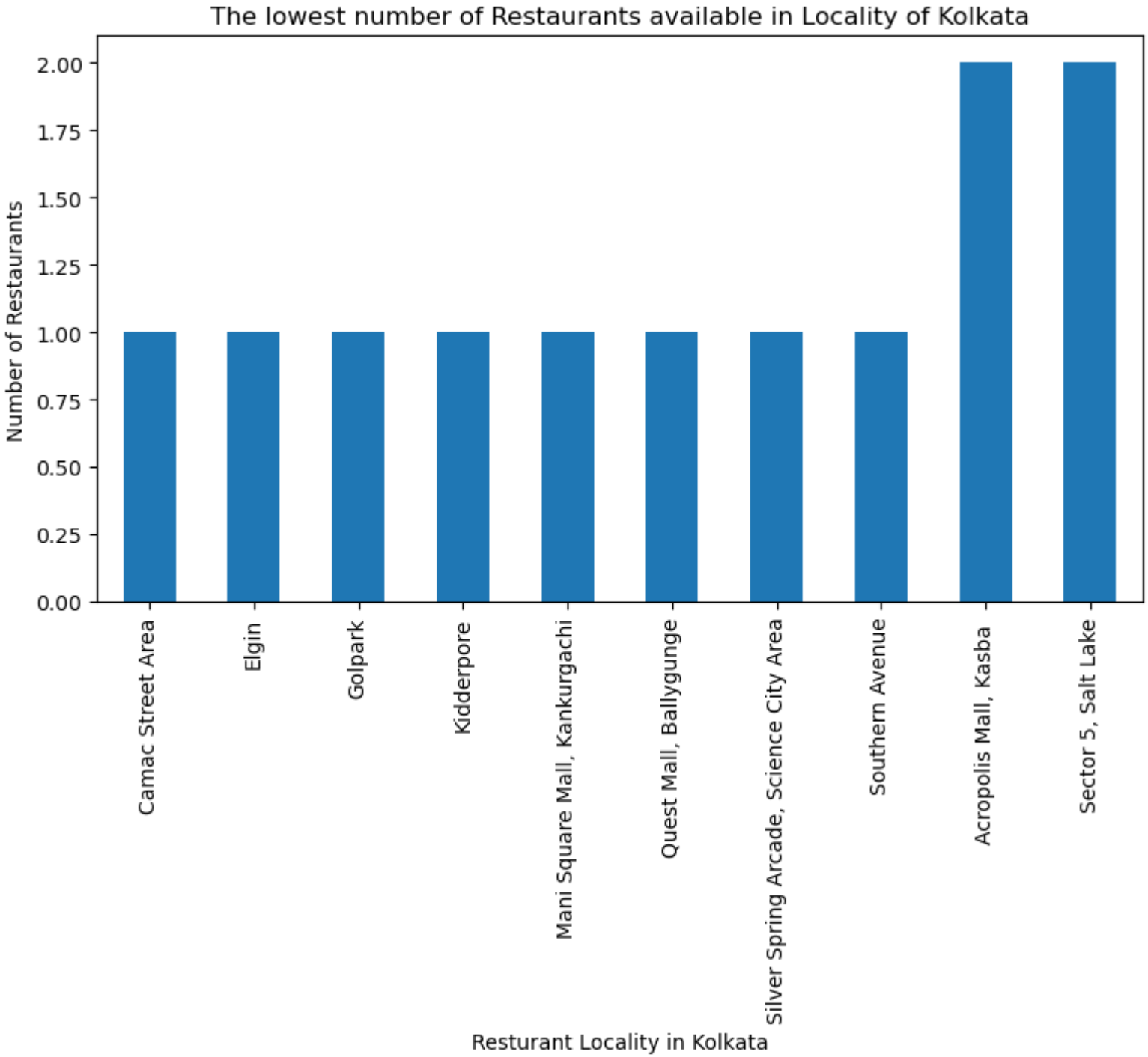



So, Ballygunge has highest number of restaurants in Kolkata.

## Question 4 : Which place have less number of restaurants?

In [15]:

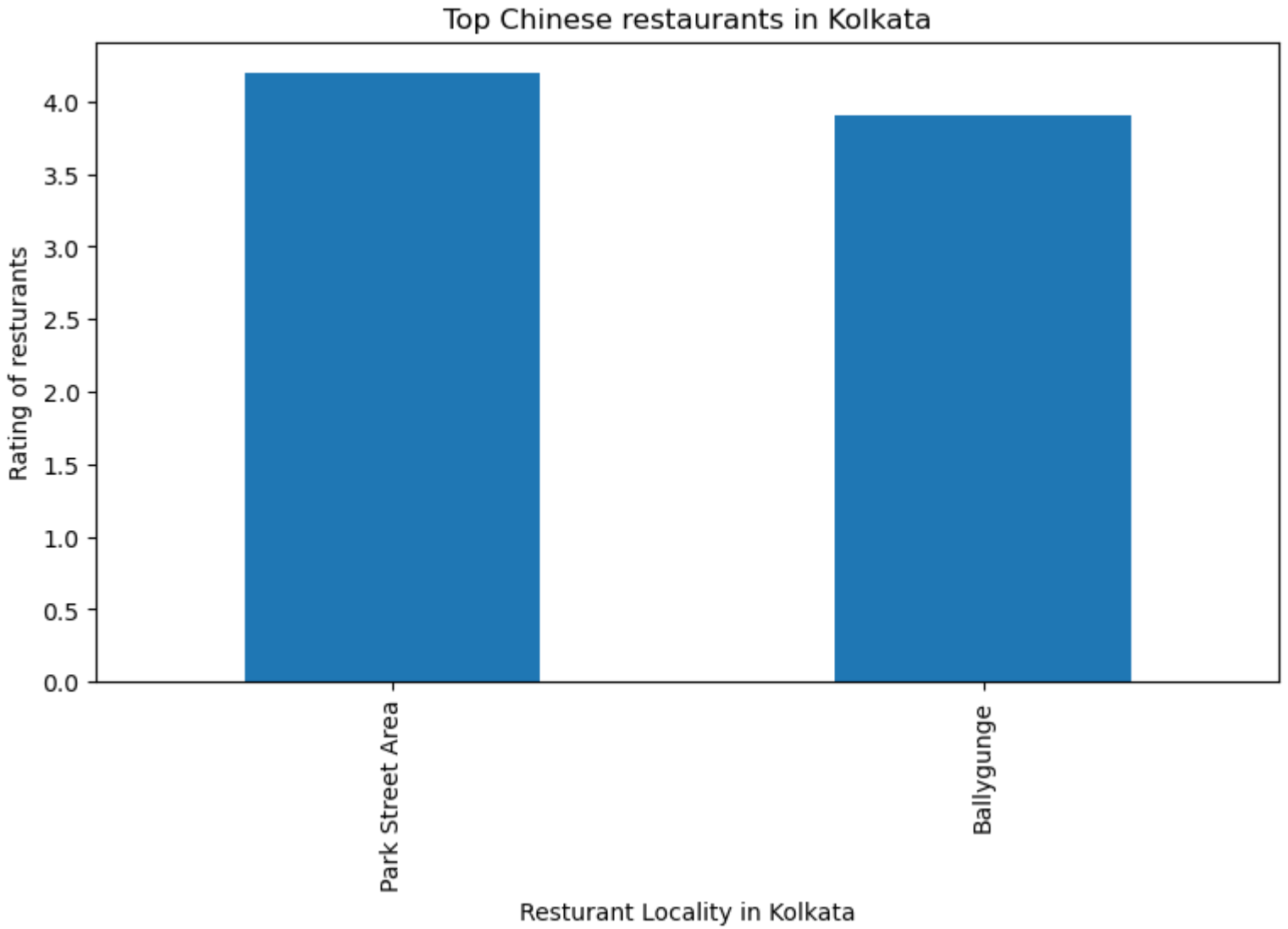
```
import matplotlib.pyplot as plt
plt.figure(figsize=(9,5), dpi = 100)
plt.title('The lowest number of Restaurants available in Locality of Kolkata')
Res.groupby('Locality')['Restaurant Name'].count().nsmallest(10).plot(kind='bar')
plt.xlabel('Resturant Locality in Kolkata')
plt.ylabel('Number of Restaurants')
plt.show()
```


The lowest number of Restaurants available in Locality of Kolkata
Number of Restaurants
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Camac Street Area
Elgin
Golpark
Kidderpore
Mani Square Mall, Kankurgachi
Quest Mall, Ballygunge
Silver Spring Arcade, Science City Area
Southern Avenue
Acropolis Mall, Kasba
Sector 5, Salt Lake
Resturant Locality in Kolkata

So, Camac Street Area has the lowest number of restaurants in Kolkata.

## Question 5 : What is the best place for chinese food in Kolkata?

In [17]:
```
import matplotlib.pyplot as plt
plt.figure(figsize=(9,5), dpi = 100)
plt.title('Top Chinese restaurants in Kolkata')
Res[Res['Cuisines'].str.startswith('Chinese')].groupby('Locality')['Aggregate rating'].mean().nlargest(5).plot(k
plt.xlabel('Resturant Locality in Kolkata')
plt.ylabel('Rating of resturants')
plt.show()
```



So, Ballygunge is the best place in Kolkata for Chinese food.

## Data transformation

In [18]:
```
df_Res_Loc =  Res.groupby('Locality').count()['Restaurant Name'].to_frame()
df_Res_rating= Res.groupby('Locality')['Aggregate rating'].mean().to_frame()
d_Cuisines = Res.groupby(['Locality'])['Cuisines'].agg(', '.join).reset_index()
d_R = Res.groupby(['Locality'])['Rating text'].unique().agg(', '.join).reset_index()
d_V = Res.groupby(['Locality'])['Votes'].sum().to_frame()
d_Lat = Res.groupby('Locality').mean()['Latitude'].to_frame()
d_Lng = Res.groupby('Locality').mean()['Longitude'].to_frame()
df_final = pd.merge(d_Lat,d_Lng,on='Locality').merge(df_Res_Loc, on='Locality').merge(d_Cuisines, on='Locality')
```

In [19]:
```
df_final = df_final[df_final['Aggregate rating'] != 0.000000]
df_final.columns =['Locality','Lat','Lng', 'No_of_Restaurant','Cusines', 'Agg_Rating','Comments' ,'No_of_Votes']
df_final.head()
```

Out[19]:

| | Locality | Lat | Lng | No_of_Restaurant | Cusines | Agg_Rating | Comments | No_of_Votes |
|---|---|---|---|---|---|---|---|---|
| **0** | Acropolis Mall, Kasba | 22.514636 | 88.393302 | 2 | Asian, Chinese, Italian, Mexican, American, Me... | 4.400 | Excellent, Very Good | 2048 |
| **1** | Ballygunge | 22.531687 | 88.366044 | 4 | Continental, Middle Eastern, Asian, Chinese, C... | 4.325 | Excellent, Good, Very Good | 4232 |
| **2** | Camac Street Area | 22.547186 | 88.350680 | 1 | North Indian, Chinese, Mexican, Italian | 4.400 | Very Good | 1484 |
| **3** | Elgin | 22.537960 | 88.349843 | 1 | Tex-Mex, American | 4.000 | Very Good | 911 |
| **4** | Golpark | 22.515082 | 88.367830 | 1 | Seafood, Chinese | 4.200 | Very Good | 2584 |

In [21]:
```
CLIENT_ID = 'JDLUI3UDZNX2IQYQEM1CCIOZKV5YQDVPCG55CLUJJKM5BMZ0'
CLIENT_SECRET = 'AEK4VKJ3V5UO3ZET1YT3ETETF2UXYAKQ1A5SS4VQHZ5H2P0Y'
VERSION = '20180605'
```

In [22]:

```
def getNearbyVenues(names, latitudes, longitudes, radius=500,LIMIT = 100):
    venues_list=[]
    for name, lat, lng in zip(names, latitudes, longitudes):
        print(name)
        url = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&v={}&ll={},{}&radius=
            CLIENT_ID,
            CLIENT_SECRET,
            VERSION,
            lat,
            lng,
            radius,
            LIMIT)
        results = requests.get(url).json()["response"]['groups'][0]['items']
        venues_list.append([(
            name,
            lat,
            lng,
            v['venue']['name'],
            v['venue']['location']['lat'],
            v['venue']['location']['lng'],
            v['venue']['categories'][0]['name']) for v in results])
    nearby_venues = pd.DataFrame([item for venue_list in venues_list for item in venue_list])
    nearby_venues.columns = ['Locality',
                  'Locality Latitude',
                  'Locality Longitude',
                  'Venue',
                  'Venue Latitude',
                  'Venue Longitude',
                  'Venue Category']
    return(nearby_venues)
```

In [23]:
```
kolkata_venues = getNearbyVenues(names=df_final['Locality'], latitudes=df_final['Lat'], longitudes=df_final['Lng
```

```
Acropolis Mall, Kasba
Ballygunge
Camac Street Area
Elgin
Golpark
Kidderpore
Mani Square Mall, Kankurgachi
Park Street Area
Quest Mall, Ballygunge
Sector 5, Salt Lake
Silver Spring Arcade, Science City Area
Southern Avenue
```

In [24]:
```
kolkata_venues.head()
```

Out[24]:

| | Locality | Locality Latitude | Locality Longitude | Venue | Venue Latitude | Venue Longitude | Venue Category |
|---|---|---|---|---|---|---|---|
| **0** | Acropolis Mall, Kasba | 22.514636 | 88.393302 | Acropolis Mall | 22.514823 | 88.393235 | Shopping Mall |
| **1** | Acropolis Mall, Kasba | 22.514636 | 88.393302 | Cinépolis | 22.514824 | 88.393236 | Multiplex |
| **2** | Acropolis Mall, Kasba | 22.514636 | 88.393302 | Punjabee Rasoi | 22.515974 | 88.392545 | Dhaba |
| **3** | Acropolis Mall, Kasba | 22.514636 | 88.393302 | Naushijaan Restaurant - Lazzat e Lucknow | 22.515238 | 88.389958 | Awadhi Restaurant |
| **4** | Acropolis Mall, Kasba | 22.514636 | 88.393302 | Starbucks | 22.514775 | 88.393169 | Coffee Shop |

In [25]:
```
kolkata_venues.groupby('Locality').count()
```

Out[25]:

| Locality | Locality Latitude | Locality Longitude | Venue | Venue Latitude | Venue Longitude | Venue Category |
|---|---|---|---|---|---|---|
| **Acropolis Mall, Kasba** | 11 | 11 | 11 | 11 | 11 | 11 |
| **Ballygunge** | 10 | 10 | 10 | 10 | 10 | 10 |
| **Camac Street Area** | 24 | 24 | 24 | 24 | 24 | 24 |
| **Elgin** | 20 | 20 | 20 | 20 | 20 | 20 |
| **Golpark** | 5 | 5 | 5 | 5 | 5 | 5 |
| **Kidderpore** | 5 | 5 | 5 | 5 | 5 | 5 |
| **Mani Square Mall, Kankurgachi** | 15 | 15 | 15 | 15 | 15 | 15 |
| **Park Street Area** | 43 | 43 | 43 | 43 | 43 | 43 |
| **Quest Mall, Ballygunge** | 17 | 17 | 17 | 17 | 17 | 17 |
| **Sector 5, Salt Lake** | 24 | 24 | 24 | 24 | 24 | 24 |
| **Silver Spring Arcade, Science City Area** | 7 | 7 | 7 | 7 | 7 | 7 |
| **Southern Avenue** | 12 | 12 | 12 | 12 | 12 | 12 |

In [26]:
```
kolkata_onehot = pd.get_dummies(kolkata_venues[['Venue Category']], prefix="", prefix_sep="")
kolkata_onehot['Locality'] = kolkata_venues['Locality']
column_list = kolkata_onehot.columns.tolist()
column_number = int(column_list.index('Locality'))
column_list = [column_list[column_number]] + column_list[:column_number] + column_list[column_number+1:]
kolkata_onehot = kolkata_onehot[column_list]
kolkata_onehot.head()
```

Out[26]:

| | Locality | American Restaurant | Arts & Crafts Store | Asian Restaurant | Awadhi Restaurant | BBQ Joint | Bakery | Bar | Bengali Restaurant | Bookstore | ... | Shopping Mall | Snack Place | South Indian Restaurant | Sp |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | Acropolis Mall, Kasba | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ... | 1 | 0 | 0 | |
| **1** | Acropolis Mall, Kasba | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ... | 0 | 0 | 0 | |
| **2** | Acropolis Mall, Kasba | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ... | 0 | 0 | 0 | |
| **3** | Acropolis Mall, Kasba | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | ... | 0 | 0 | 0 | |
| **4** | Acropolis Mall, Kasba | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ... | 0 | 0 | 0 | |

5 rows × 60 columns

In [27]:
```
kolkata_grouped = kolkata_onehot.groupby('Locality').mean().reset_index()
kolkata_grouped
```

Out[27]:

| | Locality | American Restaurant | Arts & Crafts Store | Asian Restaurant | Awadhi Restaurant | BBQ Joint | Bakery | Bar | Bengali Restaurant | Bookstore | ... | Shopping Mall | Sna Pla |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | Acropolis Mall, Kasba | 0.0 | 0.000000 | 0.000000 | 0.090909 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | ... | 0.090909 | 0.000( |
| 1 | Ballygunge | 0.0 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.200000 | 0.000000 | 0.100000 | 0.000000 | ... | 0.000000 | 0.000( |
| 2 | Camac Street Area | 0.0 | 0.000000 | 0.041667 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | ... | 0.125000 | 0.000( |
| 3 | Elgin | 0.1 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.100000 | 0.000000 | ... | 0.050000 | 0.000( |
| 4 | Golpark | 0.0 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.200000 | 0.000000 | ... | 0.000000 | 0.000( |
| 5 | Kidderpore | 0.0 | 0.000000 | 0.000000 | 0.200000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | ... | 0.000000 | 0.000( |
| 6 | Mani Square Mall, Kankurgachi | 0.0 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | ... | 0.066667 | 0.000( |
| 7 | Park Street Area | 0.0 | 0.000000 | 0.023256 | 0.000000 | 0.046512 | 0.023256 | 0.000000 | 0.000000 | 0.023256 | ... | 0.023256 | 0.023( |
| 8 | Quest Mall, Ballygunge | 0.0 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.058824 | 0.000000 | 0.000000 | 0.000000 | ... | 0.058824 | 0.000( |
| 9 | Sector 5, Salt Lake | 0.0 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.041667 | 0.041667 | 0.000000 | ... | 0.000000 | 0.000( |
| 10 | Silver Spring Arcade, Science City Area | 0.0 | 0.000000 | 0.142857 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.142857 | 0.000000 | ... | 0.000000 | 0.000( |
| 11 | Southern Avenue | 0.0 | 0.083333 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | ... | 0.000000 | 0.000( |

12 rows × 60 columns

In [28]:
```
num_top_venues = 5
for hood in kolkata_grouped['Locality']:
    print("----"+hood+"----")
    temp = kolkata_grouped[kolkata_grouped['Locality'] == hood].T.reset_index()
    temp.columns = ['venue','freq']
    temp = temp.iloc[1:]
    temp['freq'] = temp['freq'].astype(float)
    temp = temp.round({'freq': 2})
    print(temp.sort_values('freq', ascending=False).reset_index(drop=True).head(num_top_venues))
    print('\n')
```

```
----Acropolis Mall, Kasba ----
                venue  freq
0               Dhaba  0.09
1               Hotel  0.09
2  Fried Chicken Joint  0.09
3     Department Store  0.09
4          Coffee Shop  0.09


----Ballygunge----
                          venue  freq
0                       Bakery   0.2
1  Vegetarian / Vegan Restaurant   0.1
2                   Sports Club   0.1
3              Indian Sweet Shop   0.1
4                    Hookah Bar   0.1


----Camac Street Area----
```

In [29]:
```
def return_most_common_venues(row, num_top_venues):
    row_categories = row.iloc[1:]
    row_categories_sorted = row_categories.sort_values(ascending=False)
    return row_categories_sorted.index.values[0:num_top_venues]
```

In [30]:
```
num_top_venues = 10
indicators = ['st', 'nd', 'rd']
columns = ['Locality']
for ind in np.arange(num_top_venues):
    try:
        columns.append('{}{} Most Common Venue'.format(ind+1, indicators[ind]))
    except:
        columns.append('{}th Most Common Venue'.format(ind+1))
Locality_venues_sorted = pd.DataFrame(columns=columns)
Locality_venues_sorted['Locality'] = kolkata_grouped['Locality']
for ind in np.arange(kolkata_grouped.shape[0]):
    Locality_venues_sorted.iloc[ind, 1:] = return_most_common_venues(kolkata_grouped.iloc[ind, :], num_top_venue
Locality_venues_sorted
```

Out[30]:

| | Locality | 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** | Acropolis Mall, Kasba | Chinese Restaurant | Fried Chicken Joint | Dhaba | Indian Sweet Shop | Multiplex | Restaurant | Department Store | Shopping Mall | Awadhi Restaurant | Hotel |
| **1** | Ballygunge | Bakery | Vegetarian / Vegan Restaurant | Sports Club | Pizza Place | Indian Sweet Shop | Plaza | Bengali Restaurant | Hookah Bar | Dhaba | Gastropub |
| **2** | Camac Street Area | Café | Shopping Mall | Mexican Restaurant | Nightclub | Hotel | Italian Restaurant | Indian Restaurant | Planetarium | Gastropub | Dhaba |
| **3** | Elgin | Café | American Restaurant | Bengali Restaurant | Nightclub | Restaurant | Department Store | Fast Food Restaurant | Food Court | Hotel | Multiplex |
| **4** | Golpark | Bengali Restaurant | Mughlai Restaurant | Plaza | Chinese Restaurant | Café | Electronics Store | Falafel Restaurant | Fast Food Restaurant | Vegetarian / Vegan Restaurant | Department Store |
| **5** | Kidderpore | Market | Tram Station | Awadhi Restaurant | Pharmacy | Vegetarian / Vegan Restaurant | Department Store | IT Services | Hotel | Hookah Bar | Gastropub |
| **6** | Mani Square Mall, Kankurgachi | Fast Food Restaurant | Café | Vegetarian / Vegan Restaurant | Bowling Alley | Fried Chicken Joint | Mediterranean Restaurant | Food Court | Multiplex | Department Store | Indian Restaurant |
| **7** | Park Street Area | Café | Hotel | Chinese Restaurant | Nightclub | Indian Restaurant | Pub | Pizza Place | Fast Food Restaurant | BBQ Joint | Restaurant |

| | Locality | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **8** | Quest Mall, Ballygunge | Indian Restaurant | Café | Indian Sweet Shop | Irish Pub | Hotel | Hookah Bar | Mughlai Restaurant | Multiplex | Department Store | Coffee Shop |
| **9** | Sector 5, Salt Lake | Café | Indian Restaurant | Multiplex | Pizza Place | Hookah Bar | Fried Chicken Joint | Fast Food Restaurant | Falafel Restaurant | Mughlai Restaurant | Dhaba |
| **10** | Silver Spring Arcade, Science City Area | Hotel | Indian Restaurant | Asian Restaurant | Bengali Restaurant | Multicuisine Indian Restaurant | Chinese Restaurant | Vegetarian / Vegan Restaurant | Dhaba | IT Services | Hookah Bar |
| **11** | Southern Avenue | Café | Boutique | Vegetarian / Vegan Restaurant | Arts & Crafts Store | Coffee Shop | Plaza | Chinese Restaurant | Falafel Restaurant | Fast Food Restaurant | Food Court |

In [33]:
```
kclusters = 5
kolkata_clustering = kolkata_grouped.drop('Locality', 1)
kmeans = KMeans(n_clusters=kclusters, random_state=0).fit(kolkata_clustering)
kmeans.labels_[0:10]
kmeans.labels_.shape
```

Out[33]:
```
(12,)
```

In [34]:
```
kolkata_merged = df_final.head(240)
kolkata_merged['Cluster Labels'] = kmeans.labels_
kolkata_merged = kolkata_merged.join(Locality_venues_sorted.set_index('Locality'), on='Locality')
kolkata_merged.head()
```

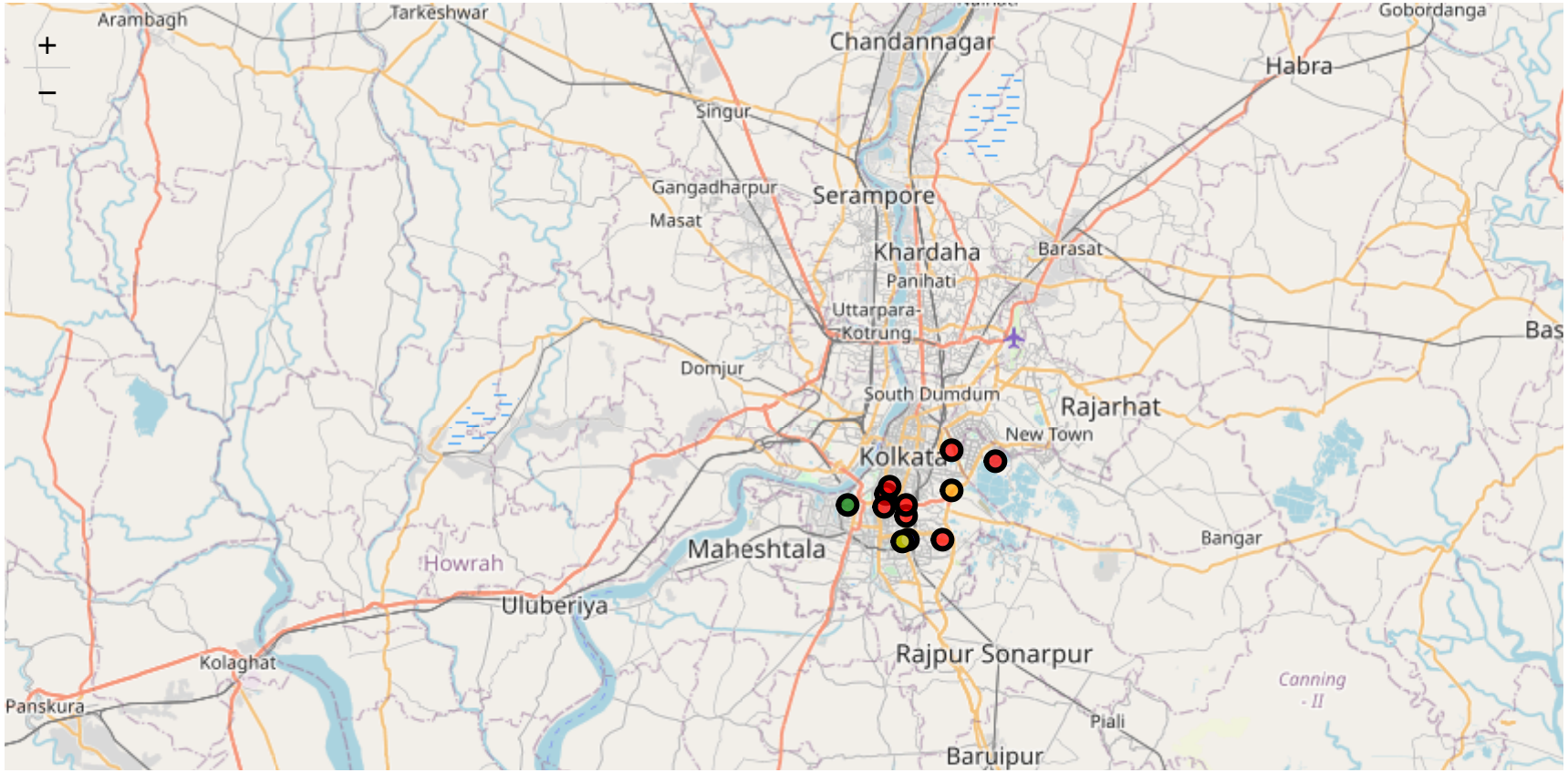
```
<ipython-input-34-54624117c5a4>:2: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)
  kolkata_merged['Cluster Labels'] = kmeans.labels_
```

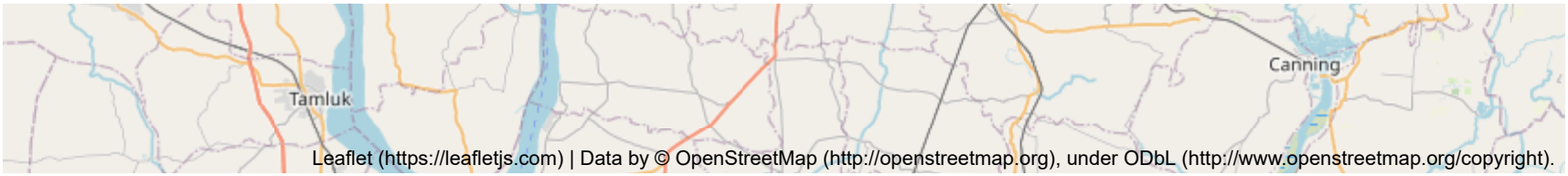
Out[34]:

| | Locality | Lat | Lng | No_of_Restaurant | Cusines | Agg_Rating | Comments | No_of_Votes | Cluster Labels | 1st Most Common Venue | 2nd Most Common Venue |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | Acropolis Mall, Kasba | 22.514636 | 88.393302 | 2 | Asian, Chinese, Italian, Mexican, American, Me... | 4.400 | Excellent, Very Good | 2048 | 0 | Chinese Restaurant | Fried Chicken Joint |
| **1** | Ballygunge | 22.531687 | 88.366044 | 4 | Continental, Middle Eastern, Asian, Chinese, C... | 4.325 | Excellent, Good, Very Good | 4232 | 0 | Bakery | Vegetarian / Vegan Restaurant |
| **2** | Camac Street Area | 22.547186 | 88.350680 | 1 | North Indian, Chinese, Mexican, Italian | 4.400 | Very Good | 1484 | 0 | Café | Shopping Mall |
| **3** | Elgin | 22.537960 | 88.349843 | 1 | Tex-Mex, American | 4.000 | Very Good | 911 | 0 | Café | American Restaurant |
| **4** | Golpark | 22.515082 | 88.367830 | 1 | Seafood, Chinese | 4.200 | Very Good | 2584 | 2 | Bengali Restaurant | Mughlai Restaurant |

In [35]:
```
map_clusters = folium.Map(location=[latitude, longitude], zoom_start=10)
x = np.arange(kclusters)
ys = [i+x+(i*x)**2 for i in range(kclusters)]
colors = ['red', 'green', 'blue', 'yellow','orange']
markers_colors = []
for lat, lon, poi, cluster in zip(kolkata_merged['Lat'], kolkata_merged['Lng'], kolkata_merged['Locality'], kolk
    label = folium.Popup(str(poi) + ' Cluster ' + str(cluster), parse_html=True)
    folium.CircleMarker(
        [lat, lon],
        radius=5,
        popup=label,
        color='black',
        fill=True,
        fill_color=colors[cluster],
        fill_opacity=0.7).add_to(map_clusters)
map_clusters
```

Out[35]:






In [36]:
```
kolkata_merged.loc[kolkata_merged['Cluster Labels'] == 0, kolkata_merged.columns[[1] + list(range(5, kolkata_mer
```

Out[36]:

| | Lat | Agg_Rating | Comments | No_of_Votes | 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 Com V |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 22.514636 | 4.400 | Excellent, Very Good | 2048 | 0 | Chinese Restaurant | Fried Chicken Joint | Dhaba | Indian Sweet Shop | Multiplex | Restaurant | Depar |
| **1** | 22.531687 | 4.325 | Excellent, Good, Very Good | 4232 | 0 | Bakery | Vegetarian / Vegan Restaurant | Sports Club | Pizza Place | Indian Sweet Shop | Plaza | Be Resta |
| **2** | 22.547186 | 4.400 | Very Good | 1484 | 0 | Café | Shopping Mall | Mexican Restaurant | Nightclub | Hotel | Italian Restaurant | I Resta |
| **3** | 22.537960 | 4.000 | Very Good | 911 | 0 | Café | American Restaurant | Bengali Restaurant | Nightclub | Restaurant | Department Store | Fast Resta |
| **6** | 22.577821 | 3.900 | Good | 1064 | 0 | Fast Food Restaurant | Café | Vegetarian / Vegan Restaurant | Bowling Alley | Fried Chicken Joint | Mediterranean Restaurant | Food |
| **7** | 22.552495 | 4.225 | Excellent, Good, Very Good | 19079 | 0 | Café | Hotel | Chinese Restaurant | Nightclub | Indian Restaurant | Pub | Pizza |
| **8** | 22.539129 | 4.400 | Very Good | 2224 | 0 | Indian Restaurant | Café | Indian Sweet Shop | Irish Pub | Hotel | Hookah Bar | Mu Resta |
| **9** | 22.569363 | 4.250 | Excellent, Good | 7006 | 0 | Café | Indian Restaurant | Multiplex | Pizza Place | Hookah Bar | Fried Chicken Joint | Fast Resta |

In [37]:
```
kolkata_merged.loc[kolkata_merged['Cluster Labels'] == 1, kolkata_merged.columns[[1] + list(range(5, kolkata_mer
```

Out[37]:

| | Lat | Agg_Rating | Comments | No_of_Votes | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **5** | 22.538999 | 4.6 | Excellent | 1219 | 1 | Market | Tram Station | Awadhi Restaurant | Pharmacy | Vegetarian / Vegan Restaurant | Department Store | IT Services |

In [38]:
```
kolkata_merged.loc[kolkata_merged['Cluster Labels'] == 2, kolkata_merged.columns[[1] + list(range(5, kolkata_mer
```

Out[38]:

| | Lat | Agg_Rating | Comments | No_of_Votes | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **4** | 22.515082 | 4.2 | Very Good | 2584 | 2 | Bengali Restaurant | Mughlai Restaurant | Plaza | Chinese Restaurant | Café | Electronics Store | Falafel Restaurant |

In [39]:
```
kolkata_merged.loc[kolkata_merged['Cluster Labels'] == 3, kolkata_merged.columns[[1] + list(range(5, kolkata_mer
```

Out[39]:

| | Lat | Agg_Rating | Comments | No_of_Votes | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **11** | 22.514119 | 4.0 | Very Good | 1126 | 3 | Café | Boutique | Vegetarian / Vegan Restaurant | Arts & Crafts Store | Coffee Shop | Plaza | Chinese Restaurant |

In [40]:
```
kolkata_merged.loc[kolkata_merged['Cluster Labels'] == 4, kolkata_merged.columns[[1] + list(range(5, kolkata_mer
```

Out[40]:

| | Lat | Agg_Rating | Comments | No_of_Votes | 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 Mos Commor Venue |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **10** | 22.5491 | 4.1 | Very Good | 1616 | 4 | Hotel | Indian Restaurant | Asian Restaurant | Bengali Restaurant | Multicuisine Indian Restaurant | Chinese Restaurant | Vegetarian / Vegan Restauran |

## Conclusion

The best restarants are available in Kidderpore area. The worst restaurants are located at Mani Square Mall, Kankurgachi Ballygunge has highest number of restaurants in Kolkata. Camac Street Area has the lowest number of restaurants in Kolkata. Ballygunge is the best place in Kolkata for Chinese food.