Coursera Capstone Project – The Battle of Neighborhoods

British Columbia (BC) is the westernmost province in Canada, located between the Pacific Ocean and the Rocky Mountains. With an estimated population of 5.1 million as of 2020, it is Canada's third-most populous province.

According to the 2016 National Household Survey 365,705 British Columbians had South Asian origins. This accounted for just over 8% of the total provincial population. The growth of the population is attributed to sustained invitations of immigration from South Asian nations. The vast majority of South Asian immigrants who immigrate to and reside in British Columbia trace their roots to the Punjab region of India and Pakistan; the province has the largest Punjabi population in Canada. According to a 2011 study conducted by Statistics Canada British Columbians from South Asia will grow to between 508,000 and 684,000 by 2036 or 10% to 11.1% of the provincial population overall.

With this diverse culture, comes diversity in cuisines. There are many different restaurants in British Columbia, catering to varied tastes with cuisines like Indian, Chinese, French, etc.

As part of this project, we will list and visualize all major parts of British Columbia that have great Indian Restaurants.

Data

For this project we need the following data:

• British Columbia Data: contains a list of Boroughs, Neighborhoods along with their location coordinates.

• Data source: http://www.geonames.org/postal-codes/CA/BC/british-columbia.html (http://www.geonames.org/postal-codes/CA/BC/british-columbia.html)

• Description: This webpage contains the required information. And we will scrape this data set to explore various neighborhoods of Britih Columbia.

• Indian Restaurants in each neighborhood of British COlumbia

• Data source: Foursquare API

• Description: By using this API we will get all the venues in each neighborhood. We can filter these venues to get only Indian Restaurants.

• We can then get the likes, ratings, etc., to rank the restaurants.

• GeoSpace Data:

• Data source: ‘pgeocode’ library of Python.

• By using this data we draw boundaries and visualize venues on the map.

Approach

•View the British Columbia's's city data from: http://www.geonames.org/postal-codes/CA/BC/british-columbia.html (http://www.geonames.org/postal-codes/CA/BC/british-columbia.html)

•Using Web Scrapping technique, collect required data.

•Using Foursquare API, we will find all venues for each neighborhood.

•Filter out all venues that are Indian Restaurants.

•Find rating, tips and like count for each Indian Restaurants using Foursquare API.

•Using rating for each restaurant, we will sort that data.

•Visualize the Ranking of neighborhoods using folium library(python)

Questions that can be asked using the above-mentioned datasets

1)What is best location in Toronto for Indian Cuisine?

2)Which areas have potential Indian Restaurant Market?

3)Which all areas lack Indian Restaurants?

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

Importing Libraries

In [36]:

```
import pandas as pd
import numpy as np
import requests
from geopy.geocoders import Nominatim
import folium
import json
from pandas.io.json import json_normalize # tranform JSON file into a pandas dataframe
from sklearn.cluster import KMeans
import matplotlib.cm as cm
import matplotlib.colors as colors
import matplotlib.pyplot as plt

import seaborn as sns

import pgeocode
```

```
Collecting seaborn
  Downloading seaborn-0.10.1-py3-none-any.whl (215 kB)
Requirement already satisfied: matplotlib>=2.1.2 in c:\users\aryan\appdata\l
ocal\programs\python\python38-32\lib\site-packages (from seaborn) (3.2.1)
Requirement already satisfied: scipy>=1.0.1 in c:\users\aryan\appdata\local
\programs\python\python38-32\lib\site-packages (from seaborn) (1.5.1)
Requirement already satisfied: numpy>=1.13.3 in c:\users\aryan\appdata\local
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Requirement already satisfied: pandas>=0.22.0 in c:\users\aryan\appdata\loca
l\programs\python\python38-32\lib\site-packages (from seaborn) (1.0.3)
Requirement already satisfied: python-dateutil>=2.1 in c:\users\aryan\appdat
a\local\programs\python\python38-32\lib\site-packages (from matplotlib>=2.1.
2->seaborn) (2.8.1)
Requirement already satisfied: kiwisolver>=1.0.1 in c:\users\aryan\appdata\l
ocal\programs\python\python38-32\lib\site-packages (from matplotlib>=2.1.2->
seaborn) (1.1.0)
Requirement already satisfied: pyparsing!=2.0.4,!=2.1.2,!=2.1.6,>=2.0.1 in
c:\users\aryan\appdata\local\programs\python\python38-32\lib\site-packages
(from matplotlib>=2.1.2->seaborn) (2.4.6)
Requirement already satisfied: cycler>=0.10 in c:\users\aryan\appdata\local
\programs\python\python38-32\lib\site-packages (from matplotlib>=2.1.2->seab
orn) (0.10.0)
Requirement already satisfied: pytz>=2017.2 in c:\users\aryan\appdata\local
\programs\python\python38-32\lib\site-packages (from pandas>=0.22.0->seabor
n) (2020.1)
Requirement already satisfied: six>=1.5 in c:\users\aryan\appdata\local\prog
rams\python\python38-32\lib\site-packages (from python-dateutil>=2.1->matplo
tlib>=2.1.2->seaborn) (1.14.0)
Requirement already satisfied: setuptools in c:\users\aryan\appdata\local\pr
ograms\python\python38-32\lib\site-packages (from kiwisolver>=1.0.1->matplot
lib>=2.1.2->seaborn) (41.2.0)
Installing collected packages: seaborn
Successfully installed seaborn-0.10.1


WARNING: You are using pip version 20.1; however, version 20.2.2 is availabl
e.
You should consider upgrading via the 'c:\users\aryan\appdata\local\programs
\python\python38-32\python.exe -m pip install --upgrade pip' command.
```

```
Requirement already satisfied: pgeocode in c:\users\aryan\appdata\local\pr
ograms\python\python38-32\lib\site-packages (0.2.1)
Requirement already satisfied: pandas in c:\users\aryan\appdata\local\prog
```

```
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Requirement already satisfied: numpy in c:\users\aryan\appdata\local\progr
ams\python\python38-32\lib\site-packages (from pgeocode) (1.18.2)
Requirement already satisfied: requests in c:\users\aryan\appdata\local\pr
ograms\python\python38-32\lib\site-packages (from pgeocode) (2.23.0)

WARNING: You are using pip version 20.1; however, version 20.2.2 is availabl
e.
You should consider upgrading via the 'c:\users\aryan\appdata\local\programs
\python\python38-32\python.exe -m pip install --upgrade pip' command.

Requirement already satisfied: python-dateutil>=2.6.1 in c:\users\aryan\appd
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de) (2.8.1)
Requirement already satisfied: pytz>=2017.2 in c:\users\aryan\appdata\local
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0.1)
Requirement already satisfied: certifi>=2017.4.17 in c:\users\aryan\appdata
\local\programs\python\python38-32\lib\site-packages (from requests->pgeocod
e) (2019.11.28)
Requirement already satisfied: urllib3!=1.25.0,!=1.25.1,<1.26,>=1.21.1 in
c:\users\aryan\appdata\local\programs\python\python38-32\lib\site-packages
(from requests->pgeocode) (1.25.8)
Requirement already satisfied: chardet<4,>=3.0.2 in c:\users\aryan\appdata\l
ocal\programs\python\python38-32\lib\site-packages (from requests->pgeocode)
(3.0.4)
Requirement already satisfied: idna<3,>=2.5 in c:\users\aryan\appdata\local
\programs\python\python38-32\lib\site-packages (from requests->pgeocode) (2.
9)
Requirement already satisfied: six>=1.5 in c:\users\aryan\appdata\local\prog
rams\python\python38-32\lib\site-packages (from python-dateutil>=2.6.1->pand
as->pgeocode) (1.14.0)
```

Extracting Data from WebPage and Transforming into DataFrame

In [2]:

```
df=pd.read_html("http://www.geonames.org/postal-codes/CA/BC/british-columbia.html")[2]
```

In [3]:

```
df=df.iloc[::2]
```

In [4]:

```
df.reset_index(inplace=True)
df.drop('index',1,inplace=True)
df.drop('Unnamed: 0',1,inplace=True)
df.drop(192,inplace=True)
df.drop('Country',1,inplace=True)
df.drop('Admin3',1,inplace=True)
df.rename(columns={'Admin2':'Borough','Place':'Neighbourhood'},inplace=True)
df.drop('Admin1',1,inplace=True)
df=df.dropna()
df=df.reset_index(drop=True)
```

In [5]:

```
df=df[['Code','Borough','Neighbourhood']]
```

In [6]:

```
df
```

Out[6]:

	Code	Borough	Neighbourhood
0	V2H	Kamloops	Kamloops North
1	V2K	Prince George	Prince George North
2	V2L	Prince George	Prince George East Central
3	V2M	Prince George	Prince George West Central
4	V2N	Prince George	Prince George South
...	...	...	...
119	V6A	Vancouver	Vancouver (Strathcona / Chinatown / Downtown E...
120	V6B	Vancouver	Vancouver (NE Downtown / Harbour Centre / Gast...
121	V7A	Richmond	Richmond South
122	V1B	Vernon	Vernon East
123	V2B	Kamloops	Kamloops Northwest

124 rows × 3 columns

In [7]:

```
def get_lat_long(postalcode):
    nomi=pgeocode.Nominatim('ca')
    query=nomi.query_postal_code(postalcode)
    latitude=query['latitude']
    longitude=query['longitude']
    return latitude,longitude
```

In [8]:

```
addlist=[]
for post in df['Code']:
    coord=get_lat_long(post)
    addlist.append(coord)
addlist
```

Out[8]:

```
[(50.7262, -120.1659),
 (54.0508, -122.9221),
 (53.9078, -122.7473),
 (53.9127, -122.8708),
 (53.6408, -122.954),
 (49.1838, -121.9046),
 (49.076, -121.9883),
 (49.0423, -122.2835),
 (49.0384, -122.3485),
 (49.2068, -122.4851),
 (49.2196, -122.6164),
 (49.1285, -122.6236),
 (49.0483, -122.5997),
 (49.2436, -122.7865),
 (49.3167, -122.7384),
 (49.265, -122.8716),
 (49.2366, -122.8521),
 (49.2201, -122.8998),
```

In [9]:

```
latlist=[]
longlist=[]
for i,j in addlist:
    latlist.append(i)
    longlist.append(j)
```

In [10]:

```
df['Latitude']=latlist
df['Longitude']=longlist
```

In [11]:

```
df.rename(columns={'Code':'PostalCode'},inplace=True)
```

In [12]:

```
df
```

Out[12]:

	PostalCode	Borough	Neighbourhood	Latitude	Longitude
0	V2H	Kamloops	Kamloops North	50.7262	-120.1659
1	V2K	Prince George	Prince George North	54.0508	-122.9221
2	V2L	Prince George	Prince George East Central	53.9078	-122.7473
3	V2M	Prince George	Prince George West Central	53.9127	-122.8708
4	V2N	Prince George	Prince George South	53.6408	-122.9540
...	...	...	...	...	...
119	V6A	Vancouver	Vancouver (Strathcona / Chinatown / Downtown E...	49.2779	-123.0908
120	V6B	Vancouver	Vancouver (NE Downtown / Harbour Centre / Gast...	49.2788	-123.1139
121	V7A	Richmond	Richmond South	49.1205	-123.1171
122	V1B	Vernon	Vernon East	50.0840	-118.9380
123	V2B	Kamloops	Kamloops Northwest	50.8869	-120.7357

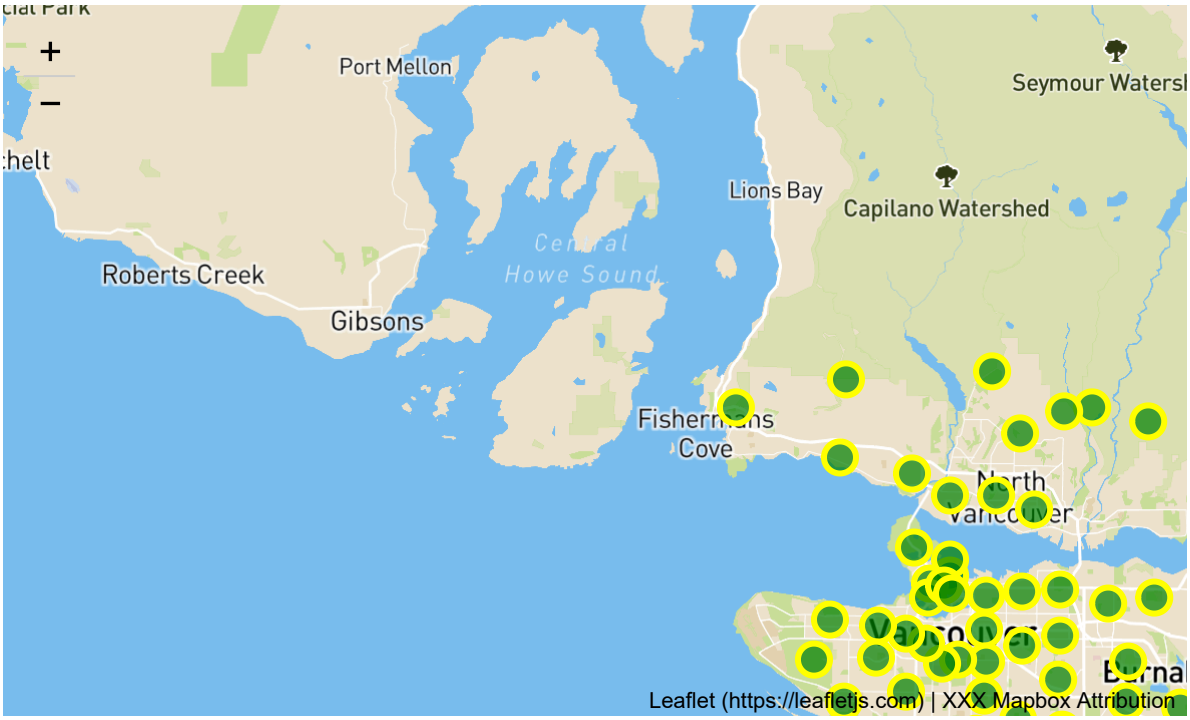
124 rows × 5 columns

Visualizing Map of British Columbia

In [13]:

```
# create map of BC using latitude and longitude values
map_bc = folium.Map(location=get_lat_long('V6A'), zoom_start=10,tiles='https://api.mapbox.c

# add markers to map
for lat, lng, borough, neighborhood in zip(df['Latitude'], df['Longitude'], df['Borough'],
    label = '{}, {}'.format(neighborhood, borough)
    label = folium.Popup(label, parse_html=True)
    folium.CircleMarker(
        [lat, lng],
        radius=8,
        popup=label,
        color='yellow',
        fill=True,
        fill_color='Green',
        fill_opacity=0.7,
        parse_html=False).add_to(map_bc)

map_bc
```

Out[13]:



Loading Foursquare API for exploring location

In [14]:

```
CLIENT_ID = ''
CLIENT_SECRET = ''  # your Foursquare Secret
VERSION = '20200126' # Foursquare API version

print('Your credentails:')
print('CLIENT_ID: ' , CLIENT_ID)
print('CLIENT_SECRET:',CLIENT_SECRET)
```

```
Your credentails:
CLIENT_ID:  YJKGLDP5YWHU3MEP2F2OTPW53RRLNRQQYIY21KU5L0RVYNW1
CLIENT_SECRET: FRS1CGWEIEC0WHFPB3DMWEL44CV0DSLRHVZMN4FW2D3CPLM2
```

Defining a Function to get list of neighborhood

In [15]:

```
def get_venues(lat,lng):

    #set variables
    radius=3000
    LIMIT=100

    #url to fetch data from foursquare api
    url = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&v={}
            CLIENT_ID,
            CLIENT_SECRET,
            VERSION,
            lat,
            lng,
            radius,
            LIMIT)

    # get all the data
    results = requests.get(url).json()
    #results = json_normalize(results)
    venue_data=results['response']['groups'][0]['items']
    venue_details=[]
    for row in venue_data:
        try:
            venue_id=row['venue']['id']
            venue_name=row['venue']['name']
            venue_category=row['venue']['categories'][0]['name']
            venue_details.append([venue_id,venue_name,venue_category])
        except KeyError:
            pass

    column_names=['ID','Name','Category']
    df1 = pd.DataFrame(venue_details,columns=column_names)
    return df1
```

Defining a function to get venue details like like count , rating , tip counts for a given venue id. This will be used for ranking.

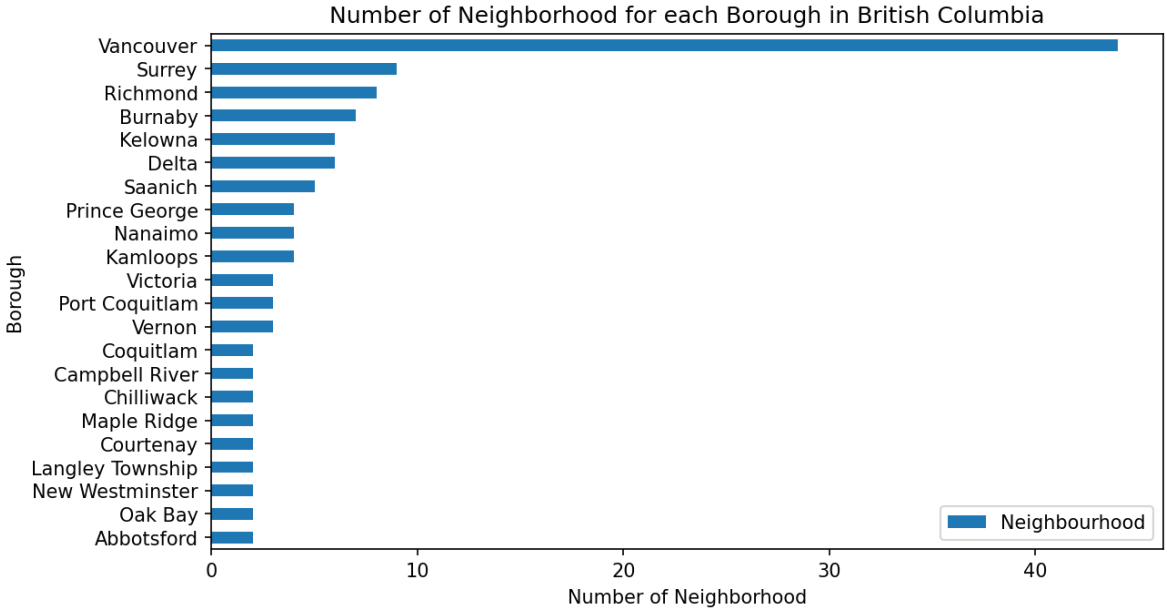
In [16]:

```
def get_venue_details(venue_id):

   #url to fetch data from foursquare api
    url = 'https://api.foursquare.com/v2/venues/{}?&client_id={}&client_secret={}&v={}'.for
           venue_id,
           CLIENT_ID,
           CLIENT_SECRET,
           VERSION)

    # get all the data
    results = requests.get(url).json()
    venue_data=results['response']['venue']
    venue_details=[]
    try:
        venue_id=venue_data['id']
        venue_name=venue_data['name']
        venue_likes=venue_data['likes']['count']
        venue_rating=venue_data['rating']
        venue_tips=venue_data['tips']['count']
        venue_details.append([venue_id,venue_name,venue_likes,venue_rating,venue_tips])
    except KeyError:
        pass

    column_names=['ID','Name','Likes','Rating','Tips']
    df2 = pd.DataFrame(venue_details,columns=column_names)
    return df2
```

Visualizing No. of Neighborhood in each Borough

In [17]:

```
plt.figure(figsize=(9,5), dpi=150)
# title
plt.title('Number of Neighborhood for each Borough in British Columbia')
#On x-axis
plt.xlabel('Number of Neighborhood', fontsize = 10)
#On y-axis
plt.ylabel('Borough', fontsize=10)
#giving a bar plot
df.groupby('Borough')['Neighbourhood'].count().sort_values().plot(kind='barh')
#Legend
plt.legend()
#displays the plot
plt.show()
```



Vancouver has the maximum number of Neighborhood, followed by Surrey and Richmond

Let us find out number of Indian Restaurants in the top 4 neighbourhoods.

In [18]:

```
df_1=df.loc[df['Borough'].isin(['Vancouver','Surrey','Richmond','Burnaby'])]
df_1.reset_index(drop=True)
```

Out[18]:

	PostalCode	Borough	Neighbourhood	Latitude	Longitude
0	V3R	Surrey	Surrey North	49.1948	-122.8131
1	V3S	Surrey	Surrey East	49.0791	-122.7553
2	V3T	Surrey	Surrey Inner Northwest	49.1894	-122.8454
3	V3V	Surrey	Surrey Outer Northwest	49.1889	-122.8730
4	V3W	Surrey	Surrey Upper West	49.1410	-122.8569
...	...	...	...	...	...
63	V5A	Burnaby	Burnaby (Government Road / Lake City / SFU / B...	49.2640	-122.9369
64	V5B	Burnaby	Burnaby (Parkcrest-Aubrey / Ardingley-Sprott)	49.2769	-122.9761
65	V6A	Vancouver	Vancouver (Strathcona / Chinatown / Downtown E...	49.2779	-123.0908
66	V6B	Vancouver	Vancouver (NE Downtown / Harbour Centre / Gast...	49.2788	-123.1139
67	V7A	Richmond	Richmond South	49.1205	-123.1171

68 rows × 5 columns

In [19]:

```
# prepare neighborhood list that contains indian resturants
column_names=['Borough', 'Neighbourhood', 'ID','Name']
indian_rest_bc=pd.DataFrame(columns=column_names)
count=1
for row in df_1.values.tolist():
    Postcode, Borough, Neighbourhood, Latitude, Longitude = row
    venues = get_venues(Latitude,Longitude)
    indian_resturants=venues[venues['Category']=='Indian Restaurant']
    print('(',count,'/',len(df_1),')','Indian Resturants in '+Neighbourhood+', '+Borough+':
    for resturant_detail in indian_resturants.values.tolist():
        id, name , category=resturant_detail
        indian_rest_bc = indian_rest_bc.append({'Borough': Borough,
                                                'Neighbourhood': Neighbourhood,
                                                'ID': id,
                                                'Name' : name
                                               }, ignore_index=True)
    count+=1
```

```
( 1 / 68 ) Indian Resturants in Surrey North, Surrey:1
( 2 / 68 ) Indian Resturants in Surrey East, Surrey:0
( 3 / 68 ) Indian Resturants in Surrey Inner Northwest, Surrey:1
( 4 / 68 ) Indian Resturants in Surrey Outer Northwest, Surrey:4
( 5 / 68 ) Indian Resturants in Surrey Upper West, Surrey:7
( 6 / 68 ) Indian Resturants in Surrey Lower West, Surrey:1
( 7 / 68 ) Indian Resturants in Surrey Northeast, Surrey:0
( 8 / 68 ) Indian Resturants in Surrey South, Surrey:1
( 9 / 68 ) Indian Resturants in Burnaby (Burnaby Heights / Willingdon Height
s / West Central Valley), Burnaby:1
( 10 / 68 ) Indian Resturants in Burnaby (Lakeview-Mayfield / Richmond Park
/ Kingsway-Beresford), Burnaby:0
( 11 / 68 ) Indian Resturants in Burnaby (Cascade-Schou / Douglas-Gilpin), B
urnaby:2
( 12 / 68 ) Indian Resturants in Burnaby (Maywood / Marlborough / Oakalla /
Windsor), Burnaby:1
( 13 / 68 ) Indian Resturants in Burnaby (Suncrest / Sussex-Nelson / Clinton
-Glenwood / West Big Bend), Burnaby:0
( 14 / 68 ) Indian Resturants in Vancouver (North Hastings-Sunrise), Vancouv
er:3
( 15 / 68 ) Indian Resturants in Vancouver (North Grandview-Woodlands), Vanc
ouver:0
( 16 / 68 ) Indian Resturants in Vancouver (South Hastings-Sunrise / North R
enfrew-Collingwood), Vancouver:5
( 17 / 68 ) Indian Resturants in Vancouver (South Grandview-Woodlands / NE K
ensington), Vancouver:3
( 18 / 68 ) Indian Resturants in Vancouver (SE Kensington / Victoria-Fraserv
iew), Vancouver:3
( 19 / 68 ) Indian Resturants in Vancouver (South Renfrew-Collingwood), Vanc
ouver:3
( 20 / 68 ) Indian Resturants in Vancouver (Killarney), Vancouver:2
( 21 / 68 ) Indian Resturants in Vancouver (East Mount Pleasant), Vancouver:
4
( 22 / 68 ) Indian Resturants in Vancouver (West Kensington / NE Riley Park-
Little Mountain), Vancouver:4
( 23 / 68 ) Indian Resturants in Vancouver (SE Riley Park-Little Mountain /
SW Kensington / NE Oakridge / North Sunset), Vancouver:1
( 24 / 68 ) Indian Resturants in Vancouver (SE Oakridge / East Marpole / Sou
th Sunset), Vancouver:1
( 25 / 68 ) Indian Resturants in Vancouver (West Mount Pleasant / West Riley
Park-Little Mountain), Vancouver:2
```

```
( 26 / 68 ) Indian Resturants in Vancouver (East Fairview / South Cambie), V
ancouver:0
( 27 / 68 ) Indian Resturants in Vancouver (Waterfront / Coal Harbour / Cana
da Place), Vancouver:0
( 28 / 68 ) Indian Resturants in Vancouver (South West End), Vancouver:0
( 29 / 68 ) Indian Resturants in Vancouver (North West End / Stanley Park),
Vancouver:0
( 30 / 68 ) Indian Resturants in Vancouver (West Fairview / Granville Island
/ NE Shaughnessy), Vancouver:0
( 31 / 68 ) Indian Resturants in Vancouver (NW Shaughnessy / East Kitsilano
/ Quilchena), Vancouver:0
( 32 / 68 ) Indian Resturants in Vancouver (Central Kitsilano), Vancouver:2
( 33 / 68 ) Indian Resturants in Vancouver (NW Arbutus Ridge), Vancouver:3
( 34 / 68 ) Indian Resturants in Vancouver (South Shaughnessy / NW Oakridge
/ NE Kerrisdale / SE Arbutus Ridge), Vancouver:1
( 35 / 68 ) Indian Resturants in Vancouver (Dunbar-Southlands / Musqueam), V
ancouver:1
( 36 / 68 ) Indian Resturants in Vancouver (SE Kerrisdale / SW Oakridge / We
st Marpole), Vancouver:2
( 37 / 68 ) Indian Resturants in Vancouver (West Kitsilano / Jericho), Vanco
uver:0
( 38 / 68 ) Indian Resturants in Vancouver (Chaldecutt / South University En
dowment Lands), Vancouver:1
( 39 / 68 ) Indian Resturants in Richmond Northeast, Richmond:0
( 40 / 68 ) Indian Resturants in Richmond Southeast, Richmond:0
( 41 / 68 ) Indian Resturants in Richmond North, Richmond:1
( 42 / 68 ) Indian Resturants in Richmond Central, Richmond:0
( 43 / 68 ) Indian Resturants in Vancouver (SW Downtown), Vancouver:0
( 44 / 68 ) Indian Resturants in Richmond (Sea Island / YVR), Richmond:0
( 45 / 68 ) Indian Resturants in Richmond West, Richmond:0
( 46 / 68 ) Indian Resturants in Richmond Southwest, Richmond:0
( 47 / 68 ) Indian Resturants in North Vancouver Outer East, Vancouver:0
( 48 / 68 ) Indian Resturants in North Vancouver Inner East, Vancouver:0
( 49 / 68 ) Indian Resturants in North Vancouver East Central, Vancouver:0
( 50 / 68 ) Indian Resturants in North Vancouver North Central, Vancouver:0
( 51 / 68 ) Indian Resturants in North Vancouver South Central, Vancouver:3
( 52 / 68 ) Indian Resturants in North Vancouver Southwest Central, Vancouve
r:3
( 53 / 68 ) Indian Resturants in North Vancouver Northwest Central, Vancouve
r:1
( 54 / 68 ) Indian Resturants in North Vancouver Southwest, Vancouver:0
( 55 / 68 ) Indian Resturants in North Vancouver Northwest, Vancouver:0
( 56 / 68 ) Indian Resturants in West Vancouver North, Vancouver:0
( 57 / 68 ) Indian Resturants in West Vancouver Southeast, Vancouver:0
( 58 / 68 ) Indian Resturants in West Vancouver South, Vancouver:0
( 59 / 68 ) Indian Resturants in West Vancouver West, Vancouver:0
( 60 / 68 ) Indian Resturants in Vancouver (Bentall Centre), Vancouver:0
( 61 / 68 ) Indian Resturants in Vancouver (Pacific Centre), Vancouver:0
( 62 / 68 ) Indian Resturants in Surrey Southwest, Surrey:1
( 63 / 68 ) Indian Resturants in Vancouver (UBC), Vancouver:0
( 64 / 68 ) Indian Resturants in Burnaby (Government Road / Lake City / SFU
/ Burnaby Mountain), Burnaby:0
( 65 / 68 ) Indian Resturants in Burnaby (Parkcrest-Aubrey / Ardingley-Sprot
t), Burnaby:0
( 66 / 68 ) Indian Resturants in Vancouver (Strathcona / Chinatown / Downtow
n Eastside), Vancouver:0
( 67 / 68 ) Indian Resturants in Vancouver (NE Downtown / Harbour Centre / G
astown / Yaletown), Vancouver:0
( 68 / 68 ) Indian Resturants in Richmond South, Richmond:0
```

In [20]:

```
print(indian_rest_bc.shape)
print(indian_rest_bc.isnull().sum())
indian_rest_bc.head()
```

```
(69, 4)
Borough          0
Neighbourhood    0
ID               0
Name             0
dtype: int64
```

Out[20]:

	Borough	Neighbourhood	ID	Name
0	Surrey	Surrey North	4ac95ec4f964a520c9bf20e3	Taste of Punjab
1	Surrey	Surrey Inner Northwest	4ac95ec4f964a520c9bf20e3	Taste of Punjab
2	Surrey	Surrey Outer Northwest	4b63a846f964a520368a2ae3	Mahek Restaurant & Lounge
3	Surrey	Surrey Outer Northwest	4e9a53f402d5df1b5037ed69	Krishna's Dosa Grill
4	Surrey	Surrey Outer Northwest	4b93033df964a520b52e34e3	Mirch Masala

We have got 69 Indian Restaurants!

Let us look at Indian Restaurants in each Borough

In [21]:

```
plt.figure(figsize=(9,5), dpi = 150)
# title
plt.title('Number of Indian Resturants for each Borough in British Columbia')
#On x-axis
plt.xlabel('Number of Indian Resturants', fontsize = 10)
#On y-axis
plt.ylabel('Borough', fontsize=10)
#giving a bar plot
indian_rest_bc.groupby('Borough')['ID'].count().sort_values().plot(kind='barh',color='Green
#legend
plt.legend()
#displays the plot
plt.show()
```

Which Neighborhood has the highest number of Indian Restaurants?

In [22]:

```
plt.figure(figsize=(9,5), dpi = 150)
# title
plt.title('Number of Indian Resturants for each Neighborhood in British Columbia')
#On x-axis
plt.xlabel('No.of Indian Resturants', fontsize = 15)
#On y-axis
plt.ylabel('Neighborhood', fontsize=15)
#giving a bar plot
#indian_rest_toronto.groupby('Neighborhood')['ID'].count().nlargest(5).plot(kind='barh', co
indian_rest_bc.groupby(['Neighbourhood','Borough'])['ID'].count().nlargest(9).plot(kind='ba


#Legend
plt.legend()
#displays the plot
plt.show()
```

Lets find out the Indian Restaurants in Vancouver.

In [23]:

```
rest_list_vanc=indian_rest_bc[indian_rest_bc['Borough']=='Vancouver']
rest_list_vanc
```

Out[23]:

	Borough	Neighbourhood	ID	Name
19	Vancouver	Vancouver (North Hastings-Sunrise)	50ada0e0e4b03c6b1ca797ff	Curry Zone
20	Vancouver	Vancouver (North Hastings-Sunrise)	4ab99baef964a520008020e3	Tandoori Palace
21	Vancouver	Vancouver (North Hastings-Sunrise)	4f73c020e4b0ab2907d5a86f	Siddhartha's
22	Vancouver	Vancouver (South Hastings-Sunrise / North Renf...	4dacac2b5da32d679da751b7	Agra Tandoori Restaurant
23	Vancouver	Vancouver (South Hastings-Sunrise / North Renf...	4ab99baef964a520008020e3	Tandoori Palace
24	Vancouver	Vancouver (South Hastings-Sunrise / North Renf...	4bd73cbcf645c9b68b82a5e0	Jambo Grill
25	Vancouver	Vancouver (South Hastings-Sunrise / North Renf...	4f73c020e4b0ab2907d5a86f	Siddhartha's
26	Vancouver	Vancouver (South Hastings-Sunrise / North Renf...	4aa95279f964a520125320e3	House of Dosas
27	Vancouver	Vancouver (South Grandview-Woodlands / NE Kens...	4aa95279f964a520125320e3	House of Dosas
28	Vancouver	Vancouver (South Grandview-Woodlands / NE Kens...	4f73c020e4b0ab2907d5a86f	Siddhartha's
29	Vancouver	Vancouver (South Grandview-Woodlands / NE Kens...	4ab99baef964a520008020e3	Tandoori Palace
30	Vancouver	Vancouver (SE Kensington / Victoria-Fraserview)	4bd73cbcf645c9b68b82a5e0	Jambo Grill
31	Vancouver	Vancouver (SE Kensington / Victoria-Fraserview)	53210bc611d2500619b26acf	Dosa Corner
32	Vancouver	Vancouver (SE Kensington / Victoria-Fraserview)	4ab836a6f964a520937c20e3	All India Sweets & Restaurant
33	Vancouver	Vancouver (South Renfrew-Collingwood)	4bd73cbcf645c9b68b82a5e0	Jambo Grill
34	Vancouver	Vancouver (South Renfrew-Collingwood)	4dacac2b5da32d679da751b7	Agra Tandoori Restaurant
35	Vancouver	Vancouver (South Renfrew-Collingwood)	4aa95279f964a520125320e3	House of Dosas
36	Vancouver	Vancouver (Killarney)	4bd73cbcf645c9b68b82a5e0	Jambo Grill
37	Vancouver	Vancouver (Killarney)	4ad4cf65f964a520e9fb20e3	Saffron Indian Cuisine
38	Vancouver	Vancouver (East Mount Pleasant)	4bf04d2051f2c9b68d78f192	Chutney Villa
39	Vancouver	Vancouver (East Mount Pleasant)	5674aec9498e6800815c3598	Vij's
40	Vancouver	Vancouver (East Mount Pleasant)	52ae4f3c11d227ba4f4b055a	Indian Roti Kitchen

	Borough	Neighbourhood	ID	Name
41	Vancouver	Vancouver (East Mount Pleasant)	4aa95279f964a520125320e3	House of Dosas
42	Vancouver	Vancouver (West Kensington / NE Riley Park-Lit...	4aa95279f964a520125320e3	House of Dosas
43	Vancouver	Vancouver (West Kensington / NE Riley Park-Lit...	5674aec9498e6800815c3598	Vij's
44	Vancouver	Vancouver (West Kensington / NE Riley Park-Lit...	4bf04d2051f2c9b68d78f192	Chutney Villa
45	Vancouver	Vancouver (West Kensington / NE Riley Park-Lit...	52ae4f3c11d227ba4f4b055a	Indian Roti Kitchen
46	Vancouver	Vancouver (SE Riley Park-Little Mountain / SW ...	4aa95279f964a520125320e3	House of Dosas
47	Vancouver	Vancouver (SE Oakridge / East Marpole / South ...	515f2bfe498e3da87afd0524	Ginger Indian Cuisine
48	Vancouver	Vancouver (West Mount Pleasant / West Riley Pa...	4aa6ad08f964a5209c4a20e3	Nirvana Indian Restaruant
49	Vancouver	Vancouver (West Mount Pleasant / West Riley Pa...	4aa95279f964a520125320e3	House of Dosas
50	Vancouver	Vancouver (Central Kitsilano)	4abff3e8f964a520329320e3	The Indian Oven
51	Vancouver	Vancouver (Central Kitsilano)	52c10a24498edc75a7191217	Vij’s Rangoli
52	Vancouver	Vancouver (NW Arbutus Ridge)	4abff3e8f964a520329320e3	The Indian Oven
53	Vancouver	Vancouver (NW Arbutus Ridge)	52c10a24498edc75a7191217	Vij’s Rangoli
54	Vancouver	Vancouver (NW Arbutus Ridge)	4b2dbd73f964a520fcda24e3	Handi Cuisine of India
55	Vancouver	Vancouver (South Shaughnessy / NW Oakridge / N...	4bff0576c30a2d7f8764101d	Mirchi Restaurant
56	Vancouver	Vancouver (Dunbar-Southlands / Musqueam)	4b2dbd73f964a520fcda24e3	Handi Cuisine of India
57	Vancouver	Vancouver (SE Kerrisdale / SW Oakridge / West ...	4bff0576c30a2d7f8764101d	Mirchi Restaurant
58	Vancouver	Vancouver (SE Kerrisdale / SW Oakridge / West ...	4ab836a6f964a520937c20e3	All India Sweets & Restaurant
59	Vancouver	Vancouver (Chaldecutt / South University Endow...	4b2dbd73f964a520fcda24e3	Handi Cuisine of India
61	Vancouver	North Vancouver South Central	4b6e2755f964a52035ae2ce3	Palki Restaurant
62	Vancouver	North Vancouver South Central	4bb695ed6edc76b01636311c	Indian Fusion
63	Vancouver	North Vancouver South Central	4d1b8dbac1db60fc3fb5fa64	Vaades Indian Restaurant
64	Vancouver	North Vancouver Southwest Central	4bb695ed6edc76b01636311c	Indian Fusion

	Borough	Neighbourhood	ID	Name
65	Vancouver	North Vancouver Southwest Central	4b6e2755f964a52035ae2ce3	Palki Restaurant
66	Vancouver	North Vancouver Southwest Central	4d1b8dbac1db60fc3fb5fa64	Vaades Indian Restaurant
67	Vancouver	North Vancouver Northwest Central	4bb695ed6edc76b01636311c	Indian Fusion

Now let us get the Ranking of Each Restaurant based on Likes, Ratings, Tips from the FourSquare API.

In [24]:

```
column_names=['Borough', 'Neighbourhood', 'ID','Name','Likes','Rating','Tips']
indian_rest_stats_bc=pd.DataFrame(columns=column_names)
count=1


for row in indian_rest_bc.values.tolist():
    Borough,Neighbourhood,ID,Name=row
    try:
        venue_details=get_venue_details(ID)
        print(venue_details)
        id,name,likes,rating,tips=venue_details.values.tolist()[0]
    except IndexError:
        print('No data available for id=',ID)
        # we will assign 0 value for these resturants as they may have been
        #recently opened or details does not exist in FourSquare Database
        id,name,likes,rating,tips=[0]*5
    print('(',count,'/',len(indian_rest_bc),')','processed')
    indian_rest_stats_bc = indian_rest_stats_bc.append({'Borough': Borough,
                                                        'Neighbourhood': Neighbourhood,
                                                        'ID': id,
                                                        'Name' : name,
                                                        'Likes' : likes,
                                                        'Rating' : rating,
                                                        'Tips' : tips
                                                       }, ignore_index=True)
    count+=1
```

```
                         ID             Name  Likes  Rating  Tips
0  4ac95ec4f964a520c9bf20e3  Taste of Punjab     10     6.1     7
( 1 / 69 ) processed
                         ID             Name  Likes  Rating  Tips
0  4ac95ec4f964a520c9bf20e3  Taste of Punjab     10     6.1     7
( 2 / 69 ) processed
                         ID                       Name  Likes  Rating  Tip
s
0  4b63a846f964a520368a2ae3  Mahek Restaurant & Lounge     15     7.9    1
1
( 3 / 69 ) processed
                         ID                  Name  Likes  Rating  Tips
0  4e9a53f402d5df1b5037ed69  Krishna's Dosa Grill      6     7.8     2
( 4 / 69 ) processed
                         ID          Name  Likes  Rating  Tips
0  4b93033df964a520b52e34e3  Mirch Masala      6     7.1     7
( 5 / 69 ) processed
                         ID             Name  Likes  Rating  Tips
0  4ac95ec4f964a520c9bf20e3  Taste of Punjab     10     6.1     7
```

In [27]:

```
print('DataFrame has :',indian_rest_stats_bc.shape[0],'rows and', indian_rest_stats_bc.shap
indian_rest_stats_bc.head()
```

```
DataFrame has : 69 rows and 7 columns
```

Out[27]:

	Borough	Neighbourhood	ID	Name	Likes	Rating	Tips
0	Surrey	Surrey North	4ac95ec4f964a520c9bf20e3	Taste of Punjab	10	6.1	7
1	Surrey	Surrey Inner Northwest	4ac95ec4f964a520c9bf20e3	Taste of Punjab	10	6.1	7
2	Surrey	Surrey Outer Northwest	4b63a846f964a520368a2ae3	Mahek Restaurant & Lounge	15	7.9	11
3	Surrey	Surrey Outer Northwest	4e9a53f402d5df1b5037ed69	Krishna's Dosa Grill	6	7.8	2
4	Surrey	Surrey Outer Northwest	4b93033df964a520b52e34e3	Mirch Masala	6	7.1	7

Let us save the DataFrame to a CSV File, and from here on we will use the CSV file for further manipulations.

In [28]:

```
indian_rest_stats_bc.to_csv('indian_rest_stats_bc.csv', index=False)
print('File Saved in your directory as indian_rest_stats_bc.csv')
```

```
File Saved in your directory as indian_rest_stats_bc.csv
```

In [29]:

```
indian_rest_stats_bc_csv=pd.read_csv('indian_rest_stats_bc.csv')
indian_rest_stats_bc_csv.head()
```

Out[29]:

	Borough	Neighbourhood	ID	Name	Likes	Rating	Tips
0	Surrey	Surrey North	4ac95ec4f964a520c9bf20e3	Taste of Punjab	10	6.1	7
1	Surrey	Surrey Inner Northwest	4ac95ec4f964a520c9bf20e3	Taste of Punjab	10	6.1	7
2	Surrey	Surrey Outer Northwest	4b63a846f964a520368a2ae3	Mahek Restaurant & Lounge	15	7.9	11
3	Surrey	Surrey Outer Northwest	4e9a53f402d5df1b5037ed69	Krishna's Dosa Grill	6	7.8	2
4	Surrey	Surrey Outer Northwest	4b93033df964a520b52e34e3	Mirch Masala	6	7.1	7

Indian Restaurants based on MAX Likes.

In [30]:

```
print(indian_rest_stats_bc_csv.iloc[indian_rest_stats_bc_csv['Likes'].idxmax()])
```

```
Borough                                                 Vancouver
Neighbourhood    Vancouver (South Hastings-Sunrise / North Renf...
ID                                          4aa95279f964a520125320e3
Name                                                 House of Dosas
Likes                                                            88
Rating                                                          8.4
Tips                                                             33
Name: 26, dtype: object
```

Indian Restaurants based on MAX Ratings.

In [31]:

```
print(indian_rest_stats_bc_csv.iloc[indian_rest_stats_bc_csv['Rating'].idxmax()])
```

```
Borough                                Vancouver
Neighbourhood    North Vancouver South Central
ID                    4bb695ed6edc76b01636311c
Name                                Indian Fusion
Likes                                          33
Rating                                          9
Tips                                           21
Name: 62, dtype: object
```

Indian Restaurants based on MAX Tips.

In [32]:

```
print(indian_rest_stats_bc_csv.iloc[indian_rest_stats_bc_csv['Tips'].idxmax()])
```

```
Borough                                                 Vancouver
Neighbourhood    Vancouver (South Hastings-Sunrise / North Renf...
ID                                          4aa95279f964a520125320e3
Name                                                 House of Dosas
Likes                                                            88
Rating                                                          8.4
Tips                                                             33
Name: 26, dtype: object
```

Top Borough for Indian Restaurants based on Average Ratings.

In [33]:

```
bc_borough_stats=indian_rest_stats_bc_csv.groupby('Borough')['Rating'].mean().reset_index()
bc_borough_stats.columns=['Borough','Average Rating']
bc_borough_stats.nlargest(10,'Average Rating')
```

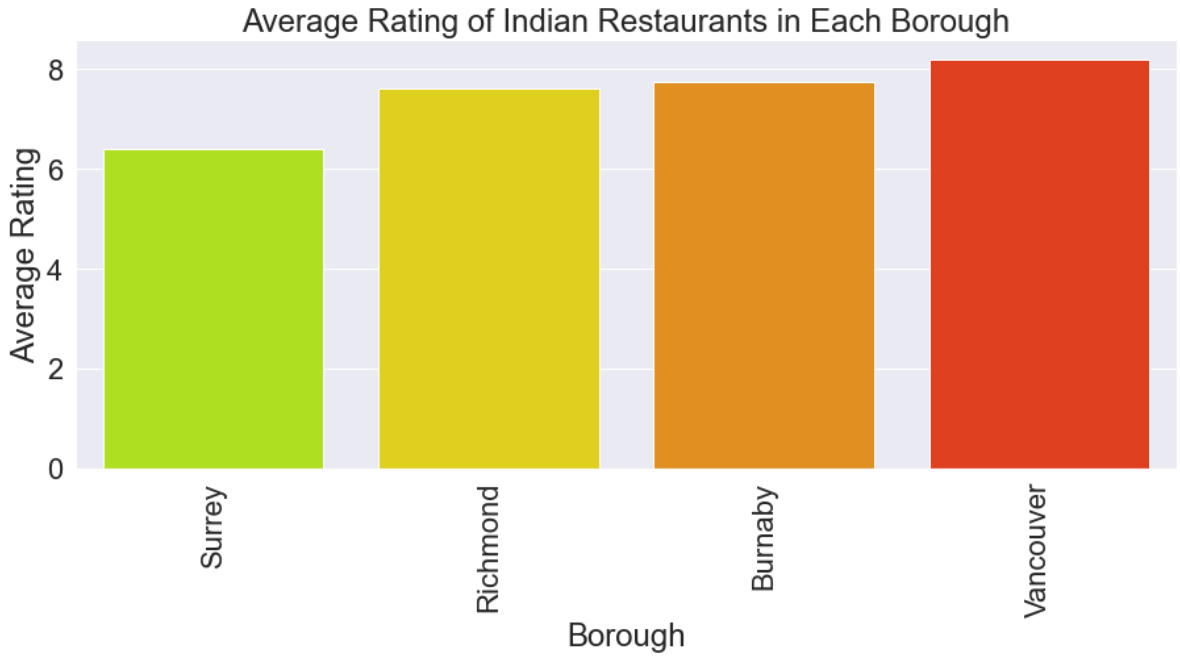
Out[33]:

	Borough	Average Rating
3	Vancouver	8.183333
0	Burnaby	7.750000
1	Richmond	7.600000
2	Surrey	6.393750

Visualizing The Best of Borough.

In [37]:

```
bc_borough_stats=bc_borough_stats.sort_values(by='Average Rating')
sns.set(style="darkgrid",font_scale=2,rc={'figure.figsize':(15,6)})
ax = sns.barplot(x="Borough", y="Average Rating", data=bc_borough_stats, palette="prism_r")
plt.title('Average Rating of Indian Restaurants in Each Borough')
plt.xticks(rotation=90)
plt.show()
```



Top Neighborhoods for Indian Restaurants based on Average Ratings.

In [39]:

```
bc_neighborhood_stats=indian_rest_stats_bc_csv.groupby(['Neighbourhood'])['Rating'].mean().
bc_neighborhood_stats.columns=['Neighbourhood','Average Rating']
bc_neighborhood_stats.sort_values(by='Average Rating',ascending=False).head()
```

Out[39]:

	Neighbourhood	Average Rating
3	North Vancouver Northwest Central	9.000000
29	Vancouver (West Kensington / NE Riley Park-Lit...	8.525000
17	Vancouver (East Mount Pleasant)	8.525000
14	Vancouver (Central Kitsilano)	8.500000
27	Vancouver (South Renfrew-Collingwood)	8.466667

In [40]:

```
avg_rating=8.0
best_bc_neighborhood_stats=bc_neighborhood_stats[bc_neighborhood_stats['Average Rating']>=a
print(best_bc_neighborhood_stats.shape[0],'Indian Restaurants has average rating of', avg_r
best_bc_neighborhood_stats.sort_values(by='Average Rating',ascending=False)
```

```
16 Indian Restaurants has average rating of 8.0 and above.
 Check the list below.
```

Out[40]:

	Neighbourhood	Average Rating
3	North Vancouver Northwest Central	9.000000
17	Vancouver (East Mount Pleasant)	8.525000
29	Vancouver (West Kensington / NE Riley Park-Lit...	8.525000
14	Vancouver (Central Kitsilano)	8.500000
27	Vancouver (South Renfrew-Collingwood)	8.466667
24	Vancouver (SE Riley Park-Little Mountain / SW ...	8.400000
4	North Vancouver South Central	8.366667
5	North Vancouver Southwest Central	8.366667
26	Vancouver (South Hastings-Sunrise / North Renf...	8.360000
25	Vancouver (South Grandview-Woodlands / NE Kens...	8.266667
0	Burnaby (Burnaby Heights / Willingdon Heights ...	8.200000
30	Vancouver (West Mount Pleasant / West Riley Pa...	8.150000
19	Vancouver (NW Arbutus Ridge)	8.133333
18	Vancouver (Killarney)	8.050000
20	Vancouver (North Hastings-Sunrise)	8.033333
8	Surrey Lower West	8.000000

Merging DataFrame to get the Coordinates.

In [41]:

```
best_neighborhood_folium=pd.merge(best_bc_neighborhood_stats,df_1,how='inner',on='Neighbour
best_neighborhood_folium=best_neighborhood_folium.rename(columns={'Borough_x':'Borough'})
best_neighborhood_folium=best_neighborhood_folium[['Borough','Neighbourhood','Average Ratin
print('We have our required DatFrame ready to be plotted on a Map.')
best_neighborhood_folium=best_neighborhood_folium.sort_values(by='Average Rating', ascendin
best_neighborhood_folium['Average Rating']=best_neighborhood_folium['Average Rating'].round
best_neighborhood_folium
```

```
We have our required DatFrame ready to be plotted on a Map.
```

Out[41]:

	Borough	Neighbourhood	Average Rating	Latitude	Longitude
0	Vancouver	North Vancouver Northwest Central	9.00	49.3500	-123.0679
1	Vancouver	Vancouver (East Mount Pleasant)	8.52	49.2620	-123.0923
2	Vancouver	Vancouver (West Kensington / NE Riley Park-Lit...	8.52	49.2480	-123.0913
3	Vancouver	Vancouver (Central Kitsilano)	8.50	49.2646	-123.1648
4	Vancouver	Vancouver (South Renfrew-Collingwood)	8.47	49.2397	-123.0407
5	Vancouver	Vancouver (SE Riley Park-Little Mountain / SW ...	8.40	49.2327	-123.0917
6	Vancouver	North Vancouver South Central	8.37	49.3160	-123.0576
7	Vancouver	North Vancouver Southwest Central	8.37	49.3222	-123.0834
8	Vancouver	Vancouver (South Hastings-Sunrise / North Renf...	8.36	49.2600	-123.0398
9	Vancouver	Vancouver (South Grandview-Woodlands / NE Kens...	8.27	49.2551	-123.0667
10	Burnaby	Burnaby (Burnaby Heights / Willingdon Heights ...	8.20	49.2740	-123.0074
11	Vancouver	Vancouver (West Mount Pleasant / West Riley Pa...	8.15	49.2492	-123.1104
12	Vancouver	Vancouver (NW Arbutus Ridge)	8.13	49.2497	-123.1660
13	Vancouver	Vancouver (Killarney)	8.05	49.2175	-123.0380
14	Vancouver	Vancouver (North Hastings-Sunrise)	8.03	49.2807	-123.0397
15	Surrey	Surrey Lower West	8.00	49.1067	-122.8576

Visualizing The Best of Neighborhoods based on Average Rating of 8.0 and above on Map.

In [47]:

```
from folium import plugins
best_neighborhood_avg_rating_map_2 = folium.Map(location=get_lat_long('V6B'), zoom_start=10

# instantiate a mark cluster object for the incidents in the dataframe
incidents = plugins.MarkerCluster().add_to(best_neighborhood_avg_rating_map_2)

for lat, lng, rating, neighborhood in zip(best_neighborhood_folium['Latitude'], best_neighb
    label = '{},{}'.format(rating,neighborhood)
    label = folium.Popup(label, parse_html=True)
    folium.Marker(
        [lat, lng],
        popup=label).add_to(incidents)
best_neighborhood_avg_rating_map_2.save('best_neighborhood_avg_rating_map_2.html')
best_neighborhood_avg_rating_map_2
```

Out[47]:

Conclusion

1. What is the best location in British Columbia for Indian Cuisine?

   Indian Fusion in Northern Vancouver has the highest rating to have Indian Food.

2. Which areas have potential Indian Restaurant Market?

   Surrey has the least rated Indian restaurants. For an investor, it's an opportunity to grab to come up with a high-quality restaurant.

3. Which all areas lack Indian Restaurants?

   Richmond and Burnaby have the lowest number of Indian Restaurants but are highly rated. For an investor, to come up with variety and quality is a challenge to conquer.

4. Which is the best place to stay if I prefer Indian Cuisine?

   Vancouver is the place where one should stay if they prefer Indian Cuisine. It has quality and variety both.

Limitations

1. Food habits and likings are completely relative.
2. Ranking of Borough, Neighborhood, and Restaurants are based on rating data fetched from FourSquare API.
3. Results may vary if more data is available.

In [1]:

```
!pip install pandoc
```

```
Requirement already satisfied: pandoc in c:\users\aryan\appdata\local\progra
ms\python\python38-32\lib\site-packages (1.0.2)
Requirement already satisfied: ply in c:\users\aryan\appdata\local\programs
\python\python38-32\lib\site-packages (from pandoc) (3.11)

WARNING: You are using pip version 20.1; however, version 20.2.2 is availabl
e.
You should consider upgrading via the 'c:\users\aryan\appdata\local\programs
\python\python38-32\python.exe -m pip install --upgrade pip' command.
```

In [ ]:

```

```