The Battle of Neighborhoods (Week 1)

A description of the problem and a discussion of the background

Bengaluru (old name Bangalore) is IT hub of India. College grads migrate from different states to start there IT career in Bengaluru. 50% population of this city is migrant. Bengaluru comes in top 10 Indian cities for multilingual people. Because of massive development of IT industry in this city, there are other industries and businesses growing here like real state, hotel/hospitality industry, restaurants,e-Commerce and retail industry. Because of the diversity, different type of people like to spend their weekends and holidays differently, some people like visit restaurants and bars,some people like to spend time with family and kids in shopping malls and some people like to go for trips. If someone is looking to open a new business, a restaurant or superstore, s/he would need to understand population density of different neighborhoods of Bengaluru and already existing restaurants, bars and superstores.

A description of the data and how it will be used to solve the problem

I would collect population density of different neighborhood of Bengaluru. Using latitude and longitude for the neighborhood, I would explore them for restaurants/bars/superstore/malls with the help of Foursquare APIs. Higher population density with less number of restaurants/bars/superstore/malls would be the best places to start a new business.

Data Source

Bruhat Bengaluru Mahanagara Palike official website

http://bbmp.gov.in/documents/10180/460906/BBMPR_ward_master_BBMP+Restructuring+03-08-2015.pdf (http://bbmp.gov.in/documents/10180/460906/BBMPR_ward_master_BBMP+Restructuring+03-08-2015.pdf)

```
In [46]:  import types
          import pandas as pd
          from botocore.client import Config
          import ibm_boto3

          def __iter__(self): return 0

          # @hidden_cell
          # The following code accesses a file in your IBM Cloud Object Storage. It incl
          udes your credentials.
          # You might want to remove those credentials before you share the notebook.
          client_b0e3d91ea3a640f0b87094576c71979a = ibm_boto3.client(service_name='s3',
              ibm_api_key_id='s3SltTmlGlRi_yzWluY3VetWRNy82jKXd_v9YDHXuPOR',
              ibm_auth_endpoint="https://iam.ng.bluemix.net/oidc/token",
              config=Config(signature_version='oauth'),
              endpoint_url='https://s3-api.us-geo.objectstorage.service.networklayer.co
          m')

          body = client_b0e3d91ea3a640f0b87094576c71979a.get_object(Bucket='courseracaps
          tone-donotdelete-pr-7mump6v0gfpjv4',Key='BBMP_Ward_Master_2011.xlsx')['Body']
          # add missing __iter__ method, so pandas accepts body as file-like object
          if not hasattr(body, "__iter__"): body.__iter__ = types.MethodType( __iter__,
          body )

          df_data= pd.read_excel(body)
          df_data['Ward_Name']=df_data['Ward_Name'].str.replace(' Ward','')
          df_data.head()
```

Out[46]:

	Ward_Name	Population_density_(persons_per_sq_km)
0	Kempegowda	3182
1	Chowdeswari	5635
2	Atturu	6606
3	Yelahanka Satellite Town	9224
4	Jakkuru	2215

```
In [67]:  df_data.shape
```

Out[67]: (198, 2)

```
In [28]: !conda install -c conda-forge geopy --yes
         from geopy.geocoders import Nominatim # convert an address into latitude and l
         ongitude values
         !conda install -c conda-forge folium=0.5.0 --yes
         import folium # map rendering library
```

```
Solving environment: done

## Package Plan ##

  environment location: /opt/conda/envs/Python36

  added / updated specs:
    - geopy


The following packages will be downloaded:

    package                    |              build
    ---------------------------|-----------------
    openssl-1.1.1d             |       h516909a_0        2.1 MB  conda-forge
    ca-certificates-2019.11.28 |       hecc5488_0        145 KB  conda-forge
    geopy-1.21.0               |             py_0         58 KB  conda-forge
    geographiclib-1.50         |             py_0         34 KB  conda-forge
    certifi-2019.11.28         |          py36_0        149 KB  conda-forge
    ------------------------------------------------------------
                                           Total:        2.5 MB

The following NEW packages will be INSTALLED:

    geographiclib:   1.50-py_0         conda-forge
    geopy:           1.21.0-py_0       conda-forge

The following packages will be UPDATED:

    ca-certificates: 2019.11.27-0                   --> 2019.11.28-hecc5488_0
conda-forge
    certifi:         2019.11.28-py36_0              --> 2019.11.28-py36_0
conda-forge

The following packages will be DOWNGRADED:

    openssl:         1.1.1d-h7b6447c_3              --> 1.1.1d-h516909a_0
conda-forge


Downloading and Extracting Packages
openssl-1.1.1d        | 2.1 MB     | ################################### | 10
0%
ca-certificates-2019 | 145 KB     | ################################### | 10
0%
geopy-1.21.0         | 58 KB      | ################################### | 10
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geographiclib-1.50   | 34 KB      | ################################### | 10
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certifi-2019.11.28   | 149 KB     | ################################### | 10
0%
Preparing transaction: done
Verifying transaction: done
Executing transaction: done
Solving environment: done

## Package Plan ##
```

```
        environment location: /opt/conda/envs/Python36

        added / updated specs:
          - folium=0.5.0


The following packages will be downloaded:

    package                    |              build
    ---------------------------|-----------------
    folium-0.5.0               |             py_0          45 KB  conda-forge
    branca-0.4.0               |             py_0          26 KB  conda-forge
    altair-4.0.1               |             py_0         575 KB  conda-forge
    vincent-0.4.4              |             py_1          28 KB  conda-forge
    ---------------------------------------------------------
                                          Total:         673 KB

The following NEW packages will be INSTALLED:

    altair:  4.0.1-py_0 conda-forge
    branca:  0.4.0-py_0 conda-forge
    folium:  0.5.0-py_0 conda-forge
    vincent: 0.4.4-py_1 conda-forge


Downloading and Extracting Packages
folium-0.5.0         | 45 KB     | ################################### | 10
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branca-0.4.0         | 26 KB     | ################################### | 10
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altair-4.0.1         | 575 KB    | ################################### | 10
0%
vincent-0.4.4        | 28 KB     | ################################### | 10
0%
Preparing transaction: done
Verifying transaction: done
Executing transaction: done
```

```python
In [68]: def getBlrData(ward_name,population_density):
             data=[]
             for name,density in zip (ward_name,population_density):
                 row=[]
                 address = name +', Bangalore, India'
                 geolocator = Nominatim(user_agent="ny_explorer")
                 location = geolocator.geocode(address)
                 if location is not None:
                     lat = location.latitude
                     long = location.longitude
                     row.append(name)
                     row.append(density)
                     row.append(lat)
                     row.append(long)
                 data.append(row)
             return(data)
```

```
In [69]: blr_data=getBlrData(ward_name=df_data['Ward_Name'],
                        population_density=df_data['Population_density_(persons_pe
         r_sq_km)'])
```

```
In [83]: Bangalore_df=pd.DataFrame(blr_data,columns=['Neighbourhood','Population_densit
         y_(persons_per_sq_km)','Latitude','Longitude'])
         Bangalore_df.dropna(how='any',inplace=True)
         Bangalore_df['Population_density_(persons_per_sq_km)']=Bangalore_df['Populatio
         n_density_(persons_per_sq_km)'].astype(int)
         Bangalore_df.head()
```

Out[83]:

	Neighbourhood	Population_density_(persons_per_sq_km)	Latitude	Longitude
0	Kempegowda	3182	13.109018	77.601900
1	Chowdeswari	5635	13.120459	77.579618
2	Atturu	6606	13.100409	77.858725
3	Yelahanka Satellite Town	9224	13.089139	77.582717
4	Jakkuru	2215	13.098320	77.625146

```
In [73]: Bangalore_df.shape
```

Out[73]: (168, 4)

```
In [74]: address = 'Bangalore, India'
         geolocator = Nominatim(user_agent="ny_explorer")
         location = geolocator.geocode(address)
         blr_lat = location.latitude
         blr_long = location.longitude
         print('The geograpical coordinate of Bangalore are {}, {}.'.format(blr_lat, bl
         r_long))
```

The geograpical coordinate of Bangalore are 12.9791198, 77.5912997.

```
In [86]: import folium
         map_blr = folium.Map(location=[blr_lat, blr_long], zoom_start=10)
         # add markers to map
         for lat, lng, label,density in zip(Bangalore_df['Latitude'], Bangalore_df['Lon
         gitude'], Bangalore_df['Neighbourhood'],
                                       Bangalore_df['Population_density_(persons_per_sq_k
         m)']):
             label = folium.Popup(label+','+ str(density), parse_html=True)
             folium.CircleMarker(
                 [lat, lng],
                 radius=5,
                 popup=label,
                 color='blue',
                 fill=True,
                 fill_color='yellow',
                 fill_opacity=0.7,
                 parse_html=False).add_to(map_blr)
         map_blr
```

Out[86]: