

# 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 their 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)  
([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 includes 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='s3SltTm1G1Ri_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.com')

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 longitude 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
0%			
geographiclib-1.50	34 KB	#####	10
0%			
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
0%			
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

```
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_per_sq_km)'])
```

```
In [83]: Bangalore_df=pd.DataFrame(blr_data,columns=['Neighbourhood','Population_density_(persons_per_sq_km)','Latitude','Longitude'])
Bangalore_df.dropna(how='any',inplace=True)
Bangalore_df['Population_density_(persons_per_sq_km)']=Bangalore_df['Population_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, blr_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['Longitude'], Bangalore_df['Neighbourhood'], Bangalore_df['Population_density_(persons_per_sq_km)']):
    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]:

