

The Battle of the Neighborhoods

Introduction: Business Opportunity

An idea to bring foreign culture, happiness to neighborhoods and increase earnings.

The target audiences are decision maker from bank, needs the bank to provide financial support.

The idea is to leverage Foursquare data to explore nearby venues and find an optimal location to run an Italian restaurant in Germany.

Data acquisition and cleaning

Based on the introduction, the following factors influence the decision making of candidate location.

- the number of existing venues in the neighborhoods (any type of similar business).
- the number of distance to the similar business in the neighborhoods.
- the distance of neighborhood from city center.

Following are data sources:

- Address data come from Bing Map
- Coordinates data come from Bing Map
- Venues data come from Foursquare

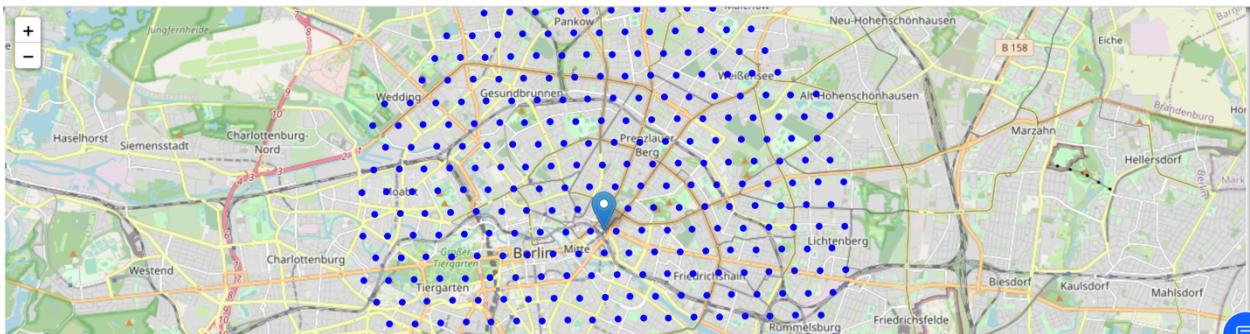
```
def get_venues_near_location(lat, lon, category, radius=500, limit=100):
    version = '20210101'
    url = 'https://api.foursquare.com/v2/venues/explore?ll={},{}&categoryId={}&radius={}&limit={}&v={}&client_id={}&client_secret={}'.format(
        lat, lon, category, radius, limit, version, client_id, client_secret)
    #print(url)
    #results = requests.get(url).json()
    #print(requests.get(url).json())
    try:
        results = requests.get(url).json()['response']['groups'][0]['items']
        #print('\n'.join([item['name'] for item in results]))
        venues = [(item['venue']['id'],
                   item['venue']['name'],
                   get_categories(item['venue']['categories']),
                   (item['venue']['location']['lat'], item['venue']['location']['lng']),
                   format_address(item['venue']['location']),
                   item['venue']['location']['distance']) for item in results]
        #print(venues)
    except:
        venues = []
    return venues

def get_address(lat, lon):
    g = geocoder.bing([lat, lon], method='reverse', key=BING_API_KEY)
    address = g.json['raw']['address']['formattedAddress']
    return address

addr = get_address(berlin_center[0], berlin_center[1])
print('Reverse geocoding check')
print('*'*23)
print('Address of {}, {} is: {}'.format(berlin_center[0], berlin_center[1], addr))

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Reverse geocoding check  
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Address of [52.521671295166016, 13.413330078125] is: Alexanderplatz 1-5, 10178 Berlin
```

Exploratory data analysis



	Address	Latitude	Longitude	X	Y	Distance from center
0	A100, 12101 Berlin	52.469947	13.388690	390548.503582	5.814530e+06	5992.495307
1	12101, Berlin, Germany	52.470067	13.397520	391148.503582	5.814530e+06	5840.376700
2	12101, Berlin, Germany	52.470186	13.406349	391748.503582	5.814530e+06	5747.173218
3	Oderstraße 174, 12101 Berlin	52.470305	13.415178	392348.503582	5.814530e+06	5715.767665
4	Warthestraße 23, 12051 Berlin	52.470423	13.424008	392948.503582	5.814530e+06	5747.173218

```

try:
    results = requests.get(url).json()['response']['groups'][0]['items']
    #print('\n',results[0],'\n')
    venues = [(item['venue']['id'],
               item['venue']['name'],
               get_categories(item['venue']['categories']),
               (item['venue']['location']['lat'], item['venue']['location']['lng']),
               format_address(item['venue']['location']),
               item['venue']['location']['distance']) for item in results]
    #print(venues)
except:
    venues = []
return venues

print('Venue coding check')
print('*'*18)
print(get_venues_near_location(berlin_center[0], berlin_center[1], food_category)[:1])

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Venue coding check
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[('5ab2728716fa0464f2ec0a42', 'Mama Van - Sai Gon Deli', [('Vietnamese Restaurant', '4bf58dd8d4849), 'Karl-Liebknecht-Str. 15, 10178 Berlin', 229])

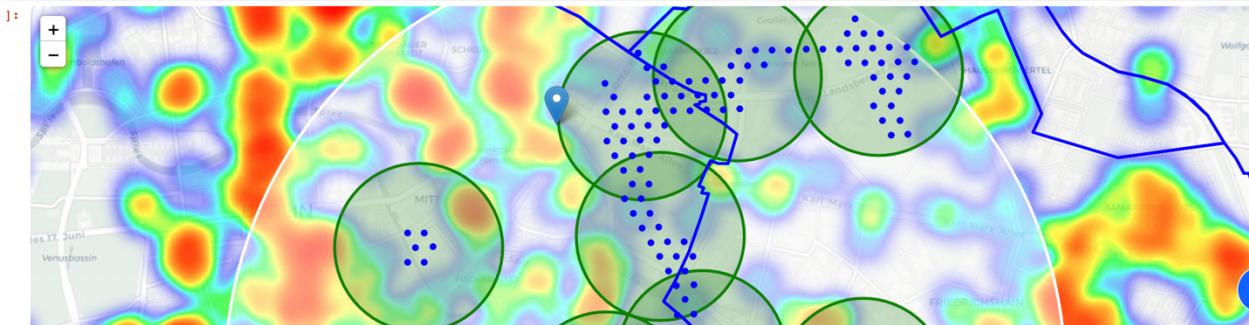
print('Total number of restaurants: ', len(restaurants))
print('Total number of Italian restaurants: ', len(italian_restaurants))
print('Percent of Italian restaurants: {:.2f}%'.format(len(italian_restaurants) / len(restaurants) * 100))
print('Average number of restaurants in neighborhood: ', np.array([len(r) for r in location_restaurants]).mean())

Total number of restaurants: 2049
Total number of Italian restaurants: 298
Percent of Italian restaurants: 14.54%
Average number of restaurants in neighborhood: 4.876373626373627

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Modeling

```
from sklearn.cluster import KMeans
number_of_clusters = 15
good_xys = df_good_locations[['X', 'Y']].values
kmeans = KMeans(n_clusters=number_of_clusters, random_state=0).fit(good_xys)
cluster_centers = [xy_to_lonlat(cc[0], cc[1]) for cc in kmeans.cluster_centers_]
map_berlin = folium.Map(location=roi_center, zoom_start=14)
folium.TileLayer('cartodbdpositron').add_to(map_berlin)
HeatMap(restaurant_latlons).add_to(map_berlin)
folium.Circle([roi_center], radius=2500, color='white', fill=True, fill_opacity=0.4).add_to(map_berlin)
folium.Marker(berlin_center).add_to(map_berlin)
for lon, lat in cluster_centers:
    folium.Circle([lat, lon], radius=500, color='green', fill=True, fill_opacity=0.25).add_to(map_berlin)
for lat, lon in good_locations:
    folium.CircleMarker([lat, lon], radius=2, color='blue', fill=True, fill_color='blue', fill_opacity=1).add_to(map_berlin)
folium.GeoJson(berlin_boroughs, style_function=boroughs_style, name='geojson').add_to(map_berlin)
map_berlin
```



Conclusion

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Addresses of centers of areas recommended for further analysis
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Oranienstraße 72, 10969 Berlin	=> 1.9km from Alexanderplatz
Platz der Vereinten Nationen 30, 10249 Berlin	=> 1.1km from Alexanderplatz
Bona-Peiser Weg, 10179 Berlin	=> 1.6km from Alexanderplatz
Harzer Straße 117, 12435 Berlin	=> 4.0km from Alexanderplatz
Gitschiner Straße 33, 10969 Berlin	=> 2.6km from Alexanderplatz
Holzmarktstraße, 10179 Berlin	=> 0.9km from Alexanderplatz
Helen-Ernst Straße 28, 10243 Berlin	=> 2.4km from Alexanderplatz
Alte Jakobstraße 114, 10969 Berlin	=> 1.9km from Alexanderplatz
Hasenheide 81, 10965 Berlin	=> 3.9km from Alexanderplatz
Am Flutgraben 3, 10997 Berlin	=> 3.7km from Alexanderplatz
Michaelkirchplatz 23, 10179 Berlin	=> 1.6km from Alexanderplatz
Landsberger Allee 48-50, 10249 Berlin	=> 2.0km from Alexanderplatz
Schloßplatz 1, 10178 Berlin	=> 1.1km from Alexanderplatz
Berolinistraße 12, 10178 Berlin	=> 0.5km from Alexanderplatz
Neuenburger Straße 22D, 10969 Berlin	=> 2.5km from Alexanderplatz

