
EXPLORE FEASIBILITY
OF MOVING WITHIN
THE SAME CITY
DHAKA, BANGLADESH

INTRODUCTION

I am Shah Nawaj Rahman,

A data enthusiast residing in Mirpur, Dhaka, Bangladesh. I enjoy many amenities and venues in the area, such as various international cuisine restaurants, cafes, food shops and entertainment. I have been offered a great opportunity to work for a one of the top Retail company which is located in another part of the city. Banani, Dhaka, Bangladesh. I am very excited and I want to use this opportunity to practice my learnings in Coursera in order to answer relevant questions arisen. The key question is : How can I find a convenient and enjoyable place similar to my current location Mirpur, within Banani Area?

OBJECTIVES

Certainly, I can use available local informative websites, apps and Google but the idea is to use and apply myself the learned tools during the course. In order to make a comparison and evaluation of the options in Banani, I must set some basis, therefore the house in Banani must meet the following demands:

- desired location is near bus station and within 1.0 km radius.
- top ammenities in the Banani neighborhood shall be similar to current residence.
- desirable to have venues such as coffee shops, restaurants, gym and food shops.
- as a reference, I have included a map of venues near Mirpur, Dhaka.

OBJECTIVES

Business Problem:
The challenge is to find a suitable apartment for rent in Banani, Dhaka; that complies with the demands on location, price and venues. The data required to resolve this challenge is described in the Data Section below.

Interested Audience
I believe this is a relevant challenge with valid questions for anyone moving to other city or to a different part of the same city. The same methodology can be applied in accordance to demands as applicable. This case is also applicable for anyone interested in exploring starting or locating a new business in any city. Lastly, it can also serve as a good practical exercise to develop Data Science skills.

DATA

The following data is required to answer the issues of the problem:

- List of neighborhood in Banani with geo data (latitud and longitud)
- List of Bus stations in Banani with their address location
- List of house for rent in Banani area with their addresses and price
- Preferably, a list of apartment for rent with additional information, such as price, address, area, room, etc
- Venues for each Banani neighborhood (than can be clustered)

APPROACH

The data will be used as follows:

- Use Foursquare and geopy data to map top 10 venues for all Banani neighborhoods and clustered in groups (as per Course LAB)
- Use foursquare and geopy data to map the location of bus stations , separately and on top of the above clustered map in order to be able to identify the venues and amenities
- create a map that depicts, for instance, the average rental price, around a radios of 1.0 km around each bus station - or a similar metrics.
- Addresses from rental locations will be converted to geodata(lat, long) using Geopy-distance and Nominatim.
- Data will be searched in open data sources if available, from real estate sites if open to reading, and libraries.

APPROACH

The processing of these DATA will allow to answer the key questions to make a decision:

- what is the cost of rent around a 1.0 km radius from each bus station?
- what is the area of Banani with best rental pricing that meets criteria established?
- What is the distance from work place (Banani Commercial Area) and the tentative future home?
- What are the venues of the two best places to live? How the prices compare?
- How venues distribute among Banani neighborhoods and around bus stations?
- Are there tradeoffs between size and price and location?
- Any other interesting statistical data findings of the real estate and overall data.

REPORT

In [1]:

```
import numpy as np
import pandas as pd
import time
import json
import requests
import folium

from pandas.io.json import json_normalize
from geopy.geocoders import Nominatim

pd.set_option('display.max_columns', None)
pd.set_option('display.max_rows', None)

print('Libraries imported!')
```

```
Libraries imported!
```

3 - STUDY OF MY CURRENT LOCATION

Reference of venues around current residence in Mirpur for comparison to Banani

In [2]:

```
address = 'Mirpur, Dhaka'

geolocator = Nominatim(user_agent=str(address))
location = geolocator.geocode(address)
latitude = location.latitude
longitude = location.longitude
print('The geograpical coordinate of Mirpur home are {}, {}.'.format(latitude, longitude))
```

```
The geograpical coordinate of Mirpur home are 23.8122474, 90.3597632.
```

In [3]:

```
neighborhood_latitude=23.8122474
neighborhood_longitude=90.3597632
```

In [4]:

```
CLIENT_ID = 'BLTEZU0PVRN3UR2NOYPATUS4PKJ4S0XVRYIU5S0LETHFMZSO' # Put Your Client Id
CLIENT_SECRET = '5YDVXPY1ORR5IUM0TED4SLT1UGNZKIAQH2HQQFT5YXQNOEUM' # Put You Client Secret
VERSION = '20210101'
LIMIT = 100 # limit of number of venues returned by Foursquare API
```

```
radius = 1000 # define radius

# create URL
url = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&v={}&ll={},{}&radius={}&limit={}'.format(
    CLIENT_ID,
    CLIENT_SECRET,
    VERSION,
    neighborhood_latitude,
    neighborhood_longitude,
    radius,
    LIMIT)

print (url)
print ('url creation for Mirpur complete')
```

```
https://api.foursquare.com/v2/venues/explore?&client_id=BLTEZU0PVRN3UR2NOYPATUS4PKJ4S0XVRYIU5S0LETHFMZSO&client_secret=5YDVXPY1ORR5IUM0TED4SLT1UGNZK
IAQH2HQQFT5YXQNOEUM&v=20210101&ll=23.8122474,90.3597632&radius=1000&limit=100
url creation for Mirpur complete
```

In [5]:

```
results = requests.get(url).json()
#results
```

In [6]:

```
# function that extracts the category of the venue
def get_category_type(row):
    try:
        categories_list = row['categories']
    except:
        categories_list = row['venue.categories']

    if len(categories_list) == 0:
        return None
    else:
        return categories_list[0]['name']
```

In [7]:

```
venues = results['response']['groups'][0]['items']

MPnearby_venues = json_normalize(venues) # flatten JSON

# filter columns
filtered_columns = ['venue.name', 'venue.categories', 'venue.location.lat', 'venue.location.lng']
c[:, filtered_columns]
```

```
# filter the category for each row
MPnearby_venues['venue.categories'] = MPnearby_venues.apply(get_category_type, axis=1)

# clean columns
MPnearby_venues.columns = [col.split(".")[-1] for col in MPnearby_venues.columns]

MPnearby_venues
```

```
C:\Users\Shah\AppData\Local\Temp/ipykernel_10972/3727455864.py:3: FutureWarning: pandas.io.json.json_normalize is deprecated, use pandas.json_normal
ize instead
  MPnearby_venues = json_normalize(venues) # flatten JSON
```

Out[7]:

	name	categories	lat	lng
0	Sher-e-Bangla National Cricket Stadium	Cricket Ground	23.806196	90.363579
1	Original 10 Mirpur	Other Great Outdoors	23.810282	90.366177
2	Rabbani Hotel and Restaurant	Restaurant	23.815782	90.366411
3	Selim's Special Tea	Tea Room	23.809275	90.364614
4	Xinxian Resturant	Chinese Restaurant	23.813651	90.366475
5	Sigree	Buffet	23.815460	90.366050
6	Mirpur 11 Bus Stand	Bus Station	23.815123	90.366382
7	Yantai Chinese & Thai Restaurant	Chinese Restaurant	23.815895	90.366075
8	Banolata Food Palace	Fast Food Restaurant	23.816366	90.366020
9	Delicious Food	Restaurant	23.812028	90.367629
10	Yummy Yummy	Fast Food Restaurant	23.810151	90.367836
11	KFC, Mirpur 11	Fried Chicken Joint	23.816734	90.366295

Map of Mirpur with venues near residence place - for reference

In [8]:

```
map_mp = folium.Map(location=[latitude, longitude], zoom_start=15)

# add markers to map
for lat, lng, label in zip(MPnearby_venues['lat'], MPnearby_venues['lng'], MPnearby_venues['name']):
    label = folium.Popup(label, parse_html=True)
```

```
    folium.RegularPolygonMarker(
        [lat, lng],
        number_of_sides=100,
        radius=10,
        popup=label,
        color='deeppink',
        fill_color='#0f0f0f',
        fill_opacity=0.6,
    ).add_to(map_mp)
```

4 - LOOKING FOR NEW POSSIBLE LOCATION

Venues around my possible future locations - Banani

In [9]:

```
newaddress = 'Banani, Dhaka'

newgeolocator = Nominatim(user_agent=str(newaddress))
newlocation = newgeolocator.geocode(newaddress)
newlatitude = newlocation.latitude
newlongitude = newlocation.longitude
print('The geograpical coordinate of Banani home are {}, {}.'.format(newlatitude, newlongitude))
```

```
The geograpical coordinate of Banani home are 23.790321, 90.4076959.
```

In [10]:

```
new_neighborhood_latitude=23.79032
new_neighborhood_longitude=90.4076959
```

In [11]:

```
CLIENT_ID = 'BLTEZU0PVRN3UR2NOYPATUS4PKJ4S0XVRYIU5S0LETHFMZSO' # Put Your Client Id
CLIENT_SECRET = '5YDVXPY1ORR5IUM0TED4SLT1UGNZKIAQH2HQQFT5YXQNOEUM' # Put You Client Secret
VERSION = '20210101'
LIMIT = 100 # limit of number of venues returned by Foursquare API
radius = 1000 # define radius

# create URL
newurl = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&v={}&ll={},{}&radius={}&limit={}'.format(
    CLIENT_ID,
    CLIENT_SECRET,
    VERSION,
    new_neighborhood_latitude
```

```
    new_neighborhood_longitude,
    radius,
    LIMIT)

print (newurl)
print ('url creation for Banani complete')
```

```
https://api.foursquare.com/v2/venues/explore?&client_id=BLTEZU0PVRN3UR2NOYPATUS4PKJ4S0XVRYIU5S0LETHFMZSO&client_secret=5YDVXPY1ORR5IUM0TED4SLT1UGNZK
IAQH2HQQFT5YXQNOEUM&v=20210101&ll=23.79032,90.4076959&radius=1000&limit=100
url creation for Banani complete
```

In [12]:

```
newresults = requests.get(newurl).json()
#results
```

In [13]:

```
# function that extracts the category of the venue
def get_category_type(row):
    try:
        categories_list = row['categories']
    except:
        categories_list = row['venue.categories']

    if len(categories_list) == 0:
        return None
    else:
        return categories_list[0]['name']
```

In [14]:

```
newvenues = newresults['response']['groups'][0]['items']

BNnearby_venues = json_normalize(newvenues) # flatten JSON

# filter columns
filtered_columns = ['venue.name', 'venue.categories', 'venue.location.lat', 'venue.location.lng']
BNnearby_venues = BNnearby_venues.loc[:, filtered_columns]

# filter the category for each row
BNnearby_venues['venue.categories'] = BNnearby_venues.apply(get_category_type, axis=1)

# clean columns
BNnearby_venues.columns = [col.split(".")[-1] for col in BNnearby_venues.columns]
```

```
C:\Users\Shah\AppData\Local\Temp/ipykernel_10972/3693336344.py:3: FutureWarning: pandas.io.json.json_normalize is deprecated, use pandas.json_normal
ize instead
  BNnearby_venues = json_normalize(newvenues) # flatten JSON
```

Out[14]:

	name	categories	lat	lng
0	Columbus coffee	Coffee Shop	23.790160	90.408098
1	Lucknow	Indian Restaurant	23.793301	90.409157
2	Gulshan Club Ltd	Nightclub	23.794640	90.411229
3	Quesadilla La Mexicana Grill	Mexican Restaurant	23.790377	90.408055
4	Artisan	Clothing Store	23.793981	90.411140
5	The Manhattan FISH MARKET	Seafood Restaurant	23.793728	90.404550
6	Movenpick	Ice Cream Shop	23.792333	90.415373
7	Time Out	Asian Restaurant	23.792268	90.409307
8	Taste	Café	23.793325	90.414650
9	Tree House	Steakhouse	23.791418	90.407776
10	Fools' Diner	Japanese Restaurant	23.790764	90.407547
11	Bitter Sweet	Café	23.795532	90.413268
12	Floor 6	Asian Restaurant	23.791281	90.402090
13	Handi Restaurant	Indian Restaurant	23.792682	90.415346
14	Nando's Banani	Portuguese Restaurant	23.790313	90.408153
15	Westin Dhaka Executive Club Lounge	Lounge	23.793772	90.414412
16	American Burger	Burger Joint	23.790214	90.408254
17	King's Confectionary, Banani	Bakery	23.790409	90.405909
18	New Zealand Natural Bangladesh	Ice Cream Shop	23.791164	90.403589
19	Royal Park Residence	Hotel	23.797082	90.404702
20	unimart	Supermarket	23.795924	90.415092
21	Astorion	Clothing Store	23.788444	90.414271
22	The Westin	Hotel	23.793439	90.406232
23	Bilash	Food	23.790746	90.405512

	name	categories	lat	lng
24	Tarka	Indian Restaurant	23.791373	90.406180
25	Tokyo Express	Japanese Restaurant	23.790176	90.403225
26	Fourpoints by Sheraton, Doreen Tower, Dhaka	Hotel	23.794413	90.413735
27	Goong	Korean Restaurant	23.797279	90.410481
28	Second Cup Coffee Company	Coffee Shop	23.793574	90.404624
29	Samdado	Sushi Restaurant	23.792229	90.413254
30	Melange	Café	23.795883	90.408303
31	Bluemoon Recreation Club	Social Club	23.790471	90.407940
32	Lake Shore Hotel	Hotel	23.790352	90.412374
33	Boomers Cafe	Café	23.792941	90.404532
34	American Burger, Gulshan	Burger Joint	23.793970	90.414260
35	Turkish Bazaar & Doner Kebab	Turkish Restaurant	23.792421	90.406421
36	Sarina Hotel	Hotel	23.793499	90.404753
37	Burger n Boost (Banani)	Burger Joint	23.791574	90.402770
38	Amari Dhaka	Hotel	23.790349	90.412783
39	Smoke Cafe	Café	23.791105	90.403021
40	La Forchetta (Italian Restaurant & Pizza)	Italian Restaurant	23.795840	90.413740
41	The Cream & Fudge Factory	Ice Cream Shop	23.790305	90.408138
42	Glazed	Donut Shop	23.793623	90.414862
43	BAGHA Club	Arts & Entertainment	23.791905	90.414135
44	Tastebud	Dessert Shop	23.789498	90.408115
45	Preetom, Banani	Fast Food Restaurant	23.793728	90.404782
46	Yellow Submarine	Breakfast Spot	23.792014	90.415443
47	Treats	Café	23.793399	90.414860
48	Club Wheels	Italian Restaurant	23.792640	90.402926
49	Prego, The Westin Dhaka	Italian Restaurant	23.793336	90.414764

	name	categories	lat	lng
50	Shawarma House, Banani	Fast Food Restaurant	23.793829	90.404625
51	Arirang Korean Restaurant	Korean Restaurant	23.797673	90.412144
52	Sbarro	Italian Restaurant	23.796370	90.413432
53	KFC, Banani	Fried Chicken Joint	23.793734	90.405362
54	Bittersweet Cafe	Café	23.795595	90.413344
55	Coffee world	Coffee Shop	23.791042	90.402963
56	Gulshan Plaza Restaurant	Asian Restaurant	23.793614	90.414597
57	Spaghetti Jazz	Jazz Club	23.795032	90.414285
58	Cuppa Coffee Club	Coffee Shop	23.794151	90.414187
59	Star Kabab & Restaurant	Asian Restaurant	23.793330	90.403224
60	RollXpress	Indian Restaurant	23.794879	90.404151
61	DCC Market	Miscellaneous Shop	23.793782	90.415112
62	Pink City, Gulshan 2	Clothing Store	23.792135	90.415807
63	Agora Gulshan	Department Store	23.788672	90.416060
64	Khazana	Indian Restaurant	23.798462	90.411510
65	Doo Mi Ok Korean Restaurant	Korean Restaurant	23.790606	90.406759
66	Absolute Thai	Thai Restaurant	23.789401	90.408103
67	Krispy Kreme	Donut Shop	23.790286	90.409128
68	Golden Tulip Hotel	Hotel	23.789101	90.406964
69	Yo Berries	Dessert Shop	23.791237	90.401628
70	Pink City Shopping Complex	Shopping Mall	23.792176	90.415788
71	Rice and Noodle	Asian Restaurant	23.792974	90.408310
72	Panini	Sandwich Place	23.792598	90.409525
73	PLATINUM SUITES	Restaurant	23.791081	90.403025
74	Jatra Banani Outlet	Hobby Shop	23.793408	90.409120
75	Loiter D85	Juice Bar	23.791719	90.404095

	name	categories	lat	lng
76	Bamboo Shoot	Chinese Restaurant	23.788668	90.415884
77	Woodhouse Grill	Steakhouse	23.791105	90.403076
78	Baton Rouge	Indian Restaurant	23.792223	90.415520
79	Sura	Korean Restaurant	23.792109	90.412668
80	UAE Market	Shopping Mall	23.794333	90.401992
81	Lavendar	Grocery Store	23.795331	90.413225
82	Sausly's, Gulshan	Fast Food Restaurant	23.792310	90.415475
83	Gulshan-2 D.C.C. Market (Fruits & Vegetable Ba...	Farmers Market	23.794645	90.414451
84	Rupayan Golden Age	Shopping Mall	23.788489	90.416087
85	Peyala	American Restaurant	23.793936	90.415380
86	Caspian	Middle Eastern Restaurant	23.788660	90.416257
87	Nordic Club	Gym / Fitness Center	23.798073	90.409967
88	Laurel Hotel	Hotel	23.798996	90.407385

Map of my possible future locations - Banani with venues near residence place

In [15]:

```
map_bn = folium.Map(location=[newlatitude, newlongitude], zoom_start=15)

# add markers to map
for lat, lng, label in zip(BNnearby_venues['lat'], BNnearby_venues['lng'], BNnearby_venues['name']):
    label = folium.Popup(label, parse_html=True)
    folium.RegularPolygonMarker(
        [lat, lng],
        number_of_sides=100,
        radius=10,
        popup=label,
        color='lime',
        fill_color='#0f0f0f',
        fill_opacity=0.6,
    ).add_to(map_bn)
```

RESULTS

Venues around current residence in Mirpur

	name	categories	lat	lng
0	Sher-e-Bangla National Cricket Stadium	Cricket Ground	23.806196	90.363579
1	Original 10 Mirpur	Other Great Outdoors	23.810282	90.366177
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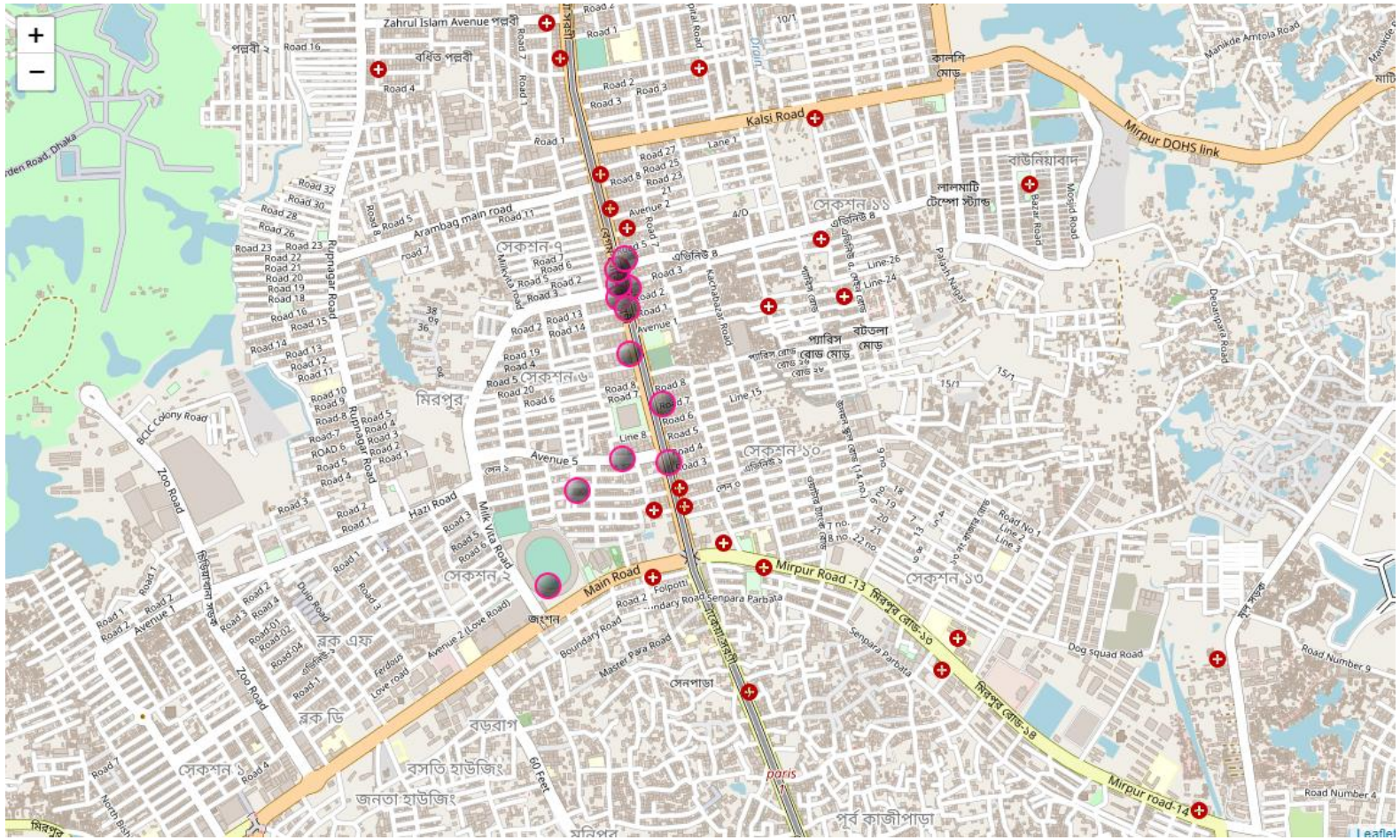
11	KFC, Mirpur 11	Fried Chicken Joint	23.816734	90.366295

Map of Mirpur with venues near my residence place



Venues around my possible future locations in Banani

	name	categories	lat	lng
0	Columbus coffee	Coffee Shop	23.790160	90.408098
1	Lucknow	Indian Restaurant	23.793301	90.409157
2	Gulshan Club Ltd	Nightclub	23.794640	90.411229
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8	Taste	Café	23.793325	90.414650
9	Tree House	Steakhouse	23.791418	90.407776
10	Fools' Diner	Japanese Restaurant	23.790764	90.407547
11	Bitter Sweet	Café	23.795532	90.413268
12	Floor 6	Asian Restaurant	23.791281	90.402090
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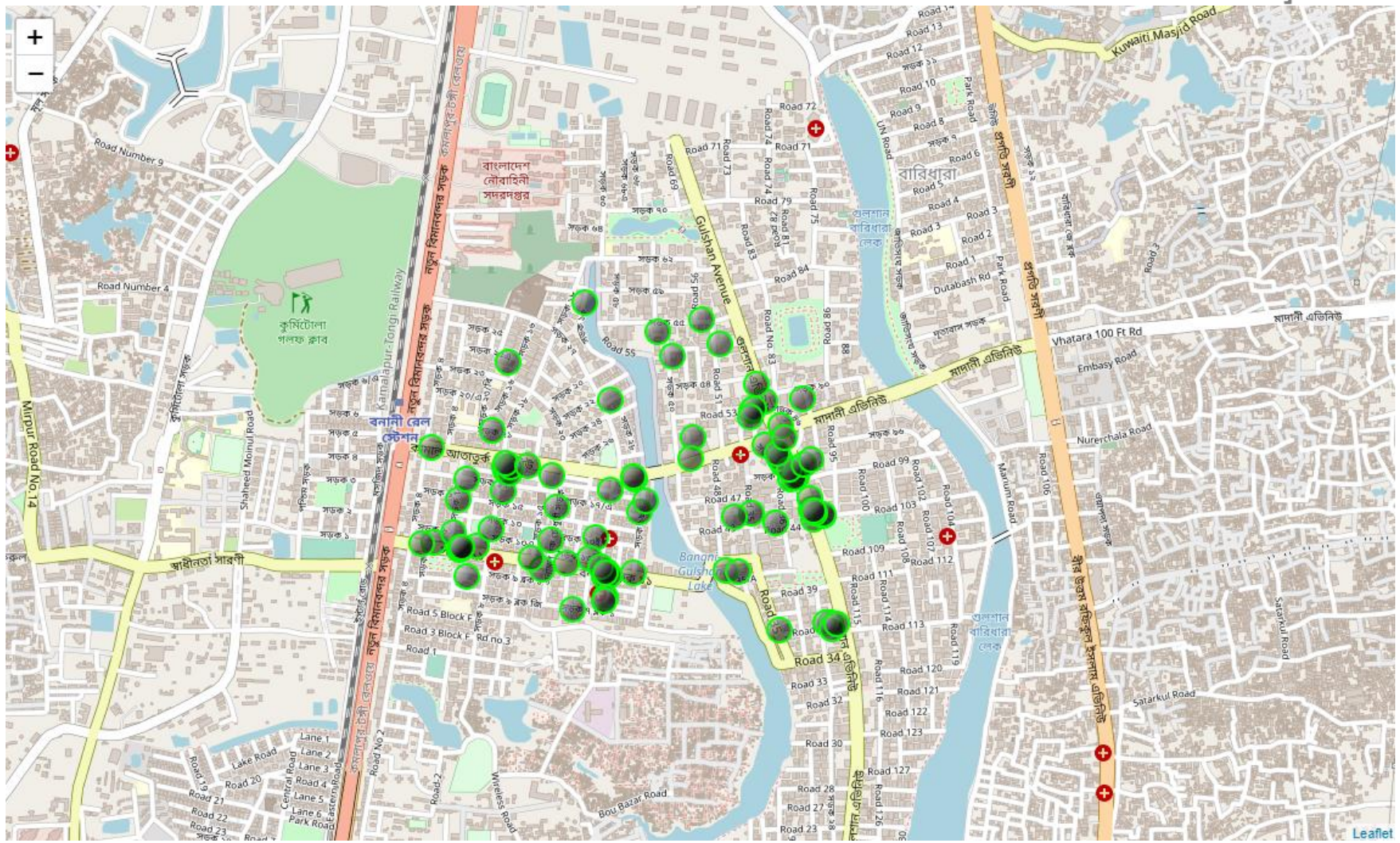
Map of my possible future locations in Banani with venues near residence place



CONCLUSION

From map it seems Banani has better venues than Mirpur. If house rent is alright, I can proceed with the moving.

THANK YOU