

IBM Applied Data Science Capstone Project

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Coffee Shop in Boston

01

BOSTON IS A CENTER OF SCIENTIFIC RESEARCH. THE BOSTON AREA'S MANY COLLEGES AND UNIVERSITIES MAKE IT A WORLD LEADER IN HIGHER EDUCATION, INCLUDING LAW, MEDICINE, ENGINEERING AND BUSINESS.

02

COFFEE SHOP ARE POPULAR. WHY?
THE COFFEE SHOP OFFERS A UNIQUELY CALM ATMOSPHERE WHERE PEOPLE CAN GATHER WITH FRIENDS TO CATCH UP OVER COFFEE, HAVE A RELAXED LUNCH WITH FAMILY OR FOCUS ON WORK IN A RELAXED ENVIRONMENT.

03

THE COFFEE SHOP REMAINS ONE OF THE BEST PLACES FOR PASSIONATE PEOPLE TO GATHER AND DISCUSS THEIR IDEAS AND BELIEFS.,

Coffee Shop in Boston

01

A GOOD COFFEE SHOP WILL CREATE A WARM, HOMELY FEEL, YET AT THE SAME TIME CREATE SPACES WHERE PEOPLE CAN SIT AND WORK IN RELATIVE PRIVACY

02

COFFEE OUTLETS ALSO MAKE THE PERFECT PLACE FOR INFORMAL MEETINGS AND DISCUSSIONS, THANKS TO THE RELAXED AMBIENCE

03

THEY'RE THE PERFECT PLACE TO HANG OUT IN A CASUAL SETTING AND MEET YOUR FRIEND OR CLASSMATES FOR A REGULAR STUDY DATE

2. Data section

To consider the problem I list the datas as below:

I found the data of location and geospatial data of college and university in <https://data.boston.gov/dataset>. I've cleaned the data before use it

2. Then I used Foursquare API to get the most common venues nearby the college and university of Boston and view the density of the coffee shop already opened

Metodology

Because the problem is understand the location of College and University in Boston to be able to view these information in a map for the first step I import the libraries

```
] : import numpy as np # library to handle data in a vectorized manner
import pandas as pd # library for data analysis
pd.set_option('display.max_columns', None)
pd.set_option('display.max_rows', None)

import json # library to handle JSON files
!pip install geopy
from geopy.geocoders import Nominatim # convert an address into latitude and longitude values

import requests # library to handle requests
from pandas.io.json import json_normalize # transform JSON file into a pandas dataframe

# Matplotlib and associated plotting modules
import matplotlib.cm as cm
import matplotlib.colors as colors
|
!pip install folium

import folium # map rendering library

print('Libraries imported.')
```

Metodology

Then I download the list of the college and University of Boston from the site <https://data.boston.gov/dataset> and I convert it in a dataframe.

In [10]:	collegeUniv.head(60)							
Out[10]:	Schoold	Name	Address	City	Zipcode	NumStudent	Latitude	Longitude
0	431594	Massachusetts General Hospital Dietetic Intern...	Fruit St, Boston, Massachusetts 02114	West End	365190	10	42.362599	-71.070141
1	168005	Suffolk University	8 Ashburton Pl Beacon Hill, Boston, Massachusetts 02108	Boston	149016	9148	42.358914	-71.061949
2	165884	Benjamin Franklin Institute of Technology	41 Berkeley St, Boston, Massachusetts 02116	South End	78750	594	42.346111	-71.070187
3	165112	Bunker Hill Community College	250 New Rutherford Ave, Boston, Massachusetts 02128	Charlestown	203509	11009	42.375125	-71.069572
4	166869	MGH Institute of Health Professions	36 1st Avenue, Boston, Massachusetts 02129	Charlestown	70077	900	42.374926	-71.053972
5	165671	Emmanuel College	400 Fenway, Massachusetts 02115	Fenway/Kenmore	52212	2454	42.341525	-71.103479
6	166984	School of the Museum of Fine Arts-Boston	230 The Fenway, Boston, Massachusetts 02115	Fenway/Kenmore	113496	754	42.338547	-71.096694
7	167783	Simmons	300 Fenway, Boston, Massachusetts 02115	Fenway/Kenmore	240740	5003	42.339196	-71.099941
8	164988	Boston University	One Silber Way, Boston, Massachusetts 02215	Fenway/Kenmore	593154	31960	42.349568	-71.099710
9	164933	The Boston Conservatory	8 Fenway, Boston, Massachusetts 02215	Fenway/Kenmore	35350	682	42.346067	-71.090012
10	168290	Wheelock College	200 the Riverway, Boston, Massachusetts 02215	Fenway/Kenmore	75256	1055	42.341749	-71.106421
11	167631	Roxbury Community College	1234 Columbus Ave, Roxbury Crossing, Massachusetts 02143	Roxbury	144812	2749	42.329244	-71.095495
12	166638	University of Massachusetts-Boston	100 Morrissey Blvd, Boston, Massachusetts 02125	North Dorchester	264200	14912	42.313818	-71.039203
13	0	Boston University Research	771 Commonwealth Ave	Fenway/Kenmore	0	0	42.350842	-71.109002
14	0	Boston University School of Law	1 University Rd	Fenway/Kenmore	54767	0	42.351171	-71.109774
15	0	Boston University Sargent College	635 Commonwealth Ave	Fenway/Kenmore	85902	0	42.349843	-71.102046
16	0	Boston University School of Management	595 Commonwealth Ave	Fenway/Kenmore	12908	0	42.349447	-71.098109

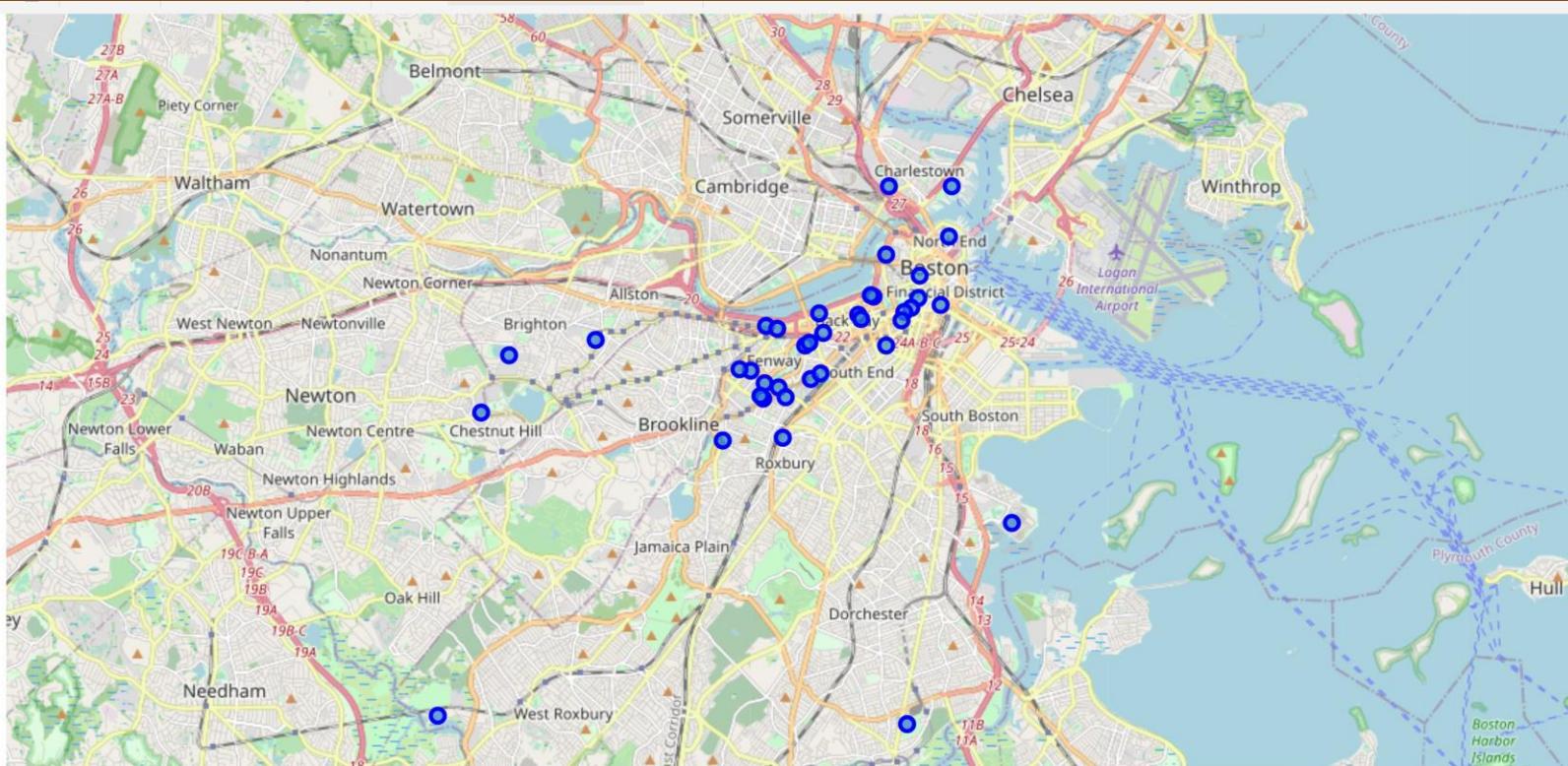
Metodology

I've cleaned the data (remove entity with number of student =0, entity closed...)

In [17]: collegeUniv1.head(60)										
Out[17]:										
Schoold	Name	Address	City	Zipcode	NumStudent	Latitude	Longitude			
0	431594 Massachusetts General Hospital Dietetic Intern...	Fruit St, Boston, Massachusetts 02114	West End	365190	10	42.362599	-71.070141			
1	168005 Suffolk University	8 Ashburton Pl Beacon Hill, Boston, Massachusetts 02108	Boston	149016	9148	42.358914	-71.061949			
2	165884 Benjamin Franklin Institute of Technology	41 Berkeley St, Boston, Massachusetts 02116	South End	78750	594	42.346111	-71.070187			
3	165112 Bunker Hill Community College	250 New Rutherford Ave, Boston, Massachusetts 02120	Charlestown	203509	11009	42.375125	-71.069572			
4	166869 MGH Institute of Health Professions	36 1st Avenue, Boston, Massachusetts 02129	Charlestown	70077	900	42.374926	-71.053972			
5	165671 Emmanuel College	400 Fenway, Massachusetts 02115	Fenway/Kenmore	52212	2454	42.341525	-71.103479			
6	166984 School of the Museum of Fine Arts-Boston	230 The Fenway, Boston, Massachusetts 02115	Fenway/Kenmore	113496	754	42.338547	-71.096694			
7	167783 Simmons	300 Fenway, Boston, Massachusetts 02115	Fenway/Kenmore	240740	5003	42.339196	-71.099941			
8	164988 Boston University	One Silber Way, Boston, Massachusetts 02215	Fenway/Kenmore	593154	31960	42.349568	-71.099710			
9	164933 The Boston Conservatory	8 Fenway, Boston, Massachusetts 02215	Fenway/Kenmore	35350	682	42.346067	-71.090012			
10	168290 Wheelock College	200 the Riverway, Boston, Massachusetts 02215	Fenway/Kenmore	75256	1055	42.341749	-71.106421			
11	167631 Roxbury Community College	1234 Columbus Ave, Roxbury Crossing, Massachusetts 02134	Roxbury	144812	2749	42.329244	-71.095495			
12	166638 University of Massachusetts-Boston	100 Morrissey Blvd, Boston, Massachusetts 02125	North Dorchester	264200	14912	42.313818	-71.039203			
13	164924 Boston College	140 Commonwealth Avenue, Chestnut Hill, Massachusetts 02143	Chestnut Hill	None	15036	42.333841	-71.169720			
14	164438 New England College of Business and Finance	10 High St, Boston, Massachusetts 02110	Financial District	127396	765	42.353539	-71.056731			
15	167297 North Bennet Street School	39 North Bennet St, Boston, Massachusetts 02113	North End	33790	144	42.365899	-71.054781			
16	164845 Empire Beauty School-Boston	30 West Street, Boston, Massachusetts 02111	Financial District	25175	205	42.354859	-71.062371			

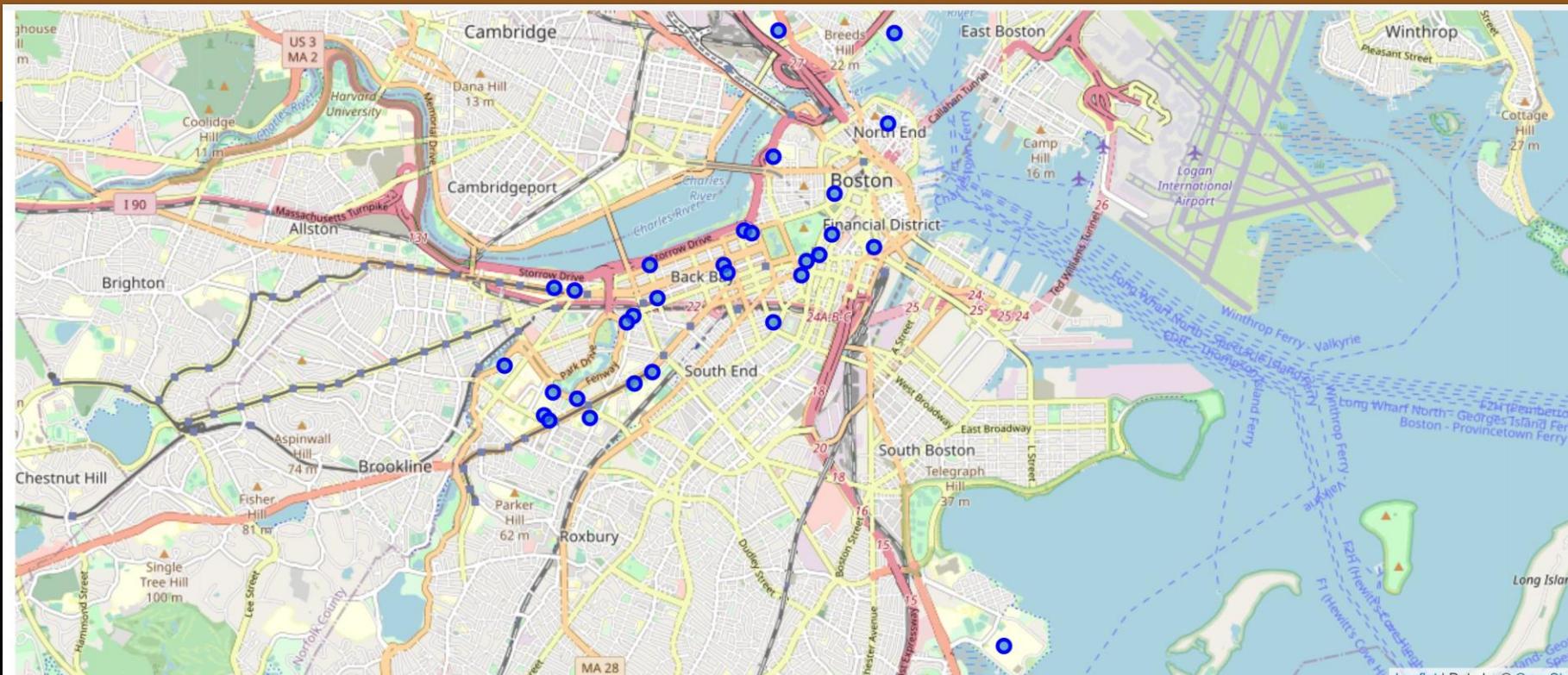
Metodology

Now I was able to view the map of the College/University in Boston



Metodology

I've cleaned again using only the College/University with address including Boston.



Metodology

Then I search in which area there are most college/University

I search where are most college/university

```
In [28]: collegeUnivB_data.groupby('City').count()
```

Out[28]:

City	SchooolId	Name	Address	Zipcode	NumStudent	Latitude	Longitude
Back Bay	6	6	6	6	6	6	6
Beacon Hill	2	2	2	2	2	2	2
Boston	1	1	1	1	1	1	1
Charlestown	2	2	2	2	2	2	2
Fenway/Kenmore	12	12	12	12	12	12	12
Financial District	3	3	3	3	3	3	3
Hyde Park	1	1	1	1	1	1	1
North Dorchester	1	1	1	1	1	1	1
North End	1	1	1	1	1	1	1
South Dorchester	1	1	1	1	1	1	1
South End	1	1	1	1	1	1	1
West End	1	1	1	1	1	1	1
West Roxbury	1	1	1	1	1	1	1

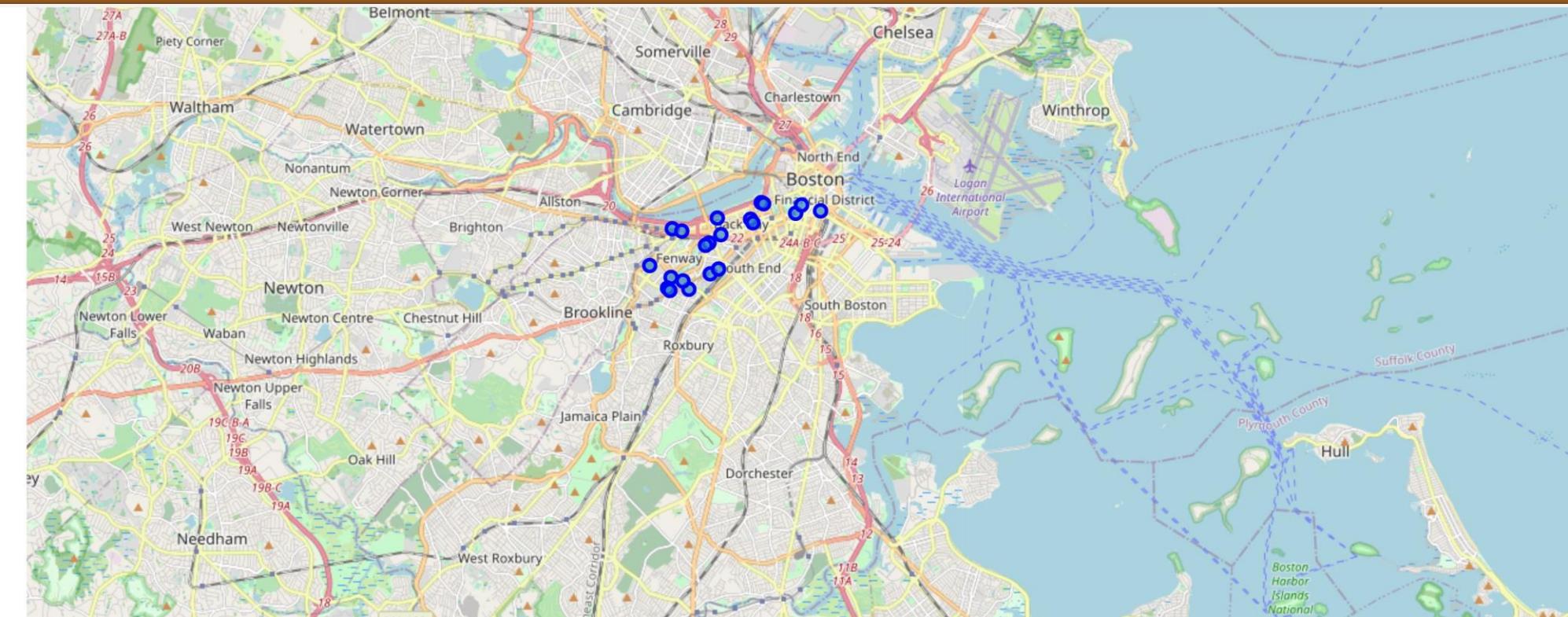
Metodology

I decided to use the first three top area (Fenway/Kenmore, Back Bay, Financial District) to have more probability of success

Schoold	Name	Address	City	Zipcode	NumStudent	Latitude	Longitude
7	Boston University	One Silber Way, Boston, Massachusetts 02215	Fenway/Kenmore	593154	31960	42.349568	-71.099710
25	Northeastern University	360 Huntington Ave, Boston, Massachusetts 02115	Fenway/Kenmore	142900	27537	42.340057	-71.088892
6	Simmons	300 Fenway, Boston, Massachusetts 02115	Fenway/Kenmore	240740	5003	42.339196	-71.099941
23	MCPHS University	179 Longwood Ave, Boston, Massachusetts 02115	Fenway/Kenmore	104000	4252	42.336889	-71.101121
28	Berklee College of Music	1140 Boylston St, Boston, Massachusetts 02215	Fenway/Kenmore	36300	4145	42.346698	-71.089012
27	Wentworth Institute of Technology	550 Huntington Ave, Boston, Massachusetts 02115	Fenway/Kenmore	236886	3808	42.336629	-71.094941
22	Massachusetts College of Art and Design	621 Huntington Ave, Boston, Massachusetts 02115	Fenway/Kenmore	217791	2422	42.336392	-71.100341
18	Fisher College	118 Beacon Street, Boston, Massachusetts 02116	Back Bay	21600	1593	42.355259	-71.074141
21	Boston Architectural College	320 Newbury Street, Boston, Massachusetts 02115	Back Bay	42344	1406	42.348469	-71.085801
9	Wheelock College	200 the Riverway, Boston, Massachusetts 02215	Fenway/Kenmore	75256	1055	42.341749	-71.106421
26	The New England Conservatory of Music	290 Huntington Ave, Boston, Massachusetts 02115	Fenway/Kenmore	0	785	42.341102	-71.086447
11	New England College of Business and Finance	10 High St, Boston, Massachusetts 02110	Financial District	127396	765	42.353539	-71.056731
5	School of the Museum of Fine Arts-Boston	230 The Fenway, Boston, Massachusetts 02115	Fenway/Kenmore	113496	754	42.338547	-71.096694
15	Bay State College	122 Commonwealth Avenue, Boston, Massachusetts...	Back Bay	10182	753	42.351779	-71.076941
8	The Boston Conservatory	8 Fenway, Boston, Massachusetts 02215	Fenway/Kenmore	35350	682	42.346067	-71.090012
14	Urban College of Boston	178 Tremont St, Boston, Massachusetts 02111	Financial District	63096	617	42.352899	-71.064081
24	New England College of Optometry	424 Beacon St, Boston, Massachusetts 02115	Back Bay	17037	467	42.351859	-71.086811
13	Empire Beauty School-Boston	30 West Street, Boston, Massachusetts 02111	Financial District	25175	205	42.354859	-71.062371
19	Sanford-Brown College-Boston	126 Newbury Street, Boston, Massachusetts 02116	Back Bay	52830	158	42.351013	-71.076417

Metodology

And I visualize the new map of Boston



Metodology

I've use FourSquare to search the other coffees in these places to better understand the density of coffees in these area of Boston

Search coffee near college/university

```
In [32]: def getNearbyVenues(names, latitudes, longitudes, radius=1000,section="coffee"):

    venues_list=[]
    for name, lat, lng in zip(names, latitudes, longitudes):

        # create the API request URL
        url = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&v={}&ll={},{}&radius={}&limit={}&section={}'.format(
            CLIENT_ID,
            CLIENT_SECRET,
            VERSION,
            lat,
            lng,
            radius,
            LIMIT,
            section
        )
```

Metodology

And I collected the information in a dataframe

	collegeUni	collegeUni Latitude	collegeUni Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Boston University	42.349568	-71.099710	Dunkin'	42.348530	-71.096283	Donut Shop
1	Boston University	42.349568	-71.099710	Tatte Bakery & Cafe	42.344007	-71.099991	Café
2	Boston University	42.349568	-71.099710	Pavement Coffeehouse	42.344178	-71.098410	Coffee Shop
3	Boston University	42.349568	-71.099710	Blackbird Doughnuts	42.344191	-71.100107	Donut Shop
4	Boston University	42.349568	-71.099710	Cafe 472	42.348727	-71.093684	Café
5	Boston University	42.349568	-71.099710	Tatte Bakery & Café	42.345800	-71.106915	Bakery
6	Boston University	42.349568	-71.099710	Cafe Landwer	42.346659	-71.105558	Israeli Restaurant
7	Boston University	42.349568	-71.099710	Pavement Coffeehouse	42.350030	-71.107020	Café
8	Boston University	42.349568	-71.099710	Starbucks	42.349533	-71.100130	Coffee Shop
9	Boston University	42.349568	-71.099710	Neighborhood's Coffee & Crepes	42.343101	-71.099287	Café
10	Boston University	42.349568	-71.099710	Starbucks	42.349398	-71.103116	Coffee Shop
11	Boston University	42.349568	-71.099710	Starbucks	42.349398	-71.103116	Coffee Shop

Metodology

I've also decided to group the information about coffees for college/university to understand better where is «cool» open a coffee

collegeUni	Latitude	Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Empire Beauty School-Boston	86	86	86	86	86	86
Urban College of Boston	84	84	84	84	84	84
New England College of Business and Finance	83	83	83	83	83	83
The Boston Conservatory	69	69	69	69	69	69
Bay State College	66	66	66	66	66	66
Sanford-Brown College-Boston	66	66	66	66	66	66
Butera School Of Art	60	60	60	60	60	60
The New England Conservatory of Music	56	56	56	56	56	56
Fisher College	52	52	52	52	52	52
School of the Museum of Fine Arts-Boston	52	52	52	52	52	52
New England College of Optometry	51	51	51	51	51	51
Simmons	49	49	49	49	49	49
Massachusetts College of Art and Design	46	46	46	46	46	46
MCPHS University	46	46	46	46	46	46
Wheelock College	46	46	46	46	46	46
Northeastern University	45	45	45	45	45	45
Berklee College of Music	44	44	44	44	44	44

Metodology

I've also decided to group the information about coffee for college/university to understand better where is cool open coffee

collegeUni	Latitude	Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Empire Beauty School-Boston	86	86	86	86	86	86
Urban College of Boston	84	84	84	84	84	84
New England College of Business and Finance	83	83	83	83	83	83
The Boston Conservatory	69	69	69	69	69	69
Bay State College	66	66	66	66	66	66
Sanford-Brown College-Boston	66	66	66	66	66	66
Butera School Of Art	60	60	60	60	60	60
The New England Conservatory of Music	56	56	56	56	56	56
Fisher College	52	52	52	52	52	52
School of the Museum of Fine Arts-Boston	52	52	52	52	52	52
New England College of Optometry	51	51	51	51	51	51
Simmons	49	49	49	49	49	49
Massachusetts College of Art and Design	46	46	46	46	46	46
MCPHS University	46	46	46	46	46	46
Wheelock College	46	46	46	46	46	46
Northeastern University	45	45	45	45	45	45
Berklee College of Music	44	44	44	44	44	44

Metodology

For example I've decided to explore the venues near "Empire Beauty School-Boston"

	Out[39]:	collegeUni	collegeUni Latitude	collegeUni Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
895	Empire Beauty School-Boston	42.354859	-71.062371		Caffè Nero	42.353521	-71.062348	Coffee Shop
896	Empire Beauty School-Boston	42.354859	-71.062371		George Howell Coffee	42.354723	-71.061443	Coffee Shop
897	Empire Beauty School-Boston	42.354859	-71.062371		Tatte Bakery & Cafe	42.353111	-71.057117	Bakery
898	Empire Beauty School-Boston	42.354859	-71.062371		Ogawa Coffee Boston	42.356674	-71.058109	Coffee Shop
899	Empire Beauty School-Boston	42.354859	-71.062371	Jaho Coffee Roaster & Wine Bar	42.351720	-71.062820	Coffee Shop	
900	Empire Beauty School-Boston	42.354859	-71.062371		Gracenote Coffee	42.351657	-71.058204	Coffee Shop
901	Empire Beauty School-Boston	42.354859	-71.062371		Explorateur	42.352485	-71.064403	Café
902	Empire Beauty School-Boston	42.354859	-71.062371		Caffè Nero	42.355238	-71.059923	Coffee Shop
903	Empire Beauty School-Boston	42.354859	-71.062371		Render Coffee	42.357145	-71.057342	Coffee Shop
904	Empire Beauty School-Boston	42.354859	-71.062371		The Paramount	42.357256	-71.070017	Breakfast Spot
905	Empire Beauty School-Boston	42.354859	-71.062371	Tatte Bakery & Cafe	42.357904	-71.070439	Bakery	

Metodology

And view it in a heatmap to understand the concentration



Metodology

We also view the heatmap without the single college but with all college and venues



Conclusion

We see from heatmap that the coffee is not only for students but also for business peoples. We should be far from red zones because of the competitors but near the interesting places. A good place is probably near the college and the parks. The area is also full of theatre and so the coffee is also good place after a performance

