

* Finding place for office in Toronto

Coursera Capstone Project_Pomorina

On GitHub :

<https://gist.github.com/06aa5b21b5e904776df3df33eee8fe59>

*Project sections

- *Introduction
- *Business Problem
- *Data Requirements
- *Data Collection
- *Data Preparation and Description
- *Methodology: Modelling and Evaluation
- *Results and Discussion
- *Conclusion

- * The goal of this project is to formulate a methodology for choosing the best places for an office location based on Foursquare data depending on the specifics of the client's business.
- * The client's activity profile defines the infrastructure requirements that should be located in the vicinity of his office. Internet data on the location of social and technological infrastructure allows you to optimize the search for the office that best meets the needs of the company.
- * This project is being implemented as specified by the IBM Data Science Professional Certificate program, which involves "to leverage the Foursquare location data to explore or compare neighbourhoods or cities" or to solve other problems with that data.

* Introduction

- * *To create a methodology for choosing the best place for the office, taking into account the criteria*
- * the cost of renting commercial real estate,
- * quality ratings of the proposed premises,
- * requirements for infrastructure facilities.



* 1. Business Problem

**realtors and brokers engaged in operations with commercial real estate,*

**tenants choosing a location for offices,*

**potential landlords who form commercial offers for the market.*

***our customers and users**

* If your company organizing international conferences and forums, you need Office



Near the first-class business or conference centre;



Near high-class hotels and restaurants;



With access to cultural and touristic sites;



With sports facilities for organizing the rest of conference participants;



with banks and office services

And with low rental prices!!!

- * About the conference and business centres of Toronto, in which it is possible to rent premises to organize these events.
- * About ratings and rental prices of these areas.
- * About tourist and cultural infrastructure facilities, as well as service facilities located around potential conference venues. We have to assess information whether there are any
- * Office premises for rent,
- * Hotels, restaurants and objects necessary for the organization of rest and leisure of participants of conferences and forums near conference and business centres.

* 2. Data Requirements



Regus.ca: contains information about office spaces of Toronto, their locations, ratings and rental prices.



EventSource.ca: contains information about Conference and Business Centres of Toronto, their locations, ratings and rental prices.



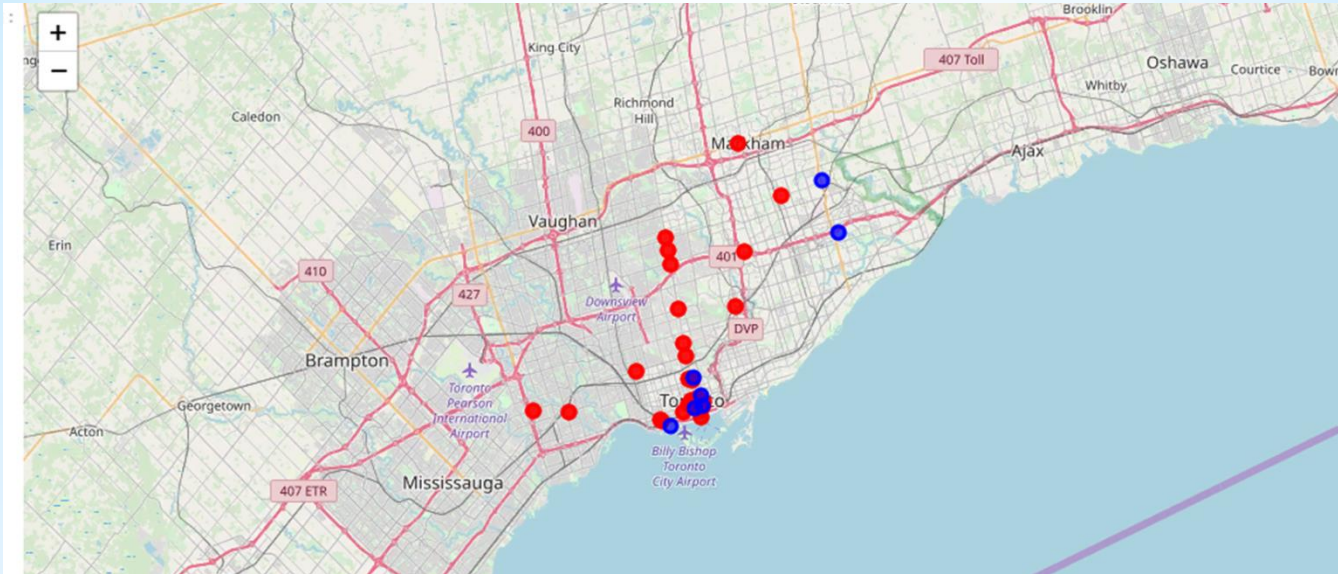
Foursquare: Foursquare contains data on hotels and restaurants, cultural and tourist sites, sports facilities in Toronto.

* 3. Data Collection

* 3.1. Getting data about office space rent in Toronto on on Regus.ca

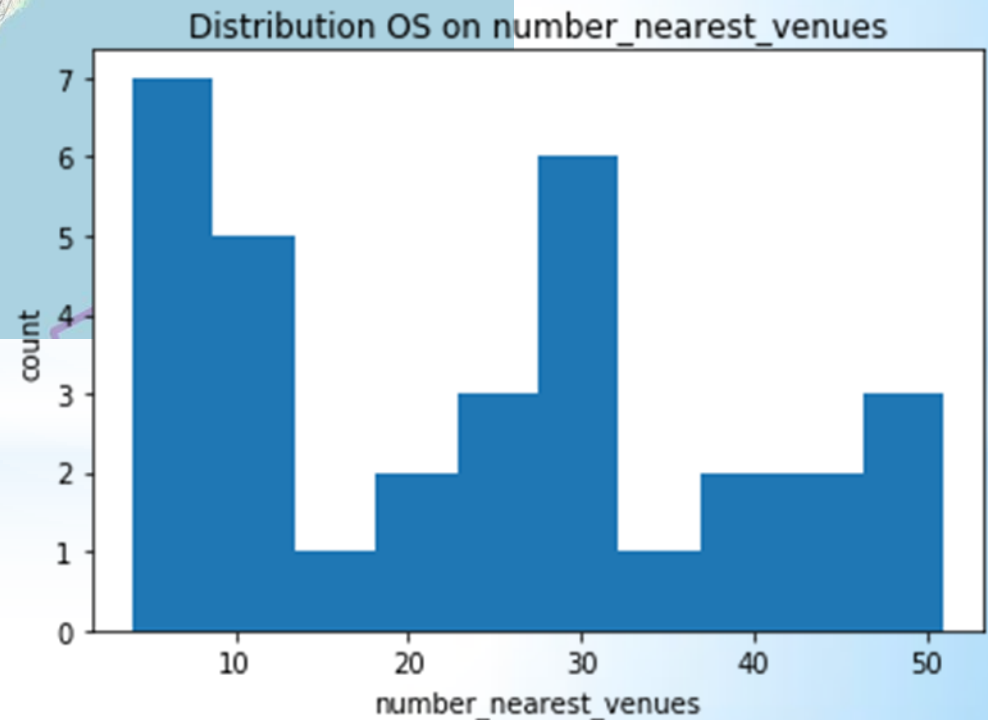
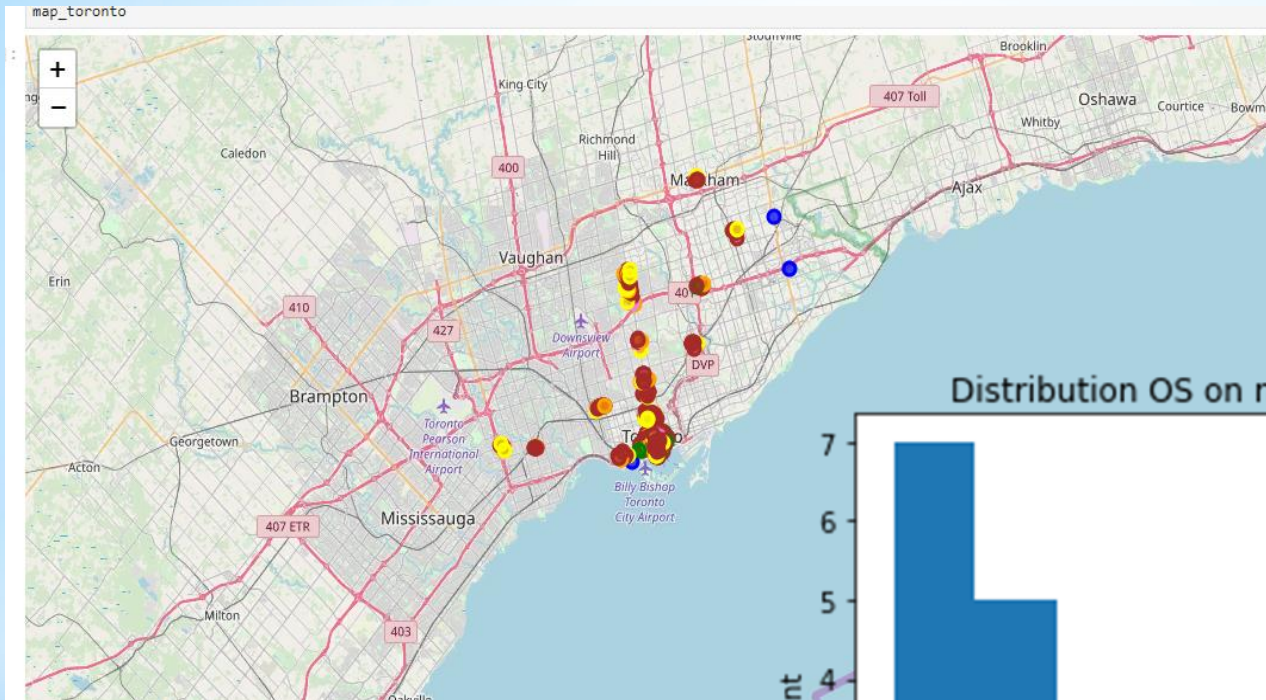
0	Yonge & Shuter	17	Yonge & St. Clair
1	Eaton Centre	18	Davisville Centre
2	University & Dundas	19	Yonge and St Clair
3	Yonge and Richmond Centre	20	Yonge and Lawrence
4	Exchange Tower	21	Don Mills
5	First Canadian Place	22	Islington Station
6	Toronto Street	23	Yonge and Sheppard
7	King East	24	Toronto - North York
8	Queen & Richmond Centre	25	Parkway Place
9	Toronto - Queen West	26	West Toronto - Etobicoke
10	King West	27	North American Centre
11	Waterpark Place	28	Midland Avenue
12	Bloor and Yonge	29	Queen & Bay
13	Yorkville	30	Brookfield Place
14	Toronto - Yorkville	31	Ontario, Toronto - Liberty Square
15	Liberty Village		
16	Toronto - Liberty Village		

* 3.2. Getting data about conference centres in Toronto on EventSource.ca



- 0 Twenty Toronto Street
- 1 Markham Convention Centre
- 2 Centennial College Event Centre
- 3 Vantage Venues
- 4 The Bram & Bluma Appel Salon
- 5 Beanfield Centre
- 6 Oakham House

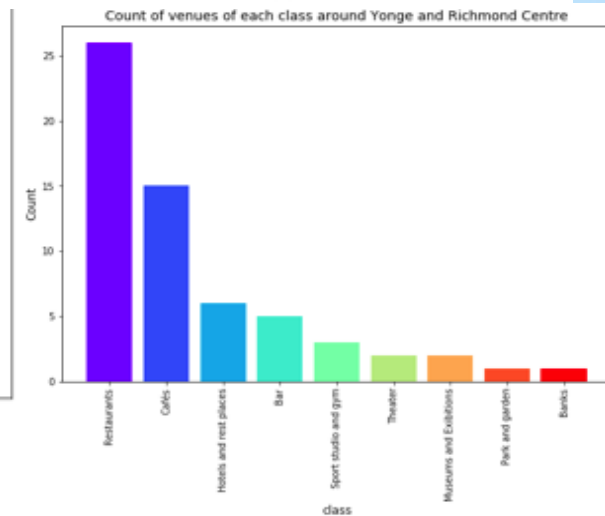
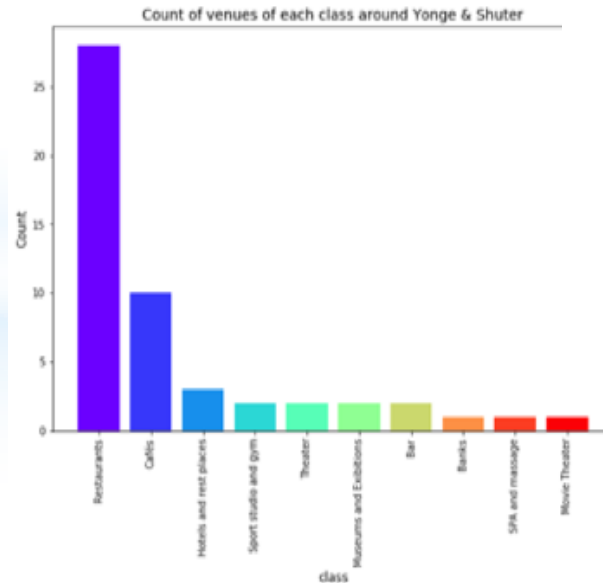
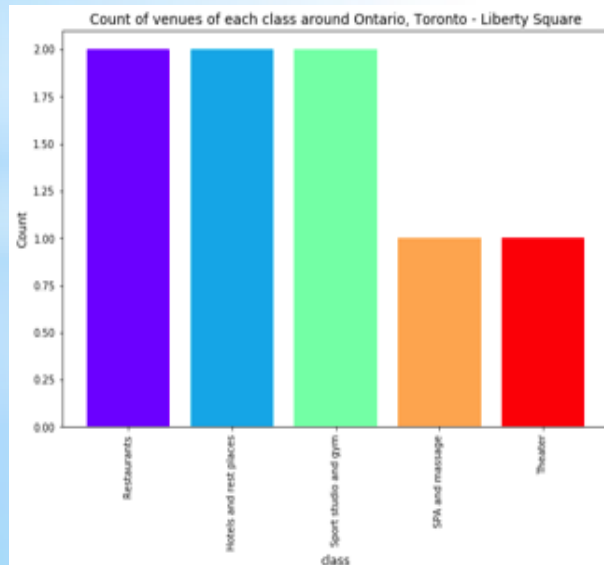
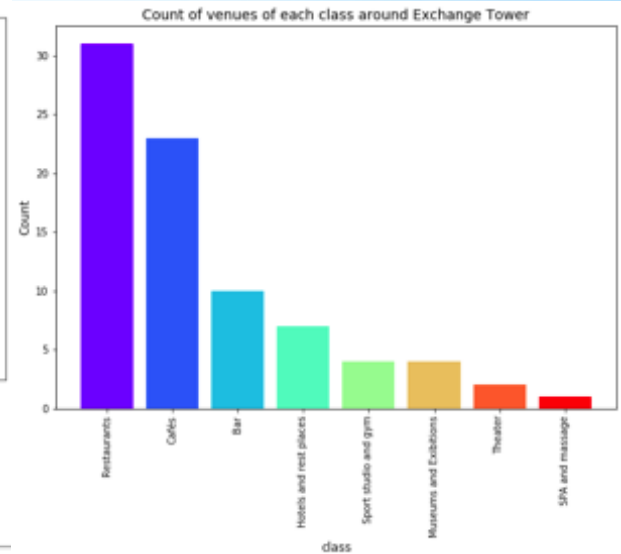
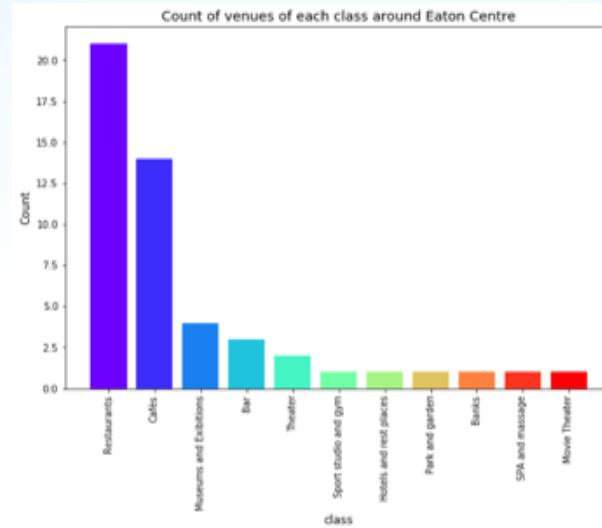
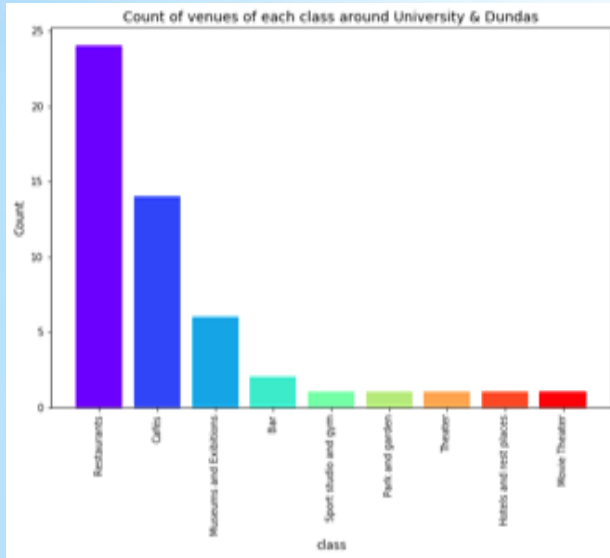
* 3.3. Getting data about office centres infrastructure in Toronto on Foursquare



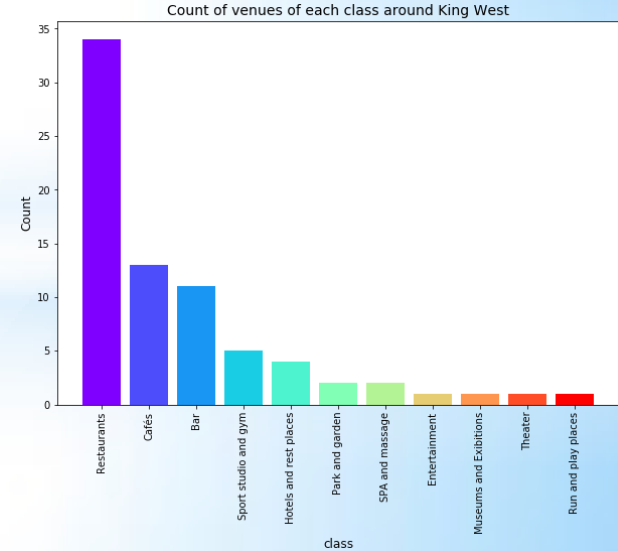
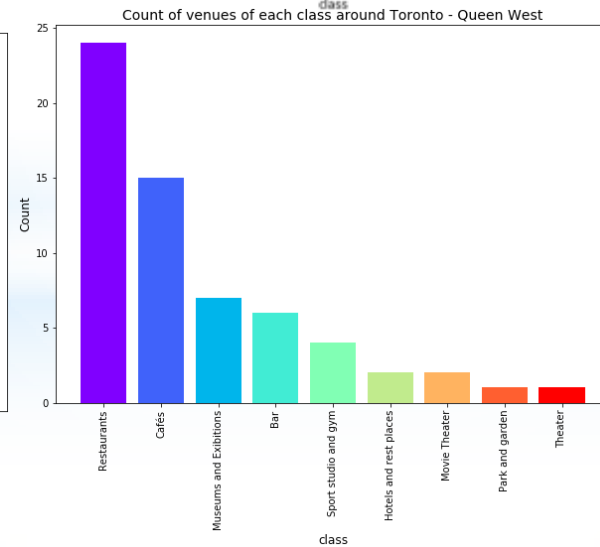
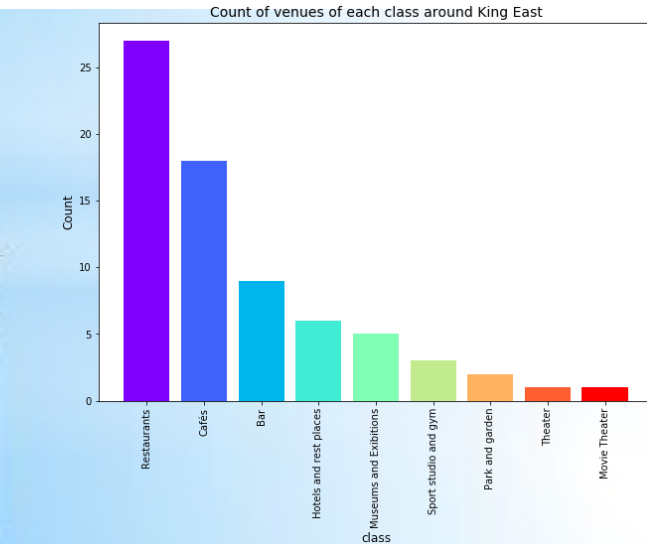
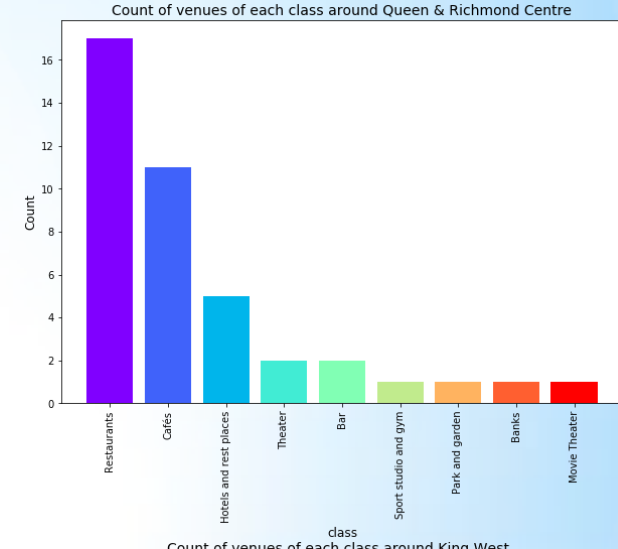
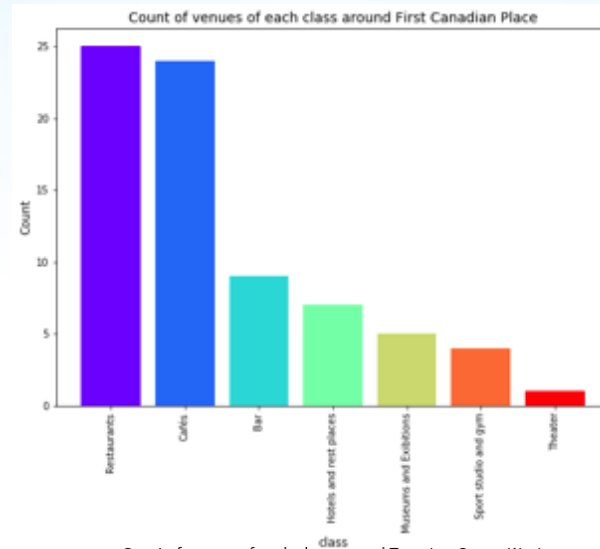
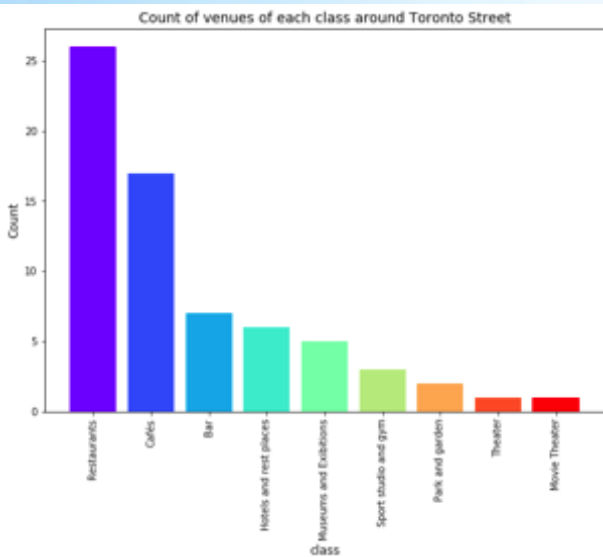
- * Removing from the DataFrame the lines relative to the office spaces and conference centres that are located outside of Toronto.
- * Removing from the DataFrame the lines where prices and ratings are not defined.
- * Deleting venues whose presence is not critical for the choice of office space
- * Getting and analyzing distribution plots venues around office spaces
- * Visualization project objects on Toronto map

* 4. Data Preparation and Description

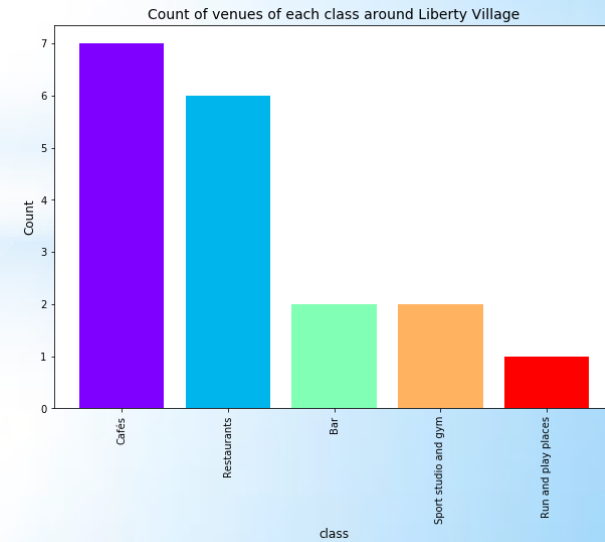
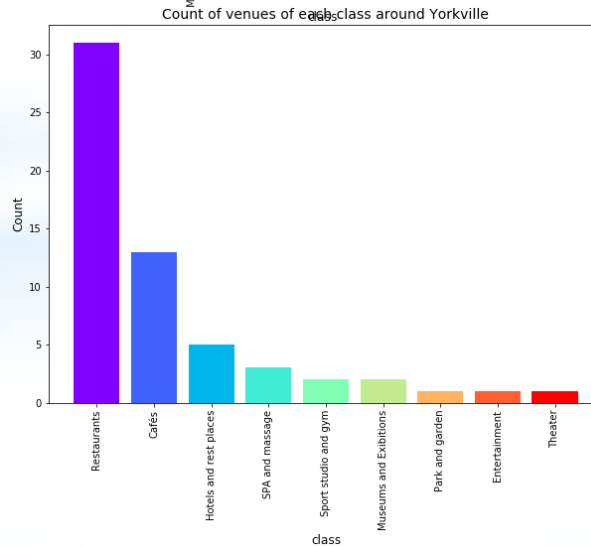
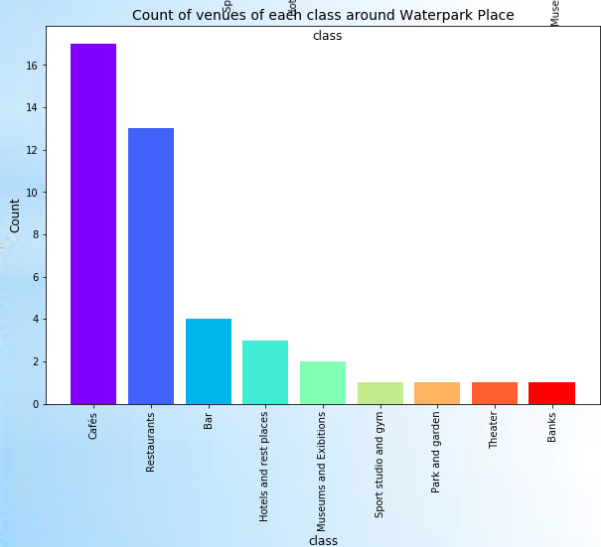
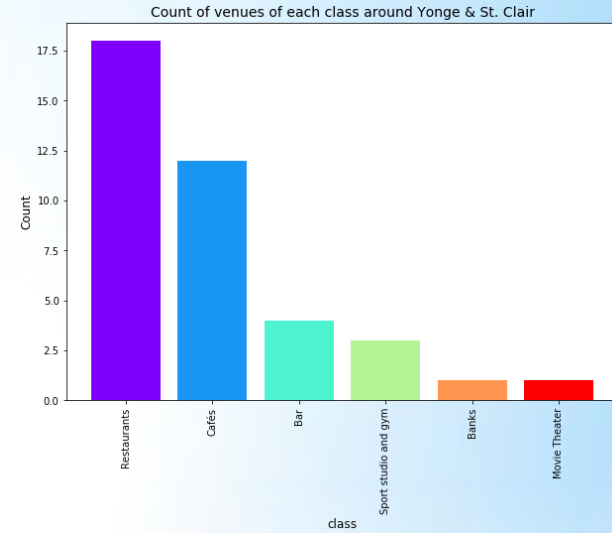
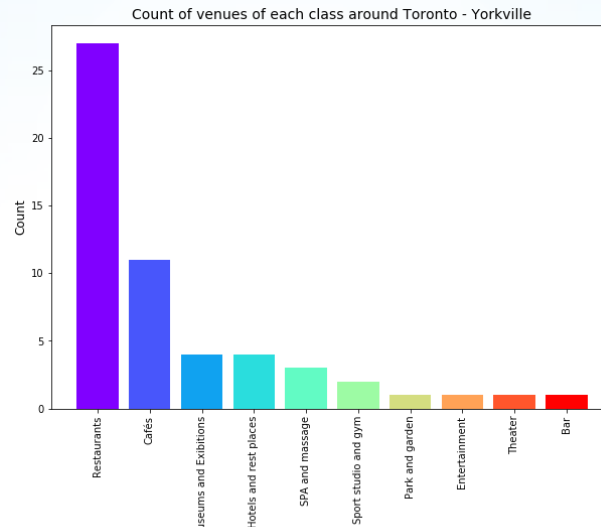
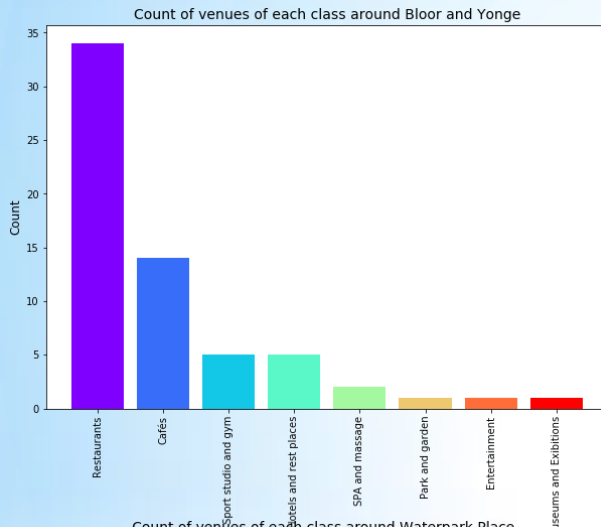
* 4.1. Getting distribution plots venues around office spaces (1)



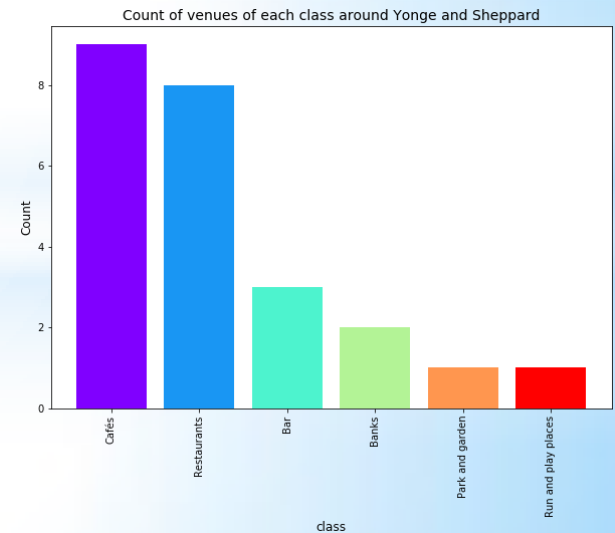
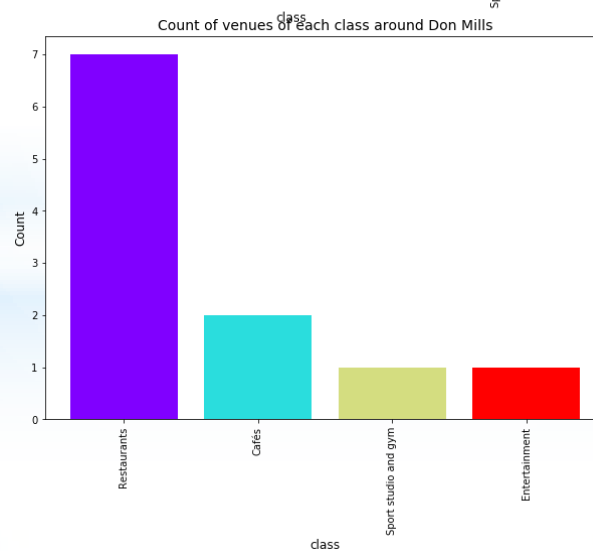
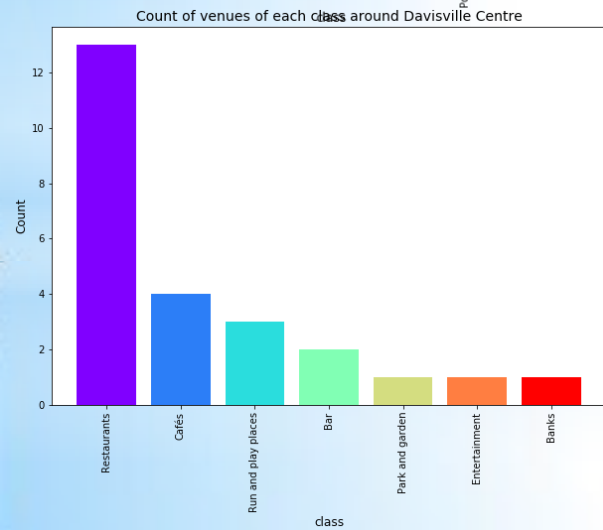
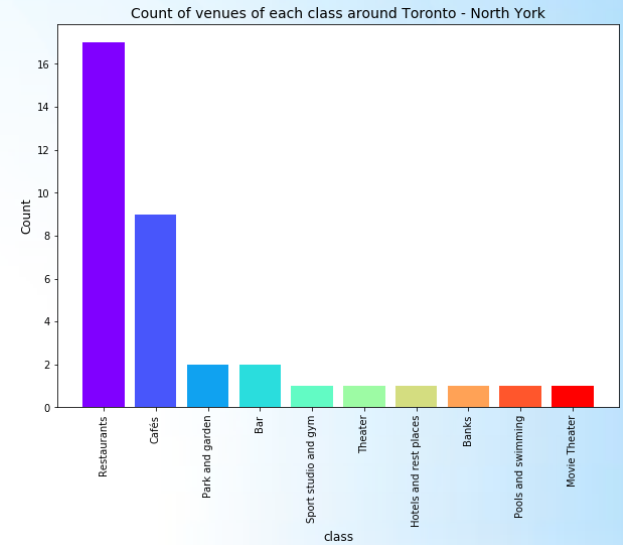
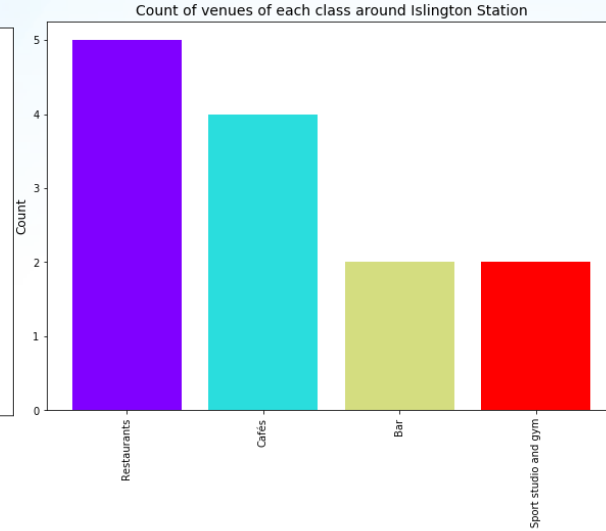
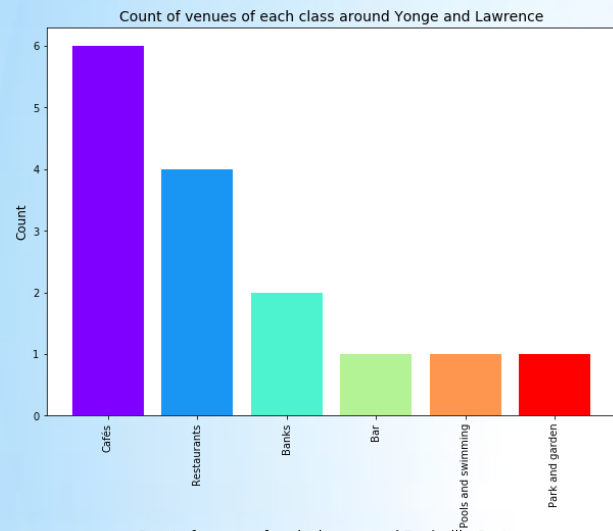
* 4.1. Getting distribution plots venues around office spaces(2)



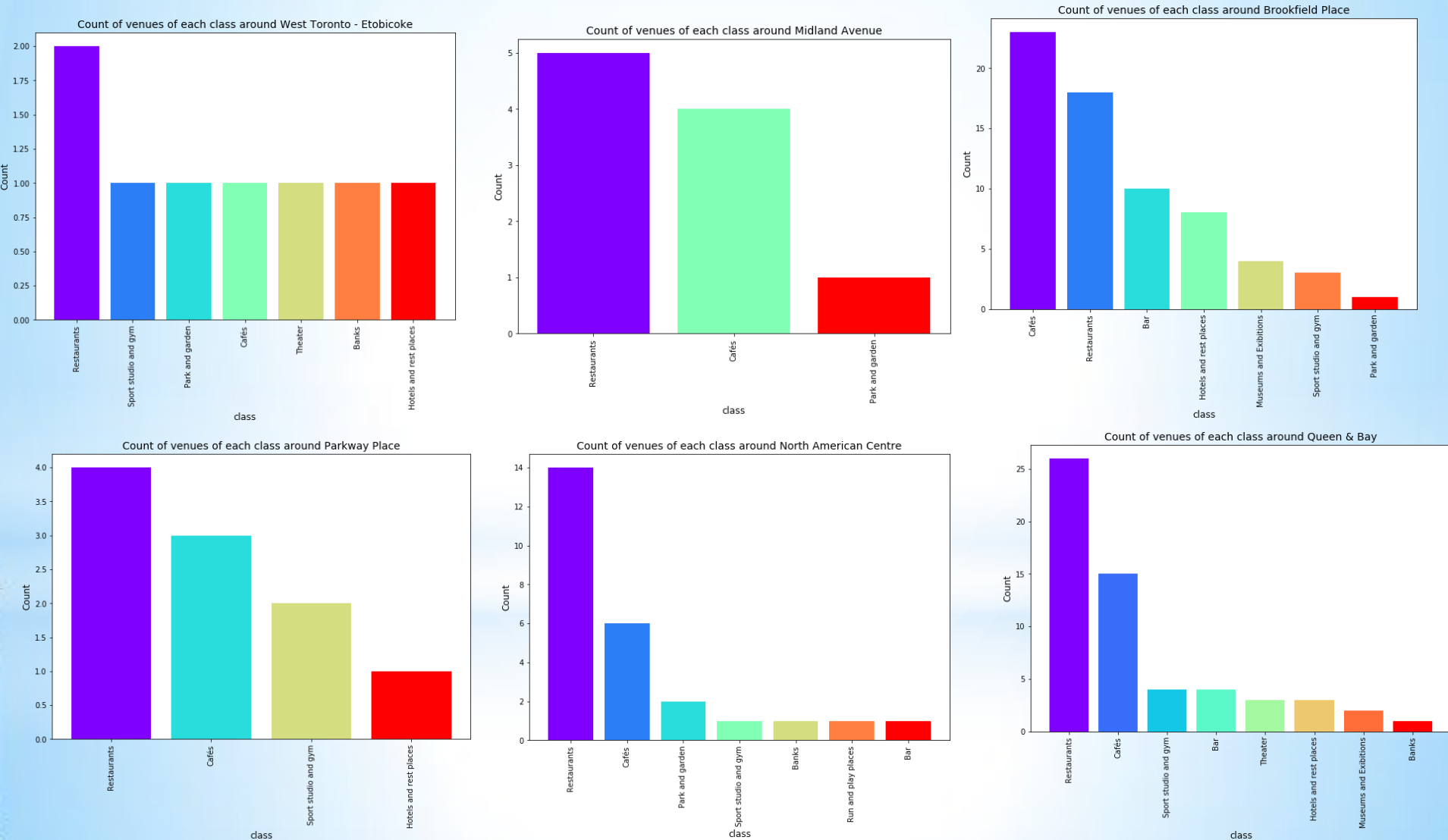
* 4.1. Getting distribution plots venues around office spaces(3)



* 4.1. Getting distribution plots venues around office spaces(4)



* 4.1. Getting distribution plots venues around office spaces(5)

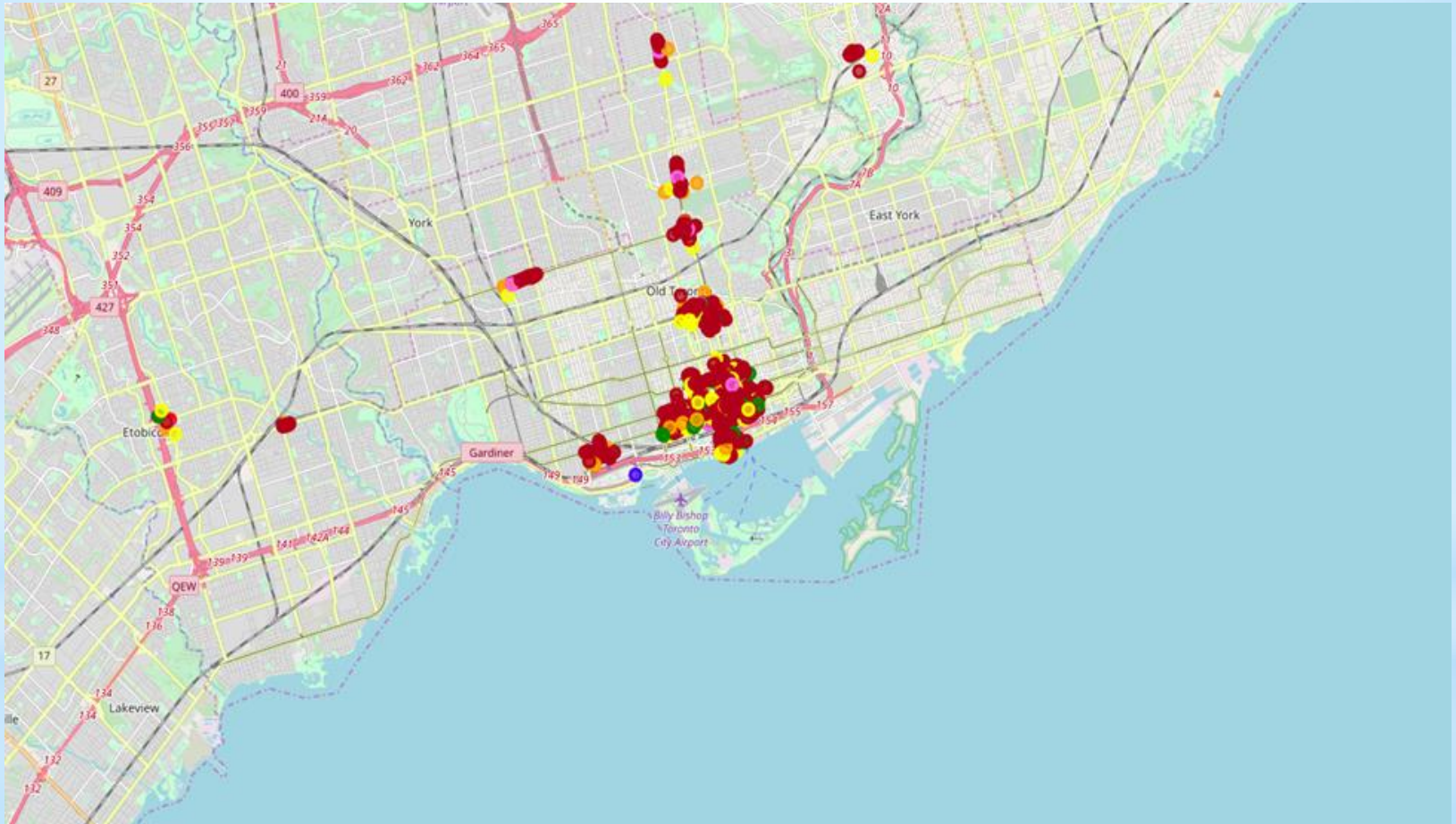


* 4.1. The office spaces with the best infrastructure

- * Yonge & Shuter - 100 venues around,
- * Eaton Centre - 100 venues around,
- * Yonge and Richmond Centre - 100 venues around,
- * Queen & Richmond Centre - 71 venues around,
- * Waterpark Place - 77 venues around,
- * Toronto - North York - 52 venues around,
- * West Toronto - Etobicoke - 9 venues around,
- * Queen & Bay are - 100 venues around

Although around the West Toronto - Etobicoke found only 9 infrastructure facilities, their list is full: there is a hotel, restaurants, bank, theatre and sports infrastructure.

* 4.2. Visualization project objects on Toronto map



Our project involves the creation of a methodology for ranking potential office spaces by their attractiveness to the customer, as well as depending on the price terms of the lease. For ranking purposes it is necessary to develop an indicators of the attractiveness of the rental object. We decided to use 2 type of indicators:

- *The nearest conference centre Availability and Quality indicator
- *The Infrastructure Quality Indicator.

Further, these indicators will be constructed and our office objects will be clustered taking into account their locations, the quality indicators and price characteristics.

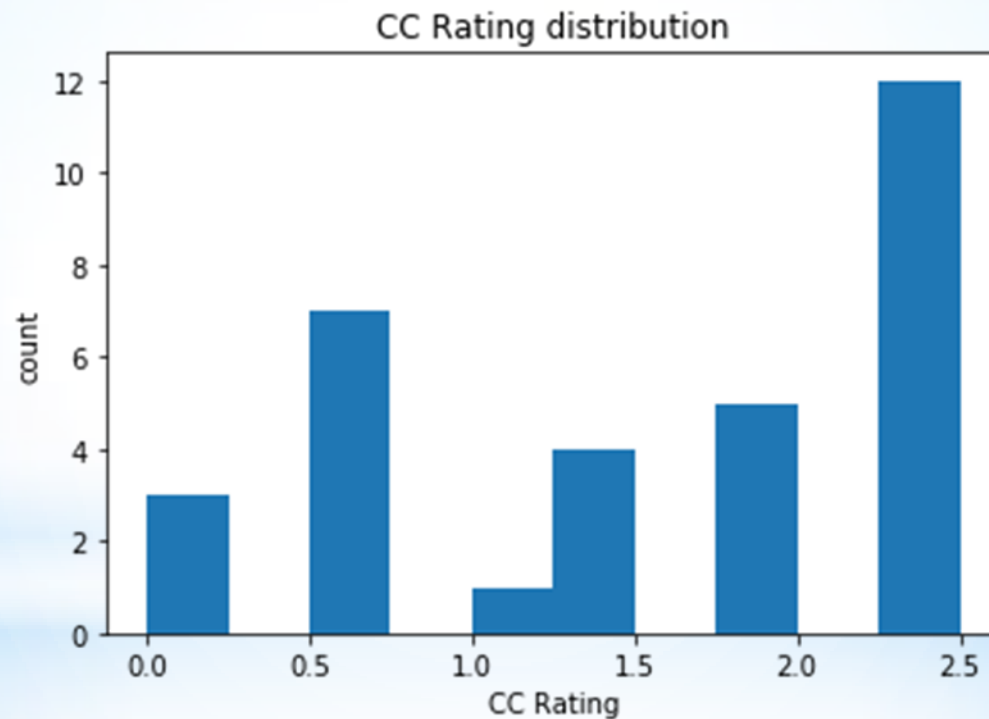
*5. Methodology: Modelling and Evaluation

* 5.1 Creating Conference Centres Availability and Quality indicator (Integral rating CC)

- *The base value *Integral rating CC* - the rating of the conference centres, calculated on the basis of customer surveys on resource *EventSource.ca*.
- *The first adjustment - in accordance with the rental price level of the conference centres premises (coefficient k_1)
- *The second adjustment - the proximity of the conference centres to the office space (coefficient k_2).

The distance to the conference centre more than 10 km is considered unacceptable and leads to a reset of the conference centre rating.

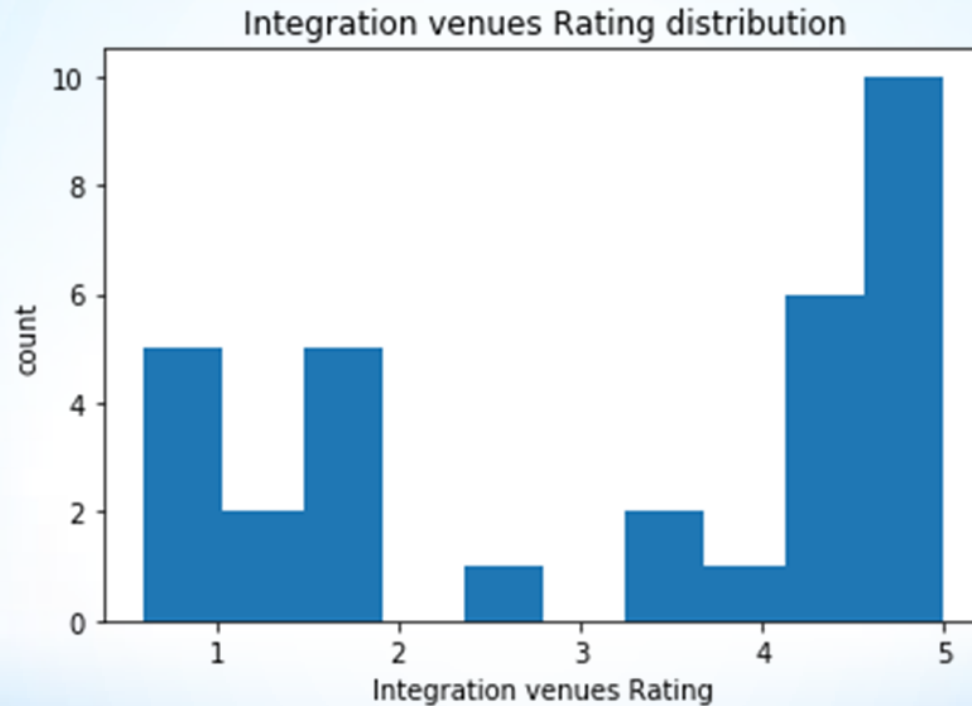
* Distribution OS on Integral rating CC



* 5.2 Creating Conference Center Availability and Quality indicator (*Infrastructure QI*)

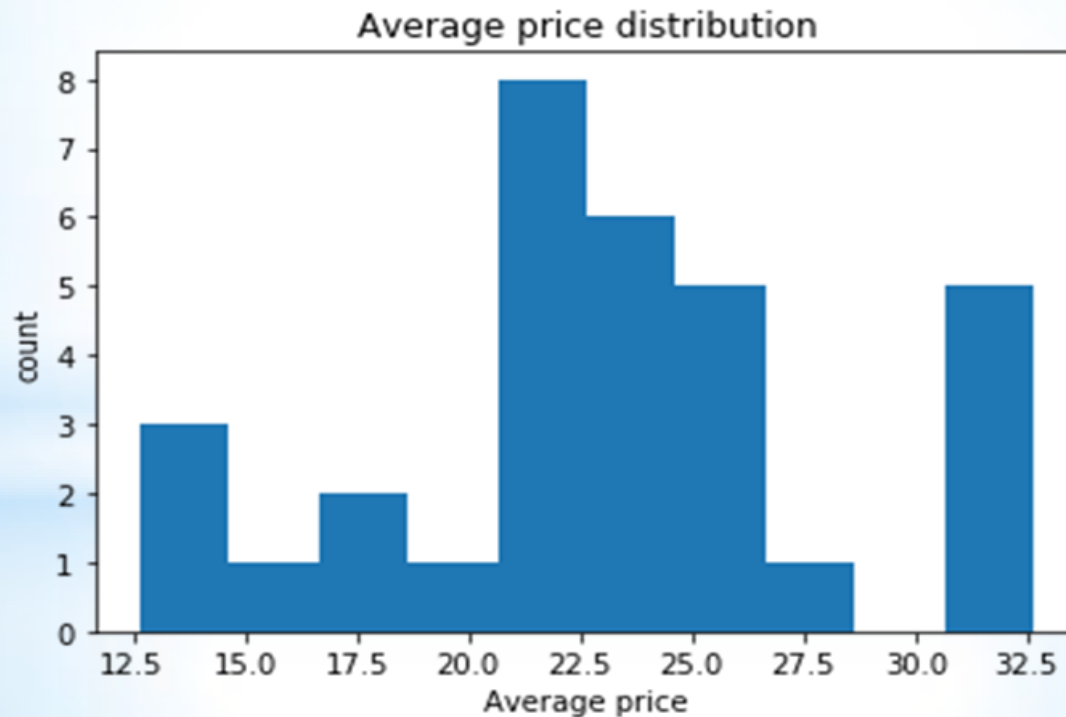
- *The base value *Infrastructure QI* - the rating, calculated on the basis of the average number of infrastructure facilities located within a radius of 500 m around the office space
- *The adjustments - in accordance with the presence in the neighborhood of
 - * Hotels (coefficient k_3) ,
 - * Restaurants (coefficient k_4),
 - * swimming pools or SPA (coefficient k_5),
 - * bank (coefficient k_6)

* Distribution OS on Infrastructure QI

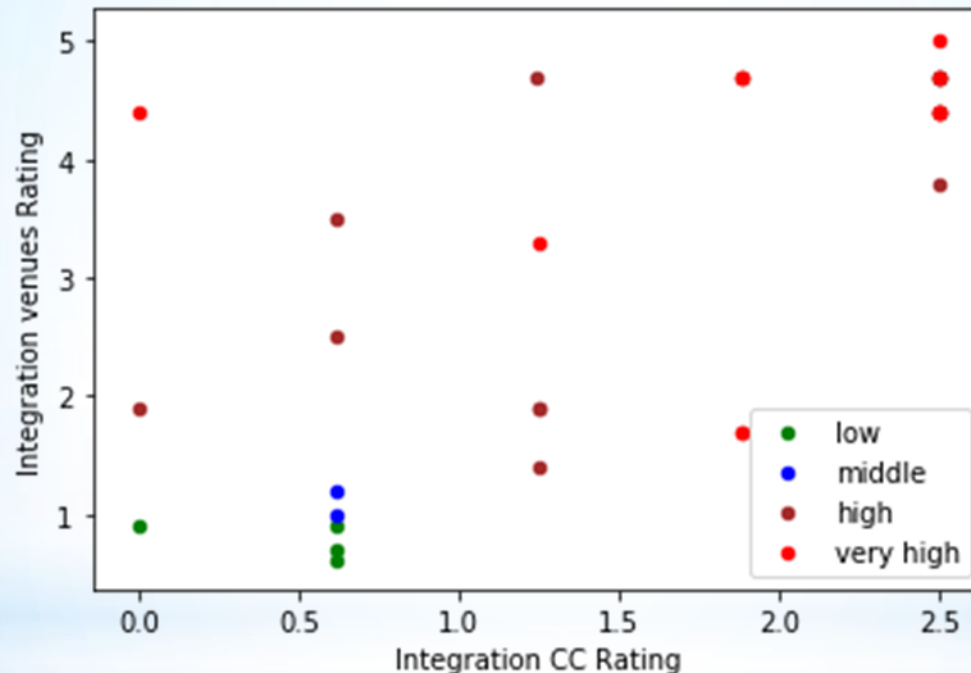


* 5.3. Distribution OS prices

*The third factor that determines the choice of office space is the rental price. Consider how our objects are distributed by price level, as well as average prices.



* 5.4. Joint distribution of office spaces on Integral rating CC, Infrastructure Quality indicator and Average prices



In the figure above we see three types of objects:

- * with low quality ratings and low prices,
- * with low ratings and high prices,
- * with high ratings and high prices.

This determined the choice of the number of classes for clustering.

* 5.5. Clustering - parameters

- * Clustering algorithm - KMeans

- * Number of clusters - 3

- * Factors

 - * Latitude

 - * Longitude

 - * Integral rating CC (R_CC)

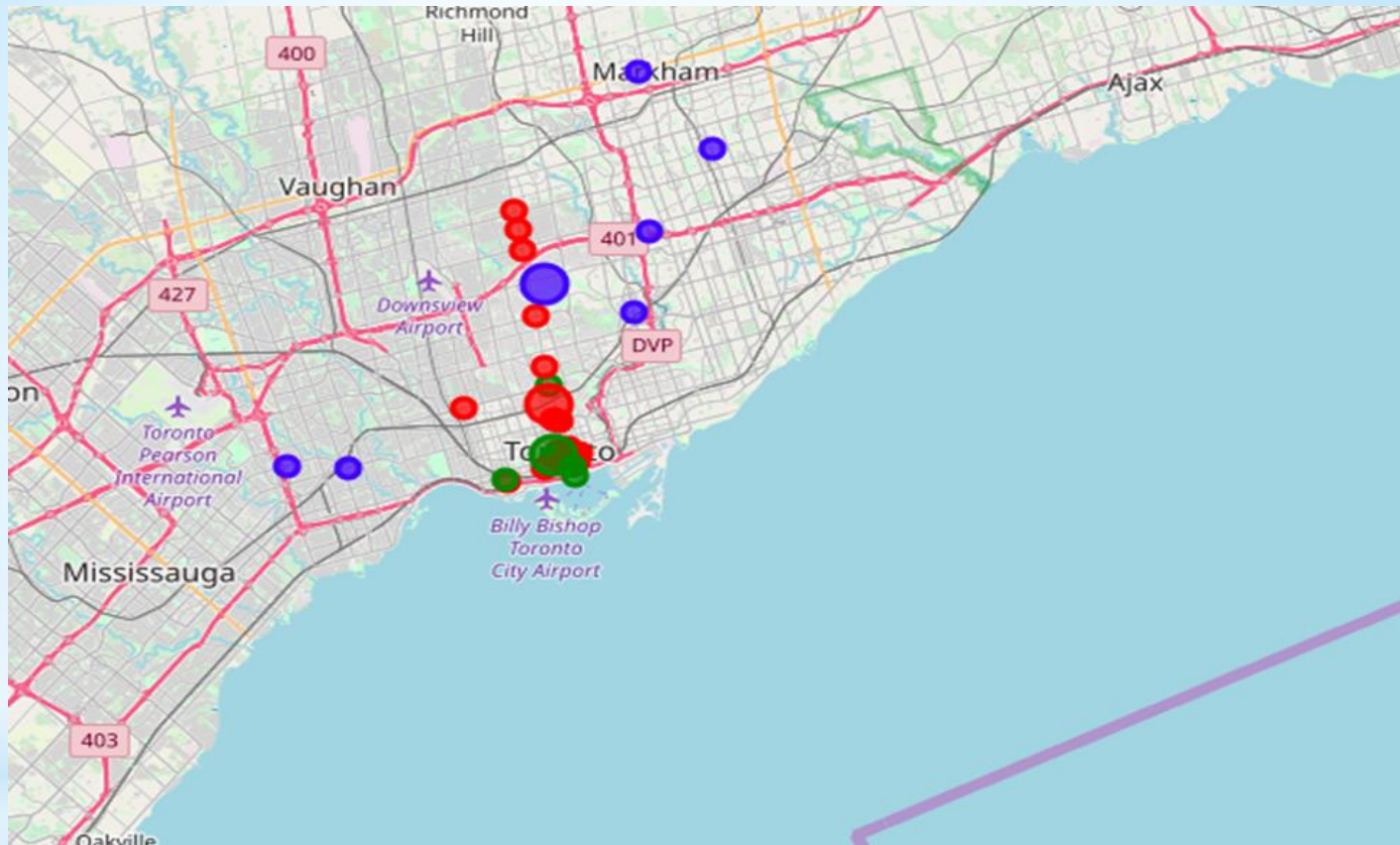
 - * Infrastructure Quality indicator (R_Inf)

 - * Average prices.

- *Location of clusters on the Toronto map*
- *First cluster features*
- *Second cluster features*
- *Third cluster features*

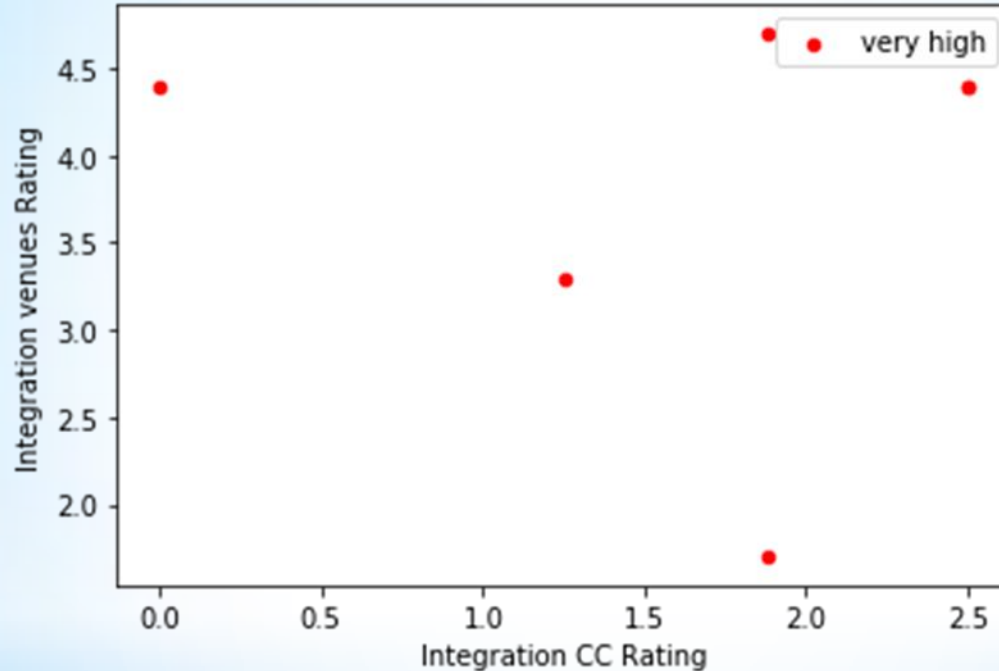
**6. Results and Discussion*

* 6.1. Clusters on the Toronto map



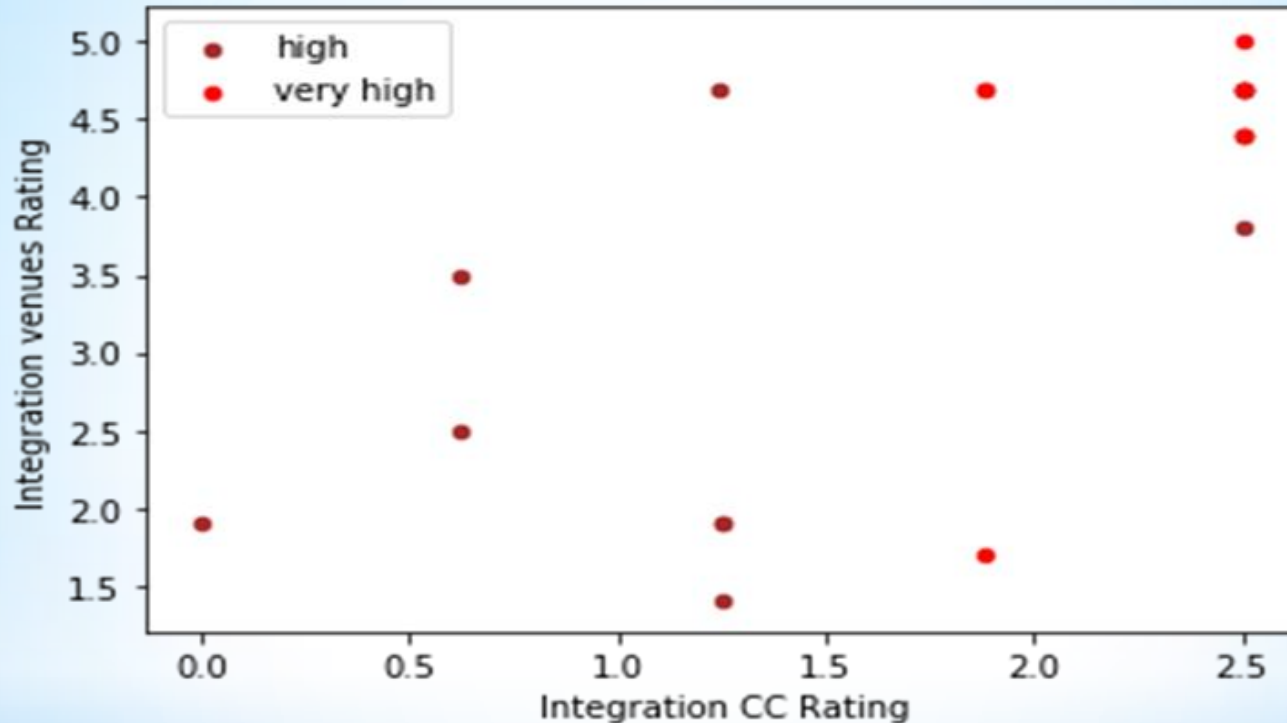
the first cluster - green,
the second cluster - red,
the third cluster - blue

* 6.2. First cluster features



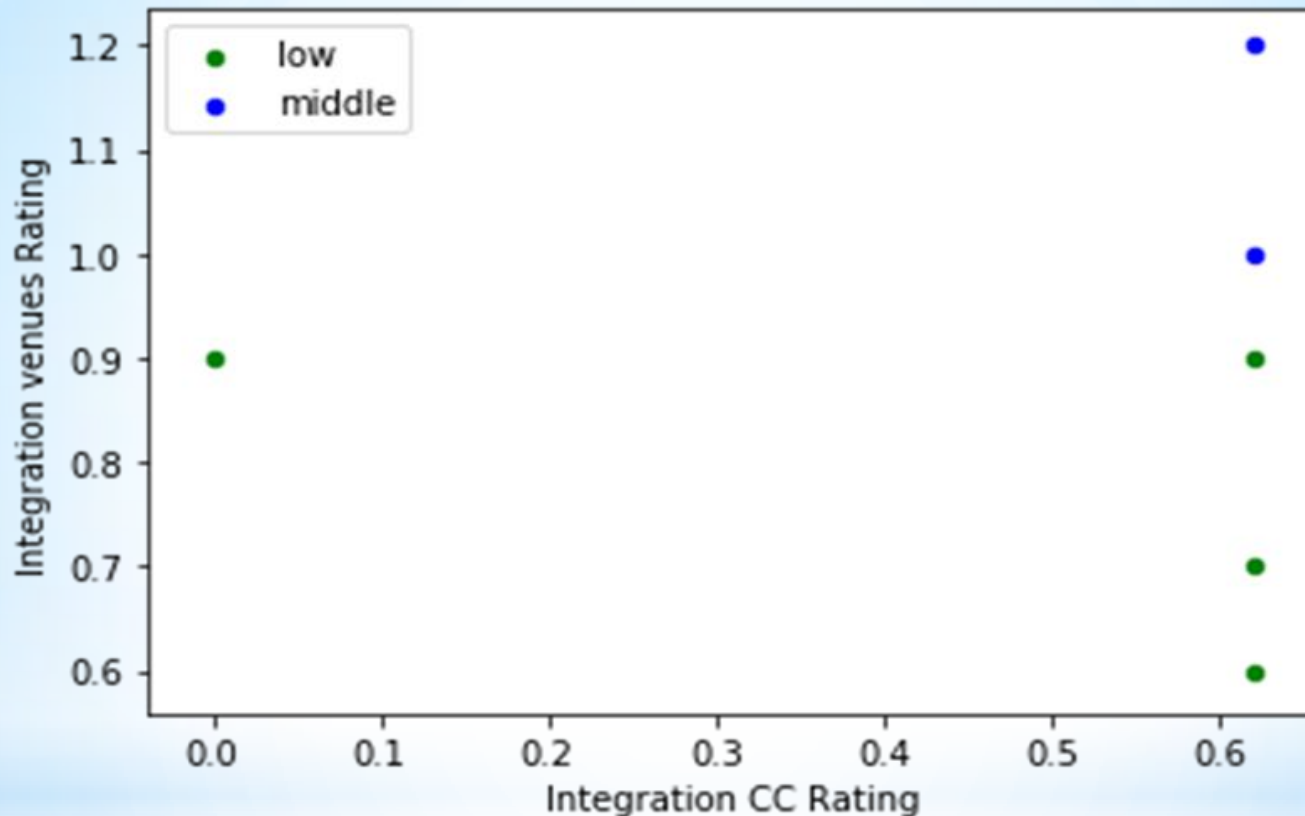
The first class contains premium properties with a high level of demand for them, which determines the highest rental prices.

* 6.3. Second cluster features



The second cluster included office premises from the top two price categories. These objects have high or average values of 'Integration venues Rating' and 'Integration CC Rating'.

* 6.4. Third cluster features



The third cluster includes office premises from the two lower price categories. These objects have the lowest values of 'Integration venues Rating' and 'Integration of CC Rating'

Machine learning allowed us to identify clusters of office spaces that differ in the level of prices and quality of service.

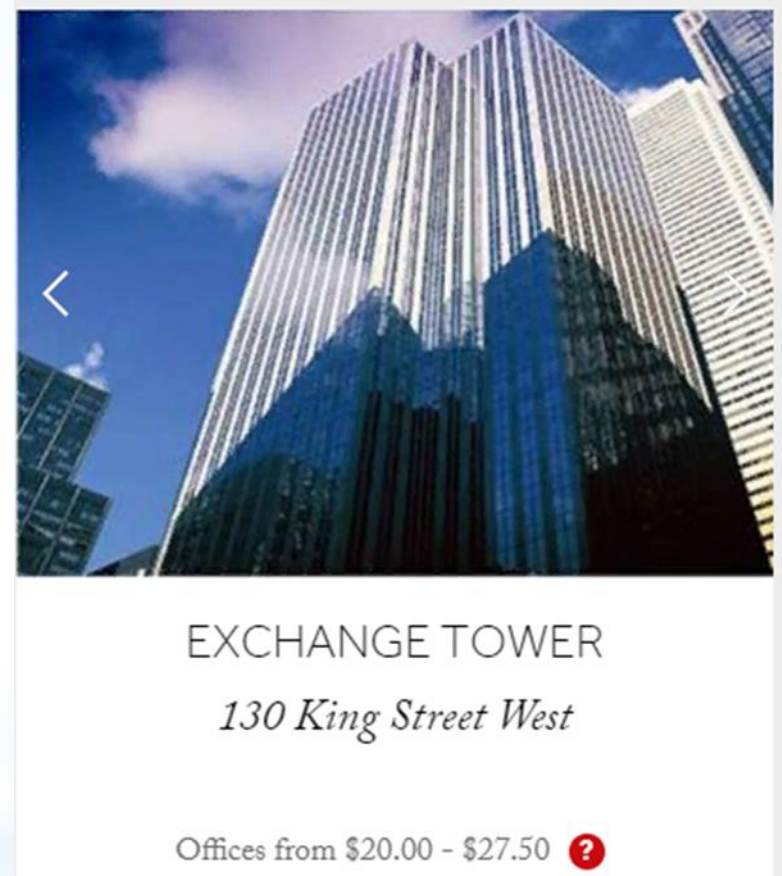
- * Although objects with low prices were included in *the third cluster*, their quality characteristics *least meet the requirements of the client*.
- * *The second cluster will be most preferable*, since it includes objects with first-class characteristics, among which you can choose objects with an acceptable price level.
- * *The first cluster* - the most expensive, but provides all kinds of services necessary for the client

*7. Conclusion

We can recommend Exchange Tower.

Near the Exchange Tower there is

- * a high-class Oakham House conference centre,
- * 7 hotels,
- * 33 restaurants and cafes,
- * a swimming pool. OS has
- * an Integration CC Rating of 2.5
- * an Integration Venues Rating - 4.7



*Recommendations