Introduction where you discuss the business problem and who would be interested in this project

Milan is a city in northern Italy, capital of Lombardy, and the second-most populous city in Italy after Rome. Milan served as the capital of the Western Roman Empire, the Duchy of Milan and the Kingdom of Lombardy–Venetia. The city proper has a population of about 1.4 million while its metropolitan city has 3.26 million inhabitants. Its continuously built-up urban area, that stretches well beyond the boundaries of the administrative metropolitan city, is the fourth largest in the EU with 5.27 million inhabitants. The population within the wider Milan metropolitan area, also known as Greater Milan, is estimated at 8.2 million, making it by far the largest metropolitan area in Italy and the 4th largest in the EU. Milan is considered a leading alpha global city, with strengths in the field of the art, commerce, design, education, entertainment, fashion, finance, healthcare, media, services, research and tourism. Its business district hosts Italy's stock exchange (Italian: Borsa Italiana), and the headquarters of national and international banks and companies. In terms of GDP, it has the second-largest economy among EU cities after Paris and is the wealthiest among EU non-capital cities.

Milan is one of the best world cities to invest money, it has been recognized as one of the world's four fashion capitals thanks to several international events and fairs, including Milan Fashion Week and the Milan Furniture Fair, which are currently among the world's biggest in terms of revenue, visitors and growth. It hosted the Universal Exposition in 1906 and 2015. The city hosts numerous cultural institutions, academies and universities, with 11% of the national total enrolled students. Milan is the destination of 8 million overseas visitors every year, attracted by its museums and art galleries that include some of the most important collections in the world, including major works by Leonardo da Vinci. The city is served by many luxury hotels and is the fifth-most starred in the world by Michelin Guide. The city is home to two of Europe's most successful football teams, A.C. Milan and F.C. Internazionale, and one of Europe's main basketball teams, Olimpia Milano. Milan will host the 2026 Winter Olympics together with Cortina d'Ampezzo.

During the day and specifically during breakfast time (07:30 - 10:00) and lunch time (12:00 - 14:30) the areas with higher population density are struggling to manage the flow of people who want to treat themselves to a dessert.Within this scenario where the city continues to face a continuous population increase, we will go to analyze the possibility of opening a handicraft shop of sweets and coffee.

Milan has 9 town halls and our focus will be on Centro storico, Stazione centrale, Città studi, Porta vittoria, Vigentino, Barona, Baggio and Porta garibaldi.

Data where you describe the data that will be used to solve the problem and the source of the data

- Wikipedia: list of all townhalls in Milan

	Townhall	Description	Area	Population	Density	Name
0	1	Centro storico	9.67	96,315	11,074	Centro storico
1	2	Stazione Centrale, Gorla, Turro, Greco, Cresce...	12.58	153.109	13,031	Stazione centrale
2	3	Città Studi, Lambrate, Porta Venezia	14.23	141,229	10,785	Città studi
3	4	Porta Vittoria, Forlanini	20.95	156.369	8,069	Porta vittoria
4	5	Vigentino, Chiaravalle, Gratosoglio	29.87	123,779	4,487	Vigentino
5	6	Barona, Lorenteggio	18.28	149,000	8,998	Barona
6	7	Baggio, De Angeli, San Siro	31.34	170,814	6,093	Baggio
7	8	Fiera, Gallaratese, Quarto Oggiaro	23.72	181,669	8,326	Fiera
8	9	Porta Garibaldi, Niguarda	21.12	181,598	9,204	Porta garibaldi

Webscraping from wikipedia to collect information into dataframe

- Geopy: locating the coordinates of addresses, cities, countries and landmarks

	Townhall	Description	Area	Population	Density	Name	Latitude	Longitude
0	1	Centro storico	9.67	96,315	11,074	Centro storico	45.467281	9.185962
1	2	Stazione Centrale, Gorla, Turro, Greco, Cresce...	12.58	153.109	13,031	Stazione centrale	45.499990	9.218999
2	3	Città Studi, Lambrate, Porta Venezia	14.23	141,229	10,785	Città studi	45.489800	9.241031
3	4	Porta Vittoria, Forlanini	20.95	156.369	8,069	Porta vittoria	45.446205	9.239343
4	5	Vigentino, Chiaravalle, Gratosoglio	29.87	123,779	4,487	Vigentino	45.419846	9.198153
5	6	Barona, Lorenteggio	18.28	149,000	8,998	Barona	45.437929	9.145648
6	7	Baggio, De Angeli, San Siro	31.34	170,814	6,093	Baggio	45.469598	9.114757
7	8	Fiera, Gallaratese, Quarto Oggiaro	23.72	181,669	8,326	Fiera	45.500015	9.122774
8	9	Porta Garibaldi, Niguarda	21.12	181,598	9,204	Porta garibaldi	45.507704	9.179410

Geopy makes it easy for Python developers to locate the coordinates of addresses, cities, countries, and landmarks across the globe using third-party geocoders and other data sources. Thanks to Geopy we collect Latitude and Longitude for each Townhall.

- Mercato-immobiliare.info: Average price (RealEstate)

	Townhall	Description	Area	Population	Density	Name	Latitude	Longitude	Price
0	1	Centro storico	9.67	96,315	11,074	Centro storico	45.467281	9.185962	€ 7.100 /m²
1	2	Stazione Centrale, Gorla, Turro, Greco, Cresce...	12.58	153.109	13,031	Stazione centrale	45.499990	9.218999	€ 5.000 /m²
2	3	Città Studi, Lambrate, Porta Venezia	14.23	141,229	10,785	Città studi	45.489800	9.241031	€ 4.500 /m²
3	4	Porta Vittoria, Forlanini	20.95	156.369	8,069	Porta vittoria	45.446205	9.239343	€ 6.450 /m²
4	5	Vigentino, Chiaravalle, Gratosoglio	29.87	123,779	4,487	Vigentino	45.419846	9.198153	€ 3.250 /m²
5	6	Barona, Lorenteggio	18.28	149,000	8,998	Barona	45.437929	9.145648	€ 3.200 /m²
6	7	Baggio, De Angeli, San Siro	31.34	170,814	6,093	Baggio	45.469598	9.114757	€ 2.400 /m²
7	9	Porta Garibaldi, Niguarda	21.12	181,598	9,204	Porta garibaldi	45.507704	9.179410	€ 6.800 /m²

Webscraping from Mercato Immobiliare to collect information into dataframe.

	Name	Price
0	Baggio	€ 2.400 /m²
1	Barona	€ 3.200 /m²
2	Centro storico	€ 7.100 /m²
3	Città studi	€ 4.500 /m²
4	Porta garibaldi	€ 6.800 /m²
5	Porta vittoria	€ 6.450 /m²
6	Stazione centrale	€ 5.000 /m²
7	Vigentino	€ 3.250 /m²

- Foursquare: Data of existing points of interests

	District	Dist_Latitude	Dist_Longitude	Venue	Venue_Lat	Venue_Long	Venue_Category
1	Centro storico	45.467281	9.185962	Starbucks Reserve Roastery	45.464920	9.186153	Coffee Shop
2	Centro storico	45.467281	9.185962	Ciacco. Gelato senz'altro	45.463704	9.186796	Ice Cream Shop
3	Centro storico	45.467281	9.185962	Gay Odin	45.466187	9.180801	Chocolate Shop
4	Centro storico	45.467281	9.185962	Di Viole Di Liquirizia	45.471460	9.185336	Cupcake Shop
5	Centro storico	45.467281	9.185962	Pasticceria Marchesi	45.465612	9.190091	Pastry Shop
6	Centro storico	45.467281	9.185962	Lavazza Coffee Design	45.466274	9.190975	Coffee Shop
7	Centro storico	45.467281	9.185962	Pasticceria Marchesi	45.468299	9.195018	Dessert Shop
8	Centro storico	45.467281	9.185962	Cova	45.468170	9.195347	Dessert Shop
9	Centro storico	45.467281	9.185962	Garibaldi Crème	45.474355	9.183466	Ice Cream Shop
10	Centro storico	45.467281	9.185962	Chocolat	45.467660	9.174160	Ice Cream Shop
11	Centro storico	45.467281	9.185962	Ammu - Cannoli espressi siciliani	45.466059	9.176548	Dessert Shop
12	Stazione centrale	45.499990	9.218999	Pasticceria Martesana	45.495824	9.203095	Dessert Shop
13	Stazione centrale	45.499990	9.218999	Gelateria Etnica	45.489586	9.217686	Ice Cream Shop
14	Stazione centrale	45.499990	9.218999	Pasticceria La Siciliana	45.488775	9.229817	Cupcake Shop
15	Stazione centrale	45.499990	9.218999	Gelateria Sartori	45.486618	9.206877	Ice Cream Shop
16	Stazione centrale	45.499990	9.218999	MAG - Mastri Artigiani del Gelato	45.481940	9.221057	Ice Cream Shop
17	Stazione centrale	45.499990	9.218999	Terra	45.482487	9.206623	Ice Cream Shop
18	Stazione centrale	45.499990	9.218999	Pasticceria Grossi	45.491280	9.237180	Dessert Shop
19	Stazione centrale	45.499990	9.218999	Pasticceria Ungaro	45.489943	9.237042	Dessert Shop
20	Stazione centrale	45.499990	9.218999	Pasticceria Valente	45.481174	9.220150	Dessert Shop

```
unique categories: 159
Italian Restaurant        78
Pizza Place               52
Café                      31
Supermarket               29
Hotel                     24
Ice Cream Shop            22
Park                      22
Restaurant                20
Plaza                     17
Chinese Restaurant        17
Bakery                    17
Dessert Shop              16
Japanese Restaurant       13
Cocktail Bar              13
Pub                       12
Tram Station              11
Seafood Restaurant        11
Trattoria/Osteria         11
Sushi Restaurant          11
Art Gallery               10
Gym                       10
Wine Bar                   9
Theater                    9
Soccer Field               8
Boutique                   7
Asian Restaurant           6
Gym / Fitness Center       6
Nightclub                  6
Wine Shop                  6
Bar                        6
..
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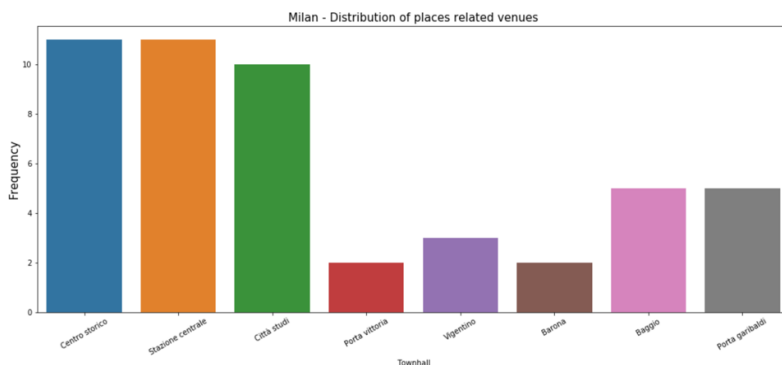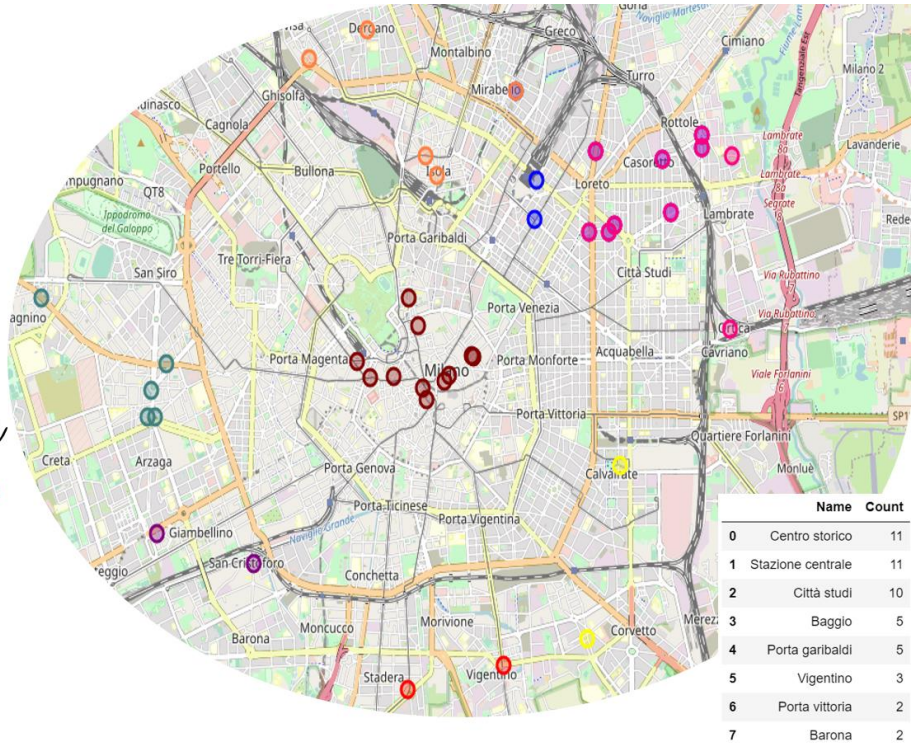
By API we collect points of interests information from Foursquare, like venue, category and coordinates
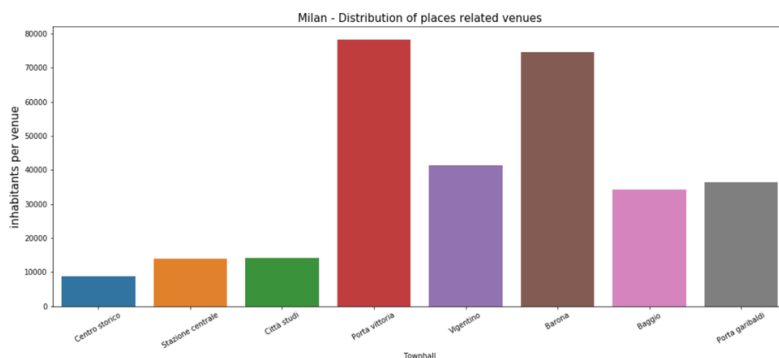
Methodology section which represents the main component of the report where you discuss and describe any exploratory data analysis that you did, any inferential statistical testing that you performed, if any, and what machine learnings were used and why

	Townhall	Description	Area	Population	Density	Name	Latitude	Longitude	Price	Count	Population By Venue
0	1	Centro storico	9.67	96315.0	11074.0	Centro storico	45.467281	9.185962	€ 7.100 /m²	11	8755.909091
1	2	Stazione Centrale, Gorla, Turro, Greco, Cresce...	12.58	153109.0	13031.0	Stazione centrale	45.499990	9.218999	€ 5.000 /m²	11	13919.000000
2	3	Città Studi, Lambrate, Porta Venezia	14.23	141229.0	10785.0	Città studi	45.489800	9.241031	€ 4.500 /m²	10	14122.900000
3	4	Porta Vittoria, Forlanini	20.95	156369.0	8069.0	Porta vittoria	45.446205	9.239343	€ 6.450 /m²	2	78184.500000
4	5	Vigentino, Chiaravalle, Gratosoglio	29.87	123779.0	4487.0	Vigentino	45.419846	9.198153	€ 3.250 /m²	3	41259.666667
5	6	Barona, Lorenteggio	18.28	149000.0	8998.0	Barona	45.437929	9.145648	€ 3.200 /m²	2	74500.000000
6	7	Baggio, De Angeli, San Siro	31.34	170814.0	6093.0	Baggio	45.469598	9.114757	€ 2.400 /m²	5	34162.800000
7	9	Porta Garibaldi, Niguarda	21.12	181598.0	9204.0	Porta garibaldi	45.507704	9.179410	€ 6.800 /m²	5	36319.600000

Data
Visualization

	Name	Count
0	Centro storico	11
1	Stazione centrale	11
2	Città studi	10
3	Baggio	5
4	Porta garibaldi	5
5	Vigentino	3
6	Porta vittoria	2
7	Barona	2

Distribution of Sweet places for each venues

Milan - Distribution of places related venues

Distribution of Sweet places for inhabitants

Milan - Distribution of places related venues

Distribution based category

6 Most Frequently Occuring Venues in Milan
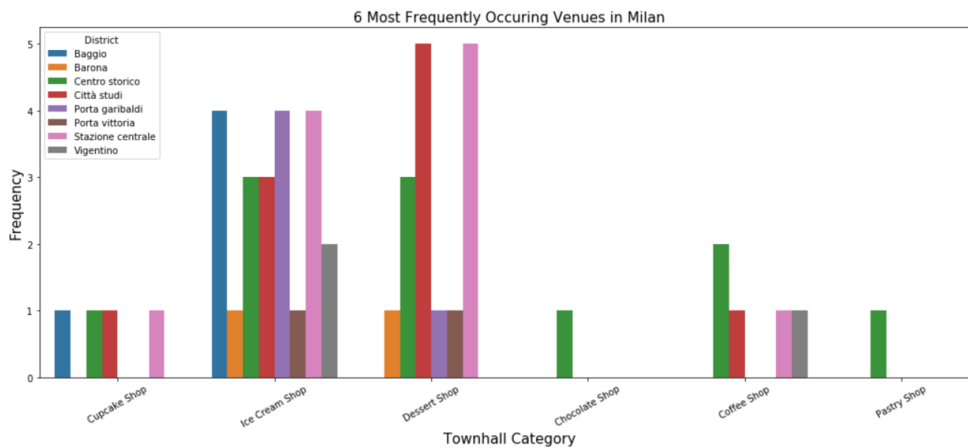
	District	Venue_Category	count
0	Baggio	Cupcake Shop	1
1	Baggio	Ice Cream Shop	4
2	Barona	Dessert Shop	1
3	Barona	Ice Cream Shop	1
4	Centro storico	Chocolate Shop	1
5	Centro storico	Coffee Shop	2
6	Centro storico	Cupcake Shop	1
7	Centro storico	Dessert Shop	3
8	Centro storico	Ice Cream Shop	3
9	Centro storico	Pastry Shop	1
10	Città studi	Coffee Shop	1
11	Città studi	Cupcake Shop	1
12	Città studi	Dessert Shop	5
13	Città studi	Ice Cream Shop	3
14	Porta garibaldi	Dessert Shop	1
15	Porta garibaldi	Ice Cream Shop	4
16	Porta vittoria	Dessert Shop	1
17	Porta vittoria	Ice Cream Shop	1
18	Stazione centrale	Coffee Shop	1
19	Stazione centrale	Cupcake Shop	1
20	Stazione centrale	Dessert Shop	5
21	Stazione centrale	Ice Cream Shop	4
22	Vigentino	Coffee Shop	1
23	Vigentino	Ice Cream Shop	2

Results section where you discuss the results

- Analysis shows that the number of places (Cupcake, Ice Cream, Coffe, Chocolate, Dessert, Pastry) is quite low considering the population in Milan.

- Dessert & Ice Cream shops are the best category in Milan; these shops are concentrated in Stazione Centrale & Città Studi (North area of Milan).

- Porta Vittoria and Barona are the districts with the highest ratio inhabitants per townhall/venue (over than 70.000). Average real estate price shows Barona is cheaper than Porta Vittoria for 50% of the price.

- Porta Vittoria (Est Area) and Barona (South Area) are the districts with a small number of places in target.