Buenos Aires

Real estate investments in areas near metro stations

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1. Introduction

1.1 Background

A strategic vision is necessary for the development of real estate businesses considering that cities are currently forced to adapt at a rate and scale never before experienced, with enormous pressure to lower carbon emissions in response to climate change, the speed of change economic and growing expectations of quality of life.

Urban change in cities of emerging economies is made even faster by demographic, social and economic changes.

Growth in urban development will be influenced, among other factors, by:

- Investments in infrastructure to unlock and update new urban areas;

- Adoption of urban technology and smart city solutions to improve quality of life, business efficiency, and city management.

- Infrastructure developments to improve inclusion and transition to a low carbon environment;

- In order to achieve long-term sustainability, circular economy and micro mobility approaches are adopted;

- Creation of new spaces, so that new life and work patterns can be incorporated, growth in areas of high experience, densification oriented to transport and sustainable development.

Commune

The City of Buenos Aires is organized in 15 Communes. These are decentralized political and administrative management units that, in some cases, cover more than one neighborhood.

The Communes have exclusive and concurrent powers with the City Government. Among the first are the maintenance of secondary roads and green spaces, the administration of its heritage, the legislative initiative and the preparation of its budget and government program.

Each commune has a government body made up of the Communal Board and its President. In addition, each Commune has an Advisory Council made up of representatives of neighborhood non-governmental entities, political parties, networks and other forms of organization with interests or actions in the territorial area of the Commune. This Council advises the Community Board and can also, among other issues, channel demands, present proposals and define priorities.

The decentralization in communes is part of a world trend that includes the most important cities in the world such as Barcelona, New York, San Pablo and Mexico.

Subway network infrastructure

The Metro is a good incentive to think about investing in a property, this because, if the property purchased for leasing is in the vicinity of or near a metro station, the capital gain of the department will increase due to this means of transportation. enhances connectivity and speed to reach most points in the capital, especially the points where the workforce is concentrated.

For this reason, the closer a home is to a metro station, the easier it is for its inhabitants to be able to easily move around the city. This makes these properties have a much higher demand, and therefore their prices are also higher.

Thanks to the fact that it guarantees predictable frequencies and travel times without the increasing traffic congestion, people want to live, work or study near the Metro. Therefore, it is not surprising the real estate interest in areas with good access to this means of transport.

The client looking for an apartment prefers to be closer to the Metro line. This applies more to a segment of smaller apartments for young couples, young professionals, and people living alone. Consolidated families prefer larger houses or apartments that are more comfortable for family life, such as condos with spaces to play and close to schools.

The Buenos Aires Subway is the subway network of the City of Buenos Aires, made up of six lines - A, B, C, D, E and H - with a total length of 62.8 km (of which 56.7 km are for commercial service) 3 and 90 stations in operation.

The network is currently made up of six lines named with letters - from A to E and H - and identified with colors, which represent some 54.7 km of roads for commercial services. The entire network is underground, there being no section at level or viaduct.

Línea	Inauguración	Recorrido inaugural	Recorrido actual	Viaje entre cabeceras	Longitud en km[9]	Estaciones	Pasajeros por día*[10]
A	1913 (106 años).	Plaza de Mayo - Plaza Once	Plaza de Mayo - San Pedrito	26 minutos	9,8	18 (17 por sentido)	307.188
B	1930 (89 años).	Callao - Federico Lacroze	Leandro N. Alem - Juan Manuel de Rosas	27 minutos	11,9	17	376.813*[11]
C	1934 (85 años).	Carlos Pellegrini - Constitución	Retiro - Constitución	13 minutos	4,5	9	338.618
D	1937 (82 años).	Florida - Tribunales	Catedral - Congreso de Tucumán	26 minutos	10,4	16	440.384
E	1944 (75 años).	Constitución - General Urquiza	Retiro - Plaza de los Virreyes	32 minutos	12,0	18	115.000
H	2007 (12 años).	Once - Caseros	Facultad de Derecho - Hospitales	22 minutos	8,8	12	104.000
P	1986 (33 años).	Intendente Saguier - Centro Cívico	Intendente Saguier - Centro Cívico	25 minutos	6,1	14	3.500
		Intendente Saguier - General Savio	Intendente Saguier - General Savio	27 minutos	7	16	

* A marzo de 2014.'

1.2 Problem

Investments in real state in Buenos Aires (in the same way as in large cities) generate an attractive income and store of value.

As real state investors we want to determine the most appropriate area to invest in the purchase of an apartment to offer to rent in the city of Buenos Aires, considering that it is located near a metro station.

We want to carry out a segmentation of the areas surrounding the metro station in the federal capital in order to compare and decide according to the urban infrastructure and nearby shops.

Segmenting this areas of interest (areas near the metro station) will allow us to make a decision taking into account the similarities and differences in the characteristics of each area.

2. Data Acquisition and Cleaning

2.1 DataSource

We must acquire and process geographic information, this aspect is key and central to study cities and social dynamics (it makes the map one of the most important visualization tools that we can use in this case).

In order to clustering and segmenting areas, I'll use mainly geospatial data to retrieve information from foursquare to identify areas which can be similar to the objective investment.

We will use datasets with information provided by the Buenos Aires city government (see https://data.buenosaires.gob.ar/dataset), in particular geospatial information in geojson format.

I'll download csv files containing metro station geospatial information and with that information we will obtain venues data from foursquare.

Some additional reference data is also obtained by doing web scrapping

All the information obtained (mainly from dataset with geospatial information will be imported as pandas dataframe, so it is necessary to solve some nested tags.

I'll use one hot encoding (a process by which categorical variables are converted so Machine Learning algorithms can do a better prediction).

3. Methodology

An exploratory analysis was carried out to carry out a micro-segmentation of zones considering Investments in real estate in Buenos Aires city, in order to determine the most appropriate area to invest in the purchase of an apartment to offer to rent in the city of Buenos Aires, considering that it is located near a metro station.

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We address two main dimensions:

(1) The segmentation of metro stations considering nearby areas of interest

(2) The communes of the city that can represent a greater profitability to invest.

3.1 Buenos Aires Communes

An exploratory analysis of the different communes of Buenos Aires was carried out determining:

- Proportion of quantity of apartments offered for sale or rent, in order to have a relative dimension of supply.

- Expected return on investment, considering the return on investment taking into account the average purchase value (dollar value of the square meter) and the expected rental income

Two-room apartments were considered the objective in which it seeks to invest.

To consider the sale quotes and rents, we took average information from the year 2019.

We will use datasets with information provided by the Buenos Aires city government (see https://data.buenosaires.gob.ar/dataset),

Properties offered for sale or rent by commune

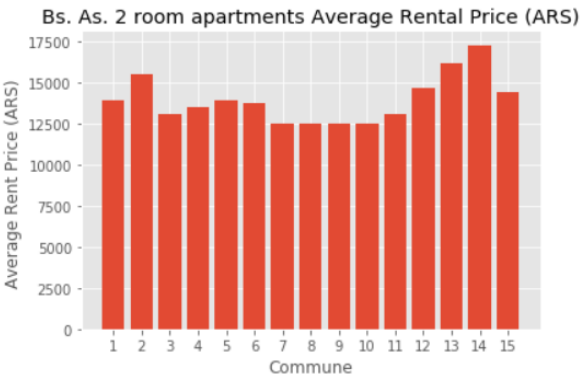
Using the datasets provided by the city government, you can get an idea of availability of properties offered for sale or rent.

Use percentage data of dwellings by occupation condition by commune, this dataset contains the Percentage Distribution of Dwellings by Occupation Condition by commune. Source National Census of Population, Homes and Houses (INDEC).

For further reference: https://data.buenosaires.gob.ar/dataset/disposicion-urbana/archivo/7131cd2c-dd3e-4c36-9453-d12fba42bb12

Average Rental Price by commune

Average monthly price (pesos) of apartments for rent of 2 and 3 rooms used and brand new in the City. DGEyC-GCBA source based on the Argenprop database.



Average Sale Price by commune

The dataset contains notarial acts of purchase and sale of real estate and mortgages recorded in the College of Notaries of the City of Buenos Aires. DGEyC-GCBA source based on the CABA College of Notaries.

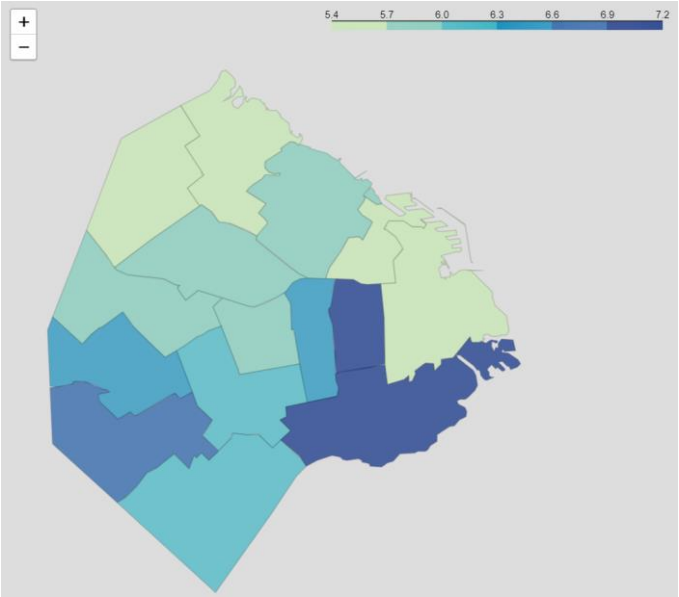
For further reference you can consult: https://data.buenosaires.gob.ar/dataset/mercado-inmobiliario/archivo/1f0580e0-9e91-49c3-9ecc-f22217efa042

Cost effectiveness

Considering the sale values per square meter and the rental values, I calculate a percentage of return on investment. Quote averages for the past year were considered. A reference price of financial dollar (CCL Dollar) was taken at Dec 30, 2019.

Choropleth map expected profitability by commune

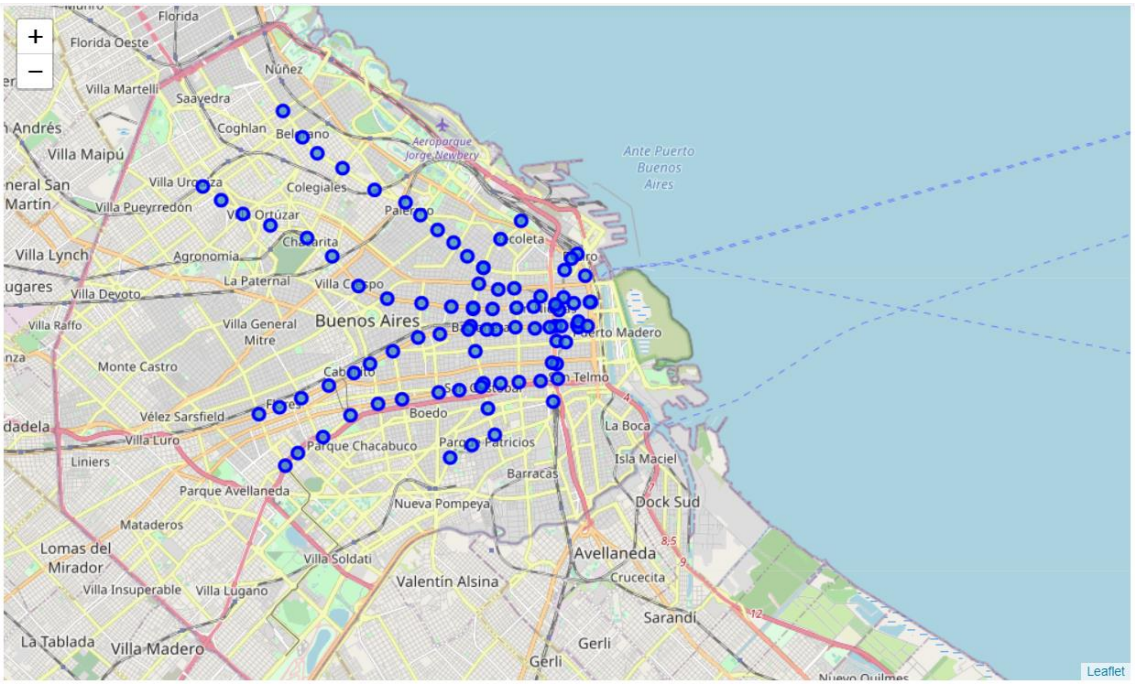
The geolocation information of the City Communes is used for the map (source: https://data.buenosaires.gob.ar/dataset/comunas).



3.2 Metro Stations

Metro Stations Geolocalization

Geolocated information was obtained from the metro stations. GeoJSON file with the location of metro stations (dataset can be found in https://data.buenosaires.gob.ar/dataset/subte-estaciones)



Principal Venues around Metro Stations

Venues will be taken from places near metro stations, venues will be grouped into categories and these categories will be converted with one hot encoding to be able to apply the K nearest supervised machine learning algorithm.

A dataframe was generated with all the information to apply the k-nearest neighborhoods algorithm

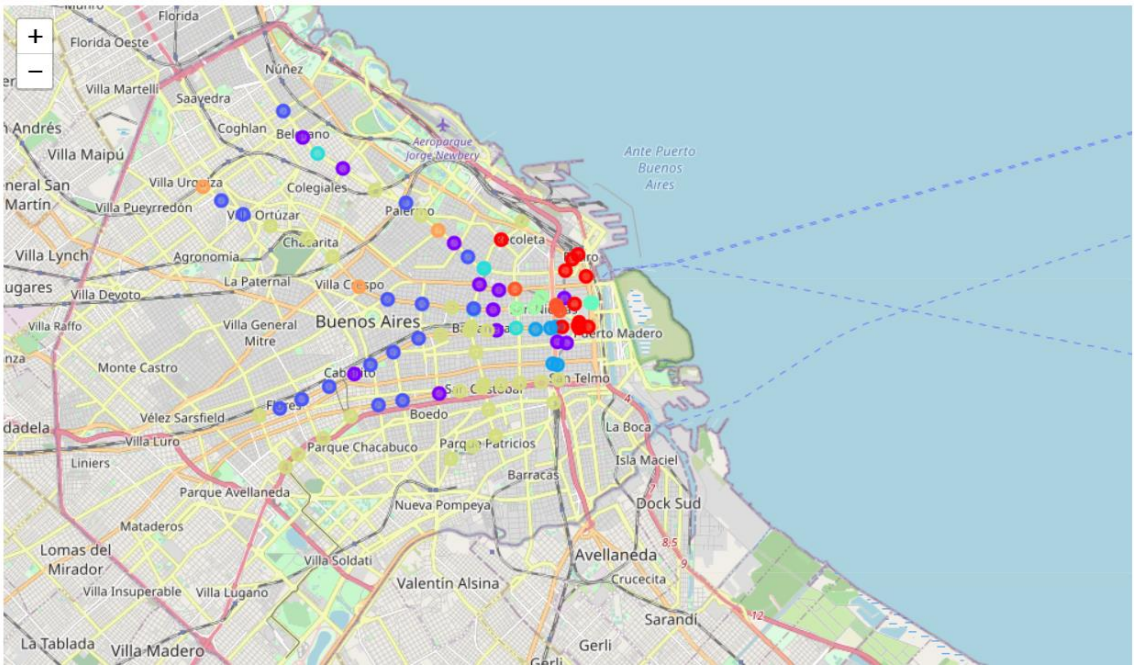
	Station	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	9 DE JULIO	Café	Theater	Coffee Shop	Hotel	Restaurant	Bookstore	Mediterranean Restaurant	Argentinian Restaurant	Pizza Place	Bar
1	ACOYTE	Ice Cream Shop	Bakery	Café	Coffee Shop	Playground	Gym	Burger Joint	Multiplex	Electronics Store	Restaurant
2	AGÜERO	Bakery	Pizza Place	Ice Cream Shop	Argentinian Restaurant	Café	Miscellaneous Shop	Coffee Shop	Italian Restaurant	Cheese Shop	Record Shop
3	ALBERTI	Café	Pizza Place	BBQ Joint	Gym	Supermarket	Gas Station	Brewery	Gym / Fitness Center	Coffee Shop	Yoga Studio
4	ALMAGRO - MEDRANO	Pizza Place	Café	Restaurant	Bar	Argentinian Restaurant	Vegetarian / Vegan Restaurant	Gym	Cheese Shop	Shoe Store	Flower Shop

The following clusters were defined:

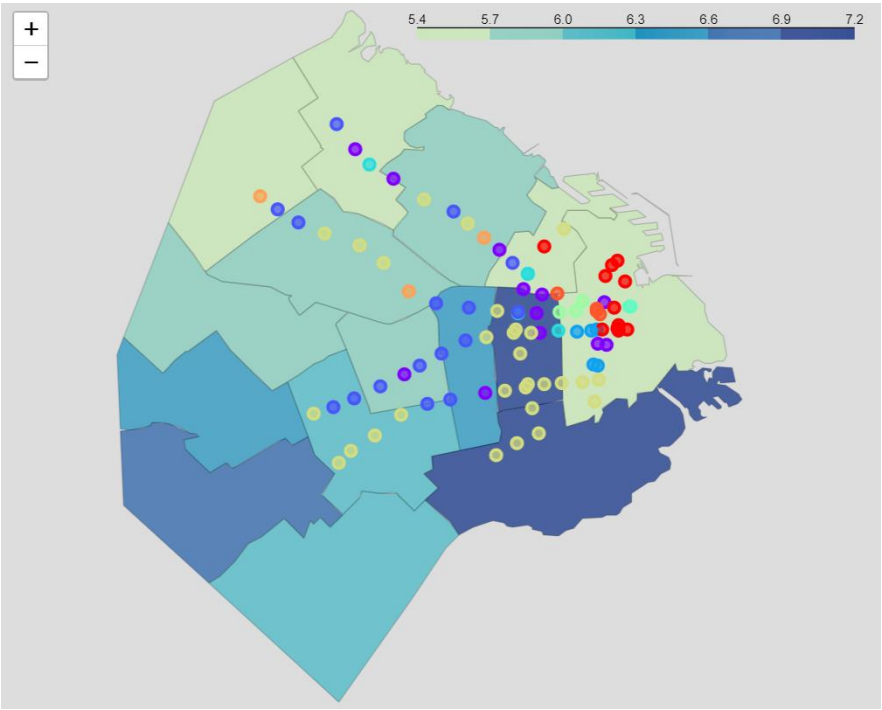
	Station
Cluster 0	LORIA (A)
	CASTRO BARROS (A)
	ANGEL GALLARDO (B)
	ECHEVERRÍA (B)
	MORENO (C)
	AGÜERO (D)
	BULNES (D)
	OLLEROS (D)
	BOEDO (E)
	CÓRDOBA (H)
	LAS HERAS (H)
Cluster 1	LEANDRO N. ALEM (B)
	CORREO CENTRAL (E)
Cluster 2	PERU (A)
	FLORIDA (B)
	CALLAO - MAESTRO ALFREDO BRAVO (B)
	LAVALLE (C)
	CATEDRAL (D)
	BOLIVAR (E)
Cluster 3	LIMA (A)
	SAENZ PEÑA (A)
	AV. DE MAYO (C)
	INDEPENDENCIA (C)
	INDEPENDENCIA (E)
Cluster 4	C. PELLEGRINI (B)
	URUGUAY (B)
	DIAGONAL NORTE (C)
	9 DE JULIO (D)
	CALLAO (D)
Cluster 5	PASCO (A)
	ALBERTI (A)
	PLAZA DE MISERERE (A)
	ACOYTE (A)
	PRIMERA JUNTA (A)
	CARABOBO (A)
	PUAN (A)
	PASTEUR - AMIA (B)
	ALMAGRO - MEDRANO (B)
	DORREGO (B)
	DE LOS INCAS -PQUE. CHAS (B)
	FACULTAD DE MEDICINA (D)
	JURAMENTO (D)
	BELGRANO (E)
	ONCE - 30 DE DICIEMBRE (H)
	CORRIENTES (H)

Cluster 6	PIEDRAS (A)
	PLAZA DE MAYO (A)
	RETIRO (C)
	SAN MARTIN (C)
	TRIBUNALES - TEATRO COLÓN (D)
	RETIRO (E)
	CATALINAS (E)
Cluster 7	PUEYRREDON (B)
	PUEYRREDON (D)
	SANTA FE - CARLOS JAUREGUI (H)
Cluster 8	SAN PEDRITO (A)
	SAN JOSÉ DE FLORES (A)
	CARLOS GARDEL (B)
	FEDERICO LACROZE (B)
	TRONADOR - VILLA ORTÚZAR (B)
	CONSTITUCION (C)
	SAN JUAN (C)
	PLAZA ITALIA (D)
	MINISTRO CARRANZA - MIGUEL ABUELO (D)
	CONGRESO DE TUCUMAN (D)
	SAN JOSE (E)
	ENTRE RIOS - RODOLFO WALSH (E)
	PICHINCHA (E)
	JUJUY (E)
	URQUIZA (E)
	JOSE MARIA MORENO (E)
	EMILIO MITRE (E)
	MEDALLA MILAGROSA (E)
	AV. LA PLATA (E)
	PLAZA DE LOS VIRREYES - EVA PERON (E)
	VARELA (E)
	CASEROS (H)
	INCLAN - MEZQUITA AL AHMAD (H)
	HUMBERTO 1° (H)
	VENEZUELA (H)
	PARQUE PATRICIOS (H)
	HOSPITALES (H)
	FACULTAD DE DERECHO - JULIETA LANTERI (H)
Cluster 9	CONGRESO - PDTE. DR. RAÚL R. ALFONSÍN (A)
	RIO DE JANEIRO (A)
	MALABIA - OSVALDO PUGLIESE (B)
	JUAN MANUEL DE ROSAS - VILLA URQUIZA (B)
	R.SCALABRINI ORTIZ (D)
	PALERMO (D)
	JOSE HERNANDEZ (D)

Clusters Map



Exposing the clusters over the map of expected returns, it is possible to expose both dimensions of interest together:



4. Conclusions

In the present study, a clustering of geographical areas was modeled that allows micro-segmentation strategies to be carried out in the real estate market considering the object of investment in real estate.

The focus is on urban infrastructure considering the structure of the venues near the metro, in order to determine areas that may result from similar characteristics / offers and thus expand the possibility of investing in communities that can offer better profitability (acquisition cost and rent expected).

As a theoretical approach, the city is framed as a center of concentration of resources and population. Following this perspective, in terms of urban development, soils are more or less valued based on their externalities, the latter understanding how the urban infrastructure resources that enable and facilitate life in society: basic services, hospitals, schools, production centers, shops, among others.

To frame the behaviors that can occur around these resources, the concepts of: accessibility, understood as the potential of opportunities for jobs, resources and social services; and "proximity", which indicates proximity to those factors that people do not use directly but constitute an indispensable aspect or necessary consequence of urban dynamics.

5. Future Directions

The proposed segmentation can serve as a basis for micro-segmentation in the real estate market and should be expanded by incorporating a greater number of study dimensions, such as. demographic information, socio-economic level, etc.