

Analysis of Singapore's Condominium Price

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Introduction

Singapore is one of the largest metropolises in the world where over 5 million people live and 2nd densest country in the world with 7,804 persons per square kilometer. Singapore are subdivided into 28 districts in total. As a potential property investor in Singapore, identifying under-priced and overpriced properties is crucial. The property prices are well-known to correlate with three major factors: 1) type property tenure, 2) distance from city central area, and 3) proximity with major shopping/restaurant areas.

In this project, I will first gather these three factors and current housing prices. Then, I will derive housing prices formula based on these three factors. Based on the equation, I will shortlist top twenties undervalued locations (outliers) for further investigation and top twenties overvalued ones for avoiding.

Data Acquisition

Based on definition of our problem, factors that will influence our decision are:

- 1) recent property price in various neighbors using **webscraping from websites**
- 2) locations and driving distances from city central area using **GoogleMap API** and
- 3) proximity with major shopping areas using **FourSquare API**

Total of 1,059 condominium-sale transactions were web-scraped from [1]. The following is the sample of the collected data.

Table 1. The Sample of The Web-Scrapped Data

	Date	District	Project Name	Address	Property Type	Tenure	Area(sq ft)	Type of Area	Price(\$psf)	Price(\$)
0	9 Apr 2019	20	SKY HABITAT		Condominium	99 Yrs FROM 2011	710	Strata	1,633	1,160,000
1	9 Apr 2019	27	THE ESTUARY		Condominium	99 Yrs FROM 2008	926	Strata	929	860,000
2	9 Apr 2019	15	THE WATERSIDE		Condominium	Freehold	2,142	Strata	1,634	3,500,000
3	8 Apr 2019	16	AQUARIUS BY THE PARK		Condominium	99 Yrs FROM 1996	1,206	Strata	970	1,170,000
4	8 Apr 2019	27	THE ESTUARY		Condominium	99 Yrs FROM 2008	1,119	Strata	945	1,058,000
5	8 Apr 2019	23	REGENT HEIGHTS		Condominium	99 Yrs FROM 1995	1,023	Strata	836	855,000
6	8 Apr 2019	15	ELLIOT AT THE EAST COAST		Condominium	Freehold	1,313	Strata	1,432	1,880,000
7	8 Apr 2019	10	WATERFALL GARDENS		Condominium	Freehold	1,830	Strata	1,667	3,050,000
8	8 Apr 2019	16	THE BAYSHORE		Condominium	99 Yrs FROM 1993	958	Strata	939	900,000
9	8 Apr 2019	5	THE TRILINQ		Condominium	99 Yrs FROM 2012	936	Strata	1,623	1,520,148

Data Cleaning

The transactions were grouped by each condominium (Project Name) and average per square foot (PSF) were calculated. After grouping, a total of 310 condominium records were found. Redundant columns such as **Type of Area** and **Property Type** were removed. Using the Google Map API, longitude and latitude information of each condominium were gathered and added into the table. Distance from central area were computed and added to the table. Then, locations are mapped on the map with prices highest to lowest are color coded (Dark-red, Red, Orange, Blue, Green, and Grey respectively) for visualizing.

Table 2. New Table with Consolidated Information

Project Name	Tenure	Price(\$psf)	Longitude	Latitude	DistanceWithCentral(km)
YISHUN EMERALD	99 Yrs FROM 1998	675.000000	103.831704	1.440107	17.508434
WOODHAVEN	99 Yrs FROM 2011	1025.500000	103.785410	1.431580	17.991419
WOODGROVE CONDOMINIUM	99 Yrs FROM 1997	685.500000	103.783327	1.430415	17.970155
WINDY HEIGHTS	Freehold	911.000000	103.911559	1.328202	8.364010
WEST BAY CONDOMINIUM	99 Yrs FROM 1991	842.000000	103.766799	1.300242	9.595547
WATERVIEW	99 Yrs FROM 2010	1092.500000	103.927682	1.350193	11.289942
WATERFRONT WAVES	99 Yrs FROM 2007	1068.000000	103.930964	1.338887	10.807098
WATERFRONT KEY	99 Yrs FROM 2007	1211.666667	103.932551	1.338767	10.944877
WATERFRONT ISLE	99 Yrs FROM 2009	1179.600000	103.929216	1.340098	10.726281
WATERFRONT GOLD	99 Yrs FROM 2009	1264.000000	103.930007	1.339721	10.773228

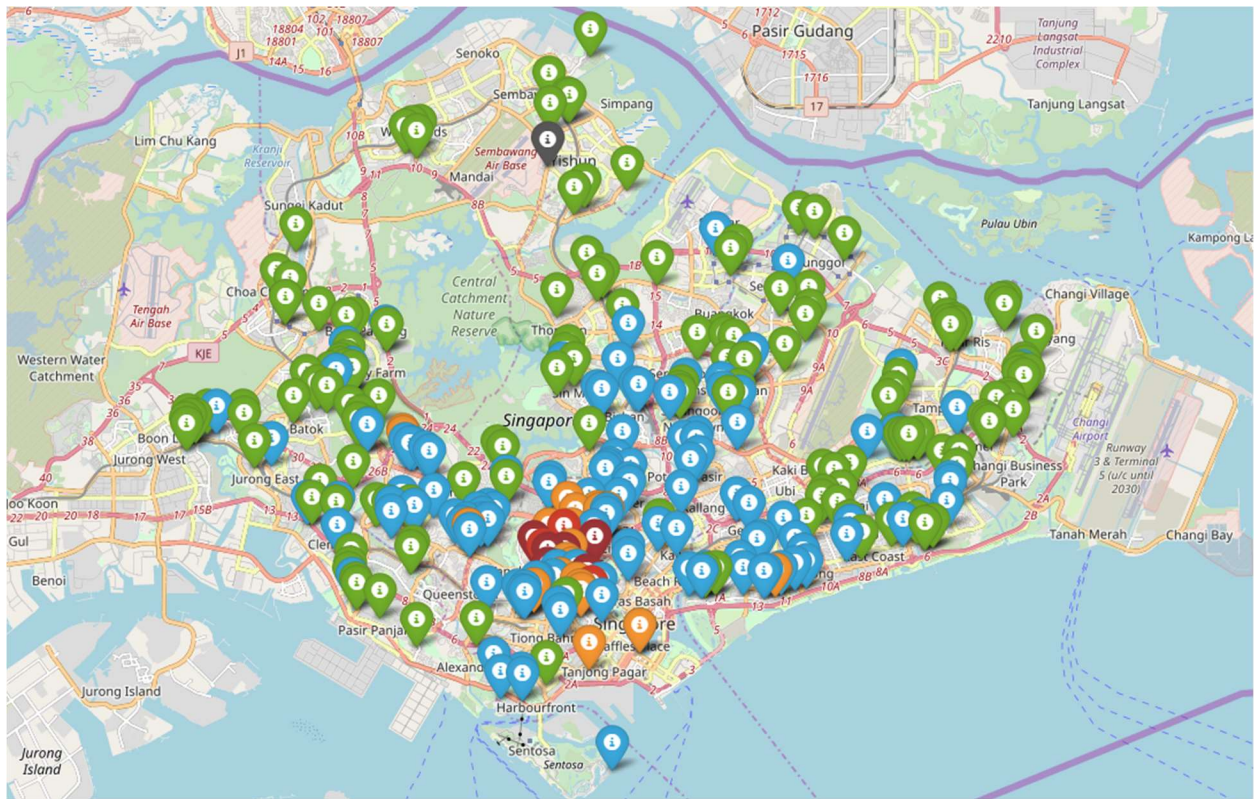


Figure 1. Location map with color-coded psf information

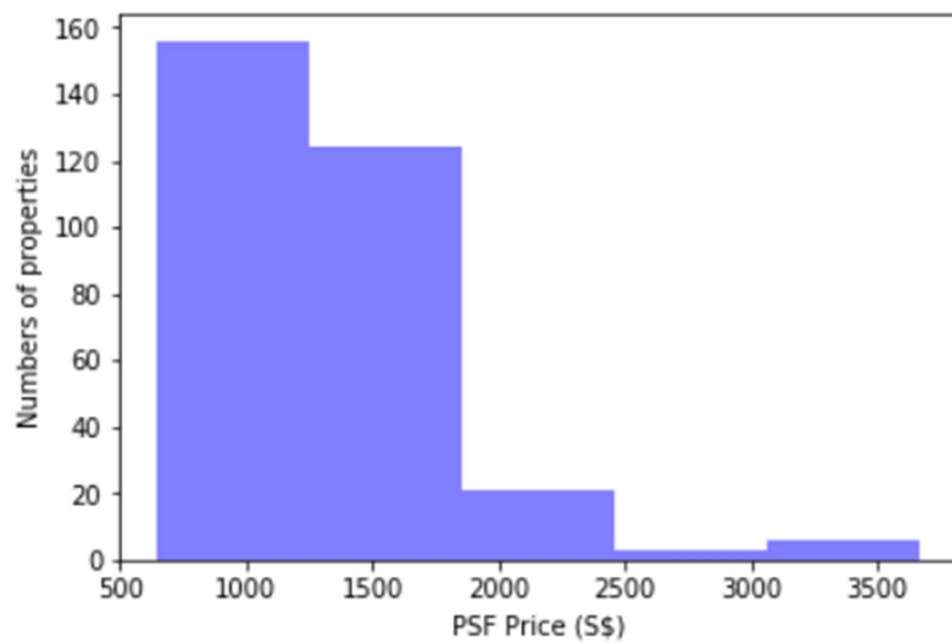


Figure 2. PSF Price Distribution

Analysis

As shown in the location map, it is difficult to analyse over 300 properties with psf price ranging from S\$500 to S\$3,500. Therefore, data science methodology will be used to build a price model. Before building the model let study price correlation with each parameters: distance from central, having low lease year, newer condominium, and accessibility to restaurants.

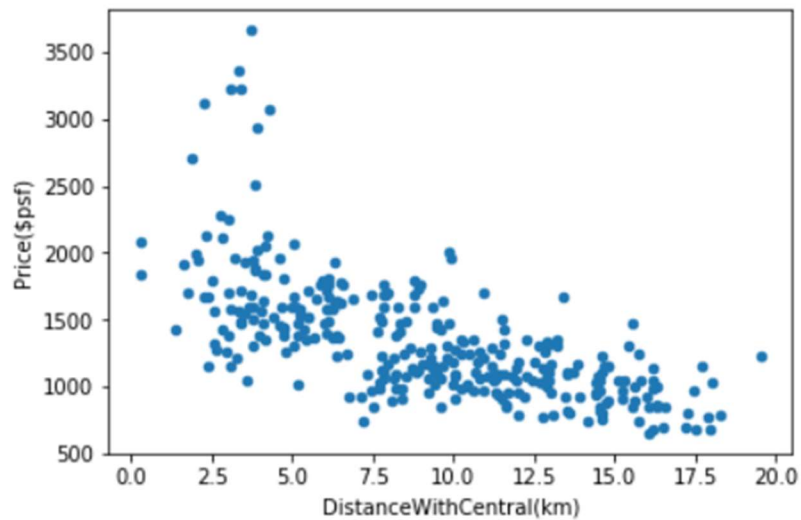


Figure 3. Distance from central vs price

There are strong correlation between the price and the distance from central area. Let look at having low lease year parameter contribution to the price.

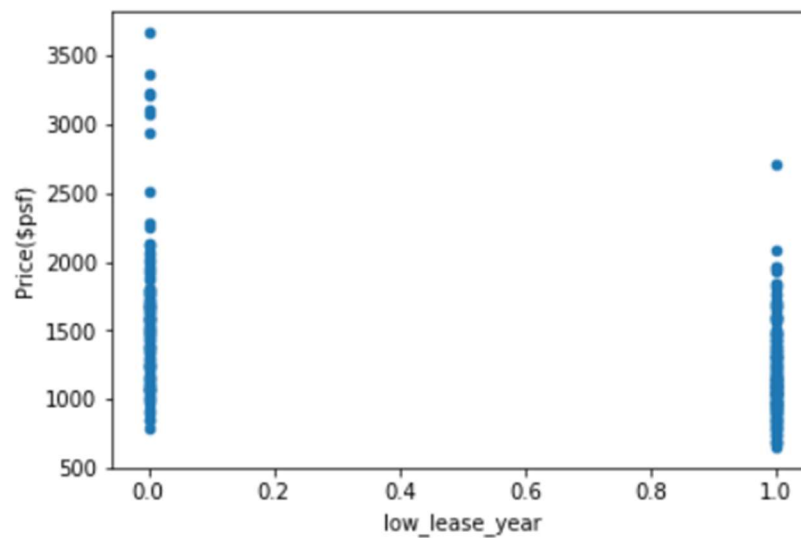


Figure 4. Low lease vs price

According to the data, there is a visual limit for how much maximum people are willing to pay for low lease property type. The data makes sense as well. The question is how exactly it contributes towards price. Let investigate the last parameter, accessibility to restaurants.

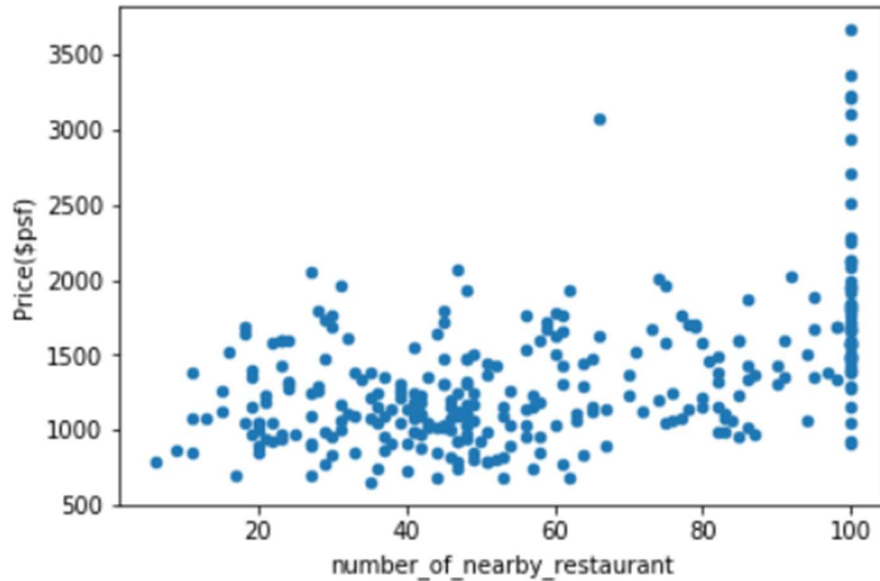


Figure 5. Number of nearby restaurants vs price

There is slight contribution of the accessibility to restaurants towards price but not obvious. It could be because most people staying in condo tend to own private cars. It is very clear that property prices are evaluated based on multiple factors. To build the price model, we need to consider multiple parameters at the same time. After input parameters are normalized, multi-variable linear regression was used to build the price model. Coefficients of the model are

`[-238.59732072 -177.24204587 19.65083229 -87.71103033 61.32625328]`

Result & Discussion

According to the coefficients, **Distance from Central** (-238.59) is the highest negative contributor and **number of nearby restaurants** (61.32) is the highest positive contributor. However, the distance parameter contributes four times than the restaurant parameter. **Freehold type** (-87.71) is more preference than **lease hold type** (-177.24). **The number of remaining lease year** (19.65) positively affect the price as well.

With the model, top twenties undervalued properties will be shortlisted for further investigations.

Table 3. Top 20 Under Valued Properties

Project Name	Project Name	Tenure	Price(\$psf)	Longitude	Latitude	DistanceWithCentral(km)	low_lease_year	freehold	Yr_From	number_of_nearby_restaurant	PriceDifferentPercent
3 ORCHARD BY-THE-PARK	3 ORCHARD BY-THE-PARK	Freehold	3666.000000	103.826118	1.304599	3.682151	0	1	2019	100	-0.494689
KANDIS RESIDENCE	KANDIS RESIDENCE	99 Yrs FROM 2016	1235.000000	103.838741	1.459187	19.531974	1	0	2016	21	-0.488517
TWENTYONE ANGULLIA PARK	TWENTYONE ANGULLIA PARK	Freehold	3361.500000	103.830830	1.304666	3.305955	0	1	2019	100	-0.442839
8 NAPIER	8 NAPIER	Freehold	3080.000000	103.821836	1.307881	4.280433	0	1	2019	66	-0.433518
BISHOPSGATE RESIDENCES	BISHOPSGATE RESIDENCES	Freehold	3221.000000	103.825860	1.299887	3.391567	0	1	2019	100	-0.419979
HILLTOPS	HILLTOPS	Freehold	3231.000000	103.839904	1.308442	3.085894	0	1	2019	100	-0.416637
LAKEVILLE	LAKEVILLE	99 Yrs FROM 2013	1471.000000	103.727064	1.347014	15.532844	1	0	2013	45	-0.388179
8 SAINT THOMAS	8 SAINT THOMAS	Freehold	3113.750000	103.837581	1.297821	2.239844	0	1	2019	100	-0.379917
ARDMORE II	ARDMORE II	Freehold	2940.000000	103.830589	1.311391	3.894594	0	1	2019	100	-0.373832
MARTIN MODERN	MARTIN MODERN	99 Yrs FROM 2016	2712.750000	103.839168	1.294683	1.868639	1	0	2016	100	-0.349169
MAYFAIR GARDENS	MAYFAIR GARDENS	99 Yrs FROM 2018	1956.538462	103.782814	1.339926	9.885014	1	0	2018	75	-0.347701
PARC ROSEWOOD	PARC ROSEWOOD	99 Yrs FROM 2011	1151.000000	103.786742	1.429247	17.695395	1	0	2011	36	-0.338517
THE JOVELL	THE JOVELL	99 Yrs FROM 2018	1301.111111	103.967721	1.358843	15.433751	1	0	2018	24	-0.337387
J GATEWAY	J GATEWAY	99 Yrs FROM 2012	1678.000000	103.743502	1.337340	13.417444	1	0	2012	100	-0.323071
ALLSWORTH PARK	ALLSWORTH PARK	999 Yrs FROM 1885	1595.000000	103.782488	1.321209	8.746287	1	0	1885	23	-0.286956
THE LANAI	THE LANAI	999 Yrs FROM 1885	1307.000000	103.762674	1.357826	12.873993	1	0	1885	39	-0.274233
GRANGE RESIDENCES	GRANGE RESIDENCES	Freehold	2507.000000	103.824681	1.305414	3.862497	0	1	2019	100	-0.264987
KINGSFORD . HILLVIEW PEAK	KINGSFORD . HILLVIEW PEAK	99 Yrs FROM 2012	1345.000000	103.765683	1.365987	13.228460	1	0	2012	34	-0.256408
CASPIAN	CASPIAN	99 Yrs FROM 2008	1143.000000	103.719321	1.344210	16.172385	1	0	2008	40	-0.255487
GRANDEUR PARK RESIDENCES	GRANDEUR PARK RESIDENCES	99 Yrs FROM 2016	1500.000000	103.946157	1.324868	11.527217	1	0	2016	49	-0.247820

Table 4. Top 20 Overvalued Properties

Project Name	Project Name	Tenure	Price(\$psf)	Longitude	Latitude	DistanceWithCentral(km)	low_lease_year	freehold	Yr_From	number_of_nearby_restaurant	PriceDifferentPercent
BLU CORAL	BLU CORAL	Freehold	1161.000000	103.915764	1.314146	7.958086	0	1	2019	80	0.357492
NATHAN PLACE	NATHAN PLACE	Freehold	1380.000000	103.827603	1.296681	3.040346	0	1	2019	97	0.362812
NOUVELLE PARK	NOUVELLE PARK	Freehold	1013.000000	103.878876	1.368738	9.964798	0	1	2019	43	0.367453
VILLA MARINA	VILLA MARINA	99 Yrs FROM 1995	949.333333	103.928762	1.313282	9.248241	1	0	1995	85	0.388471
CASABELLA	CASABELLA	Freehold	1093.000000	103.801018	1.325387	7.299506	0	1	2019	53	0.420012
SUNNY PALMS	SUNNY PALMS	Freehold	1065.000000	103.912301	1.318690	7.852601	0	1	2019	49	0.420837
THE PEARL @ MOUNT FABER	THE PEARL @ MOUNT FABER	99 Yrs FROM 2002	1146.000000	103.825626	1.272414	3.087742	1	0	2002	78	0.432504
WEST BAY CONDOMINIUM	WEST BAY CONDOMINIUM	99 Yrs FROM 1991	842.000000	103.766799	1.300242	9.595547	1	0	1991	64	0.484829
CASA SARINA	CASA SARINA	Freehold	1032.000000	103.908442	1.321835	7.673403	0	1	2019	54	0.486418
EMERALD PARK	EMERALD PARK	99 Yrs FROM 1991	1150.000000	103.831428	1.290968	2.380671	1	0	1991	100	0.497064
OCEAN PARK	OCEAN PARK	Freehold	1065.000000	103.919727	1.309797	8.171516	0	1	2019	94	0.498059
CHUAN PARK	CHUAN PARK	99 Yrs FROM 1980	889.500000	103.865992	1.354324	8.054343	1	0	1980	67	0.499108
THE INTERLACE	THE INTERLACE	99 Yrs FROM 2009	1017.666667	103.804758	1.283894	5.180631	1	0	2009	86	0.523310
KERRISDALE	KERRISDALE	99 Yrs FROM 1998	1051.500000	103.859324	1.314626	3.609284	1	0	1998	100	0.578150
CHERRYHILL	CHERRYHILL	Freehold	986.000000	103.879992	1.351115	8.180725	0	1	2019	83	0.592897
WINDY HEIGHTS	WINDY HEIGHTS	Freehold	911.000000	103.911559	1.328202	8.364010	0	1	2019	38	0.603828
LEGENDA AT JOO CHIAT	LEGENDA AT JOO CHIAT	99 Yrs FROM 2001	929.000000	103.903177	1.314312	6.732049	1	0	2001	100	0.605812
KENTVIEW PARK	KENTVIEW PARK	Freehold	921.000000	103.786968	1.283487	7.159826	0	1	2019	47	0.679026
THE ARCADIA	THE ARCADIA	99 Yrs FROM 1979	745.000000	103.812591	1.334890	7.174973	1	0	1979	36	0.761042
LE REVE	LE REVE	Freehold	849.000000	103.907506	1.320277	7.491185	0	1	2019	58	0.828889

Here is the map of how outliers distribute. There is a cluster of undervalued properties in the central area and there is a cluster of overvalued properties in the east coast area. They are shortlisted for further study.

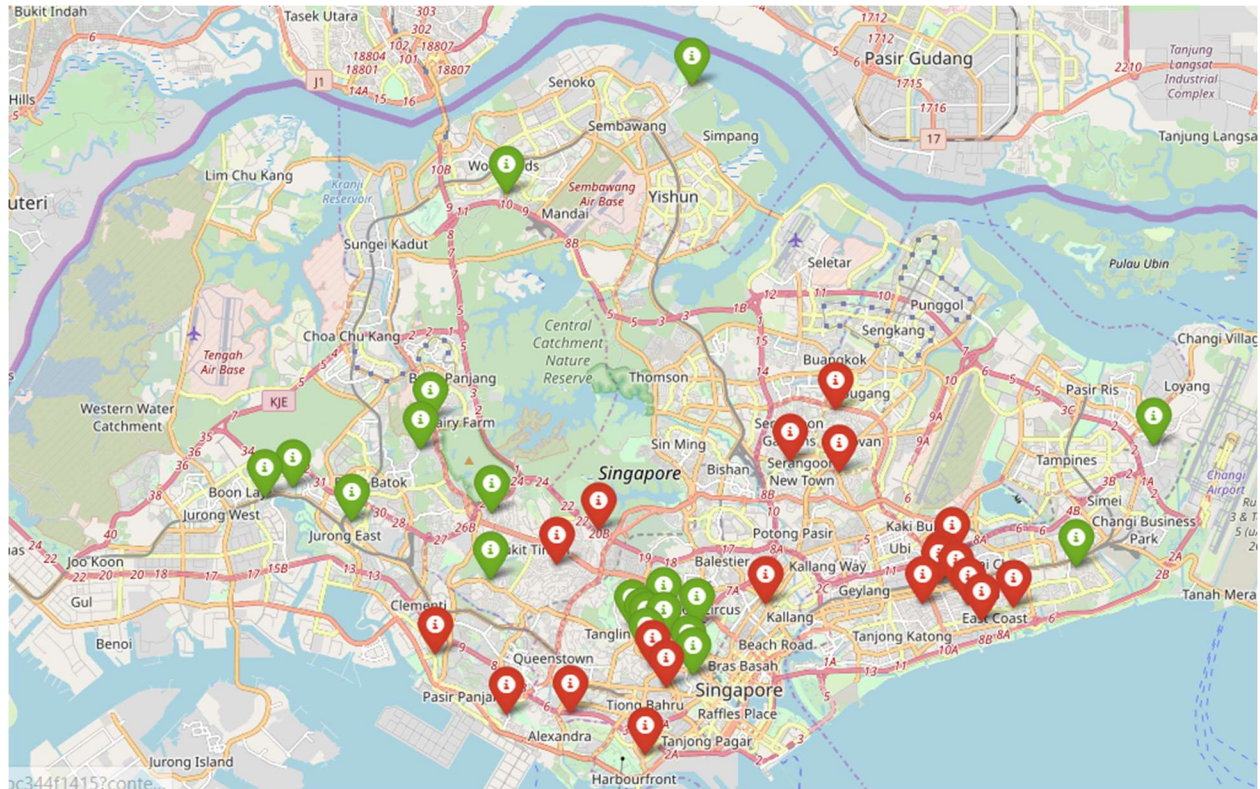


Figure 6. Under-Valued (Green) and Over-Valued (Red) Properties Map

Reference

- [1] <https://www.squarefoot.com.sg/latest-transactions/sale/residential/condominium>
- [2] <https://github.com/Kyaw-Htet/IBMDDataScienceCapstone>

DISCLAIMER

This post is just a sample project to play around with open-source information, tools, and techniques. It provides unverified information for fun only. It is not intended to be and does not constitute financial advice, investment advice or any other advice.