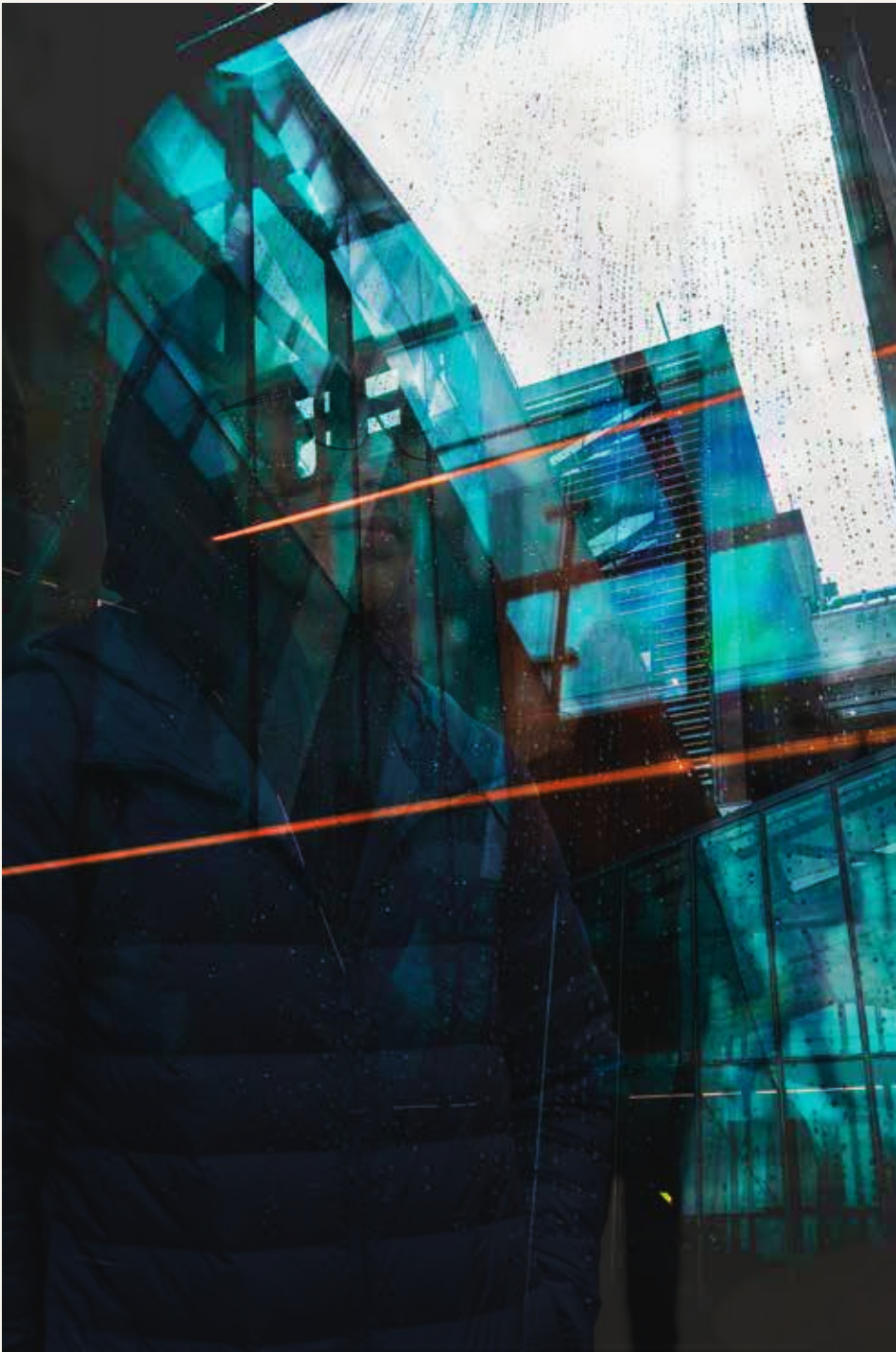


MELBOURNE

HOUSING MARKET

BY
SATRIO DIRGANTORO



ABOUT ME

SATRIO DIRGANTORO

Student JCDS 10
Purwadhika Jakarta

Background:

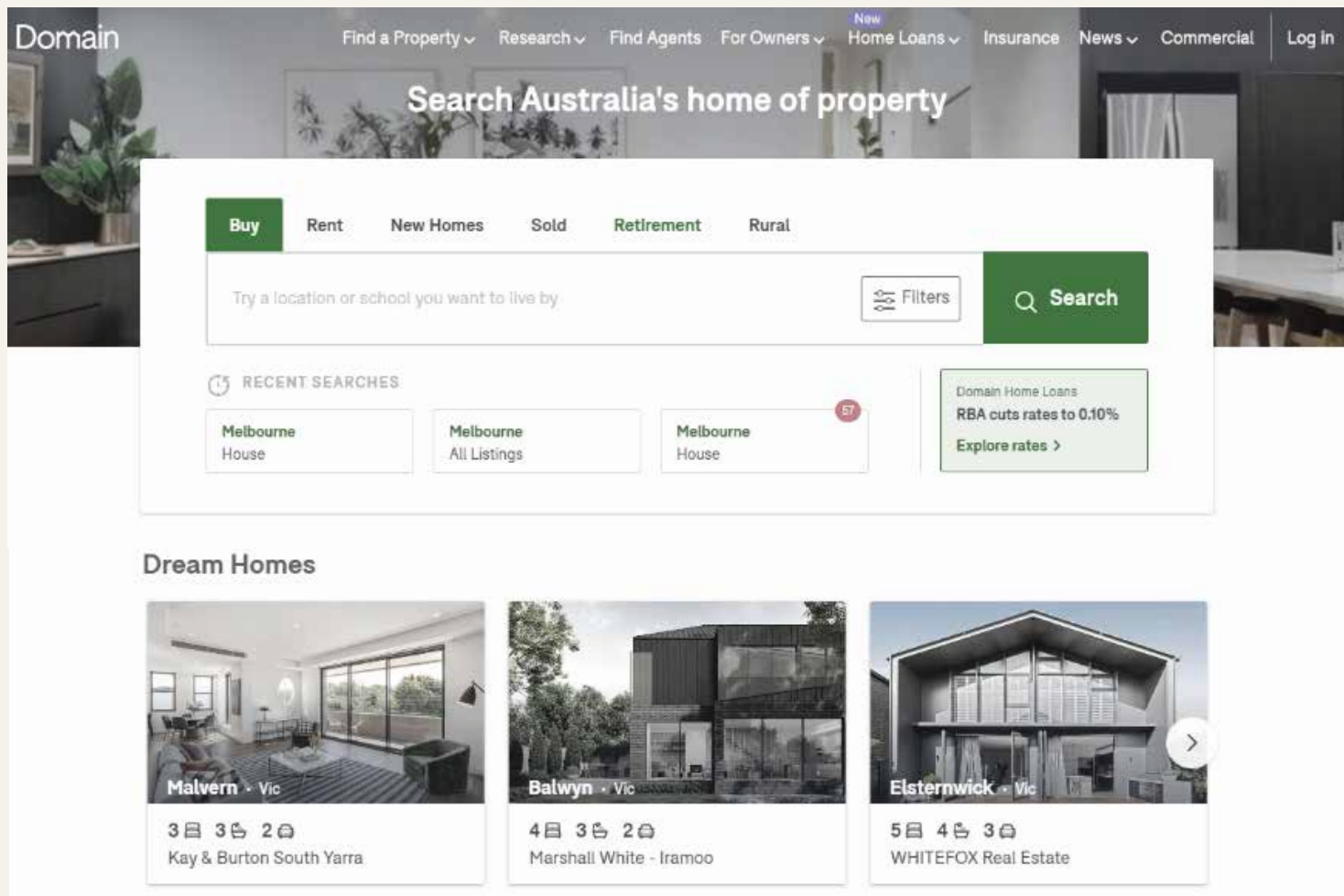
Ex – Supervisor Sales Strategy
PT. Lotte Shopping Avenue Indonesia

English Literature
Jakarta State University 2008

1.

DATA SOURCE

Dataset diambil dari Kaggle.com dimana sumber data berasal dari Domain.com.au bagian dari Domain Group. Domain group itu sendiri adalah sebuah perusahaan yang menawarkan ekosistem solusi properti multi-platform.

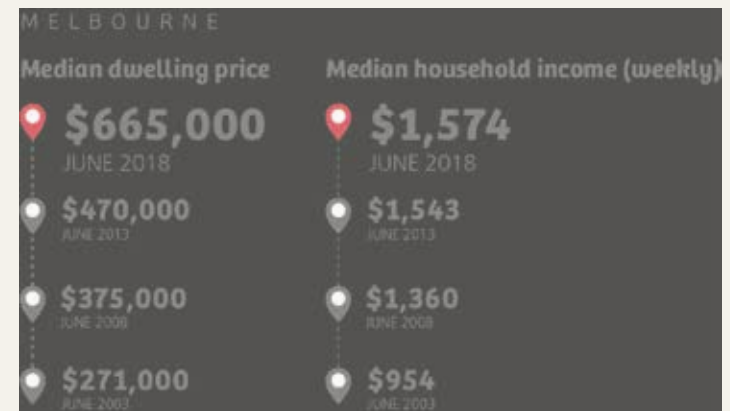




2. ISSUE

Housing Bubble

Kenaikan harga properti atau sekelompok asset yang berlangsung terus menerus, dimana kenaikan harga tersebut akan menyebabkan munculnya harapan kenaikan harga di masa yang akan datang.



Melbourne Median House Price VS Median Weekly income per capita

3.

PROBLEM



Kondisi seperti ini membuat para vendor / *property owner* sulit menentukan harga yang tepat (*reasonable*) dalam menjual properti. Tidak terlampau tinggi agar mudah dijual dan juga tidak terlalu rendah supaya tidak kehilangan profit.

BUSINESS QUESTIONS 4.

1. Kapan housing bubble terjadi di Melbourne?
2. Apakah jarak suatu property ke CBD area berpengaruh terhadap harga?
3. Daerah manakah yang memiliki potensi penjualan tertinggi?
4. Fitur - fitur apa saja yang menjadi faktor penting dalam menentukan harga suatu rumah?



Project ini akan menganalisis harga properti di Melbourne dan melihat fitur-fitur apa saja yang mempengaruhi harga dari suatu rumah.

Berdasarkan data tersebut akan dibuat model machine learning dengan pendekatan *Supervised Learning: Regression* untuk memprediksi harga rumah berdasarkan fitur fiturnya.



6. READ DATA

- Karakteristik dasar:

Bedroom, Bathroom, Car Spot, Landsize, Building Area, Property Type, Year Built

- Lokasi:

Region name, Council Area, Suburb, Latitude, Longitude, Address, Postcode

- Informasi lainnya:

SellerG/Property Agency, Method, Price

	Suburb	Address	Rooms	Type	Price	Method	SellerG	Date	Distance	Postcode	Bathroom	Car	Landsize	BuildingArea	YearBuilt	CouncilArea	Latitude	Longitude	Regionname	Propertycount
0	Abbotsford	85 Turner St	2	h	1400000.0	S	Biggin	2016-03-12	2.5	3067.0	1.0	1.0	202.0	140.0	1950.0	Yarra City Council	-37.799600	144.998400	Northern Metropolitan	4019.0
1	Abbotsford	25 Bloomburg St	2	h	1035000.0	S	Biggin	2016-04-02	2.5	3067.0	1.0	0.0	156.0	79.0	1900.0	Yarra City Council	-37.807900	144.993400	Northern Metropolitan	4019.0
2	Abbotsford	5 Charles St	3	h	1465000.0	SP	Biggin	2017-04-03	2.5	3067.0	2.0	0.0	134.0	150.0	1900.0	Yarra City Council	-37.809300	144.994400	Northern Metropolitan	4019.0
3	Abbotsford	40 Federation La	3	h	850000.0	PI	Biggin	2017-04-03	2.5	3067.0	2.0	1.0	94.0	95.0	1950.0	Yarra City Council	-37.798900	144.996900	Northern Metropolitan	4019.0
4	Abbotsford	55a Park St	4	h	1800000.0	VB	Nelson	2016-04-06	2.5	3067.0	1.0	2.0	120.0	142.0	2014.0	Yarra City Council	-37.807200	144.994100	Northern Metropolitan	4019.0
5	Abbotsford	129 Charles St	2	h	941000.0	S	Jellis	2016-07-05	2.5	3067.0	1.0	0.0	181.0	95.0	1950.0	Yarra City Council	-37.804100	144.995300	Northern Metropolitan	4019.0
6	Abbotsford	124 Yarra St	3	h	1876000.0	S	Nelson	2016-07-05	2.5	3067.0	2.0	0.0	245.0	210.0	1910.0	Yarra City Council	-37.802400	144.999300	Northern Metropolitan	4019.0
7	Abbotsford	98 Charles St	2	h	1636000.0	S	Nelson	2016-08-10	2.5	3067.0	1.0	2.0	256.0	107.0	1890.0	Yarra City Council	-37.806000	144.995400	Northern Metropolitan	4019.0
8	Abbotsford	217 Langridge St	3	h	1000000.0	S	Jellis	2016-08-10	2.5	3067.0	2.0	1.0	139.0	95.0	1950.0	Yarra City Council	-37.804267	144.996003	Northern Metropolitan	4019.0
9	Abbotsford	18a Mollison St	2	t	745000.0	S	Jellis	2016-08-10	2.5	3067.0	1.0	1.0	87.0	95.0	1950.0	Yarra City Council	-37.802533	144.996667	Northern Metropolitan	4019.0
10	Abbotsford	6/241 Nicholson St	1	u	300000.0	S	Biggin	2016-08-10	2.5	3067.0	1.0	1.0	97.5	95.0	1950.0	Yarra City Council	-37.800800	144.997300	Northern Metropolitan	4019.0
11	Abbotsford	10 Valiant St	2	h	1007000.0	S	Biggin	2016-08-10	2.5	3067.0	1.0	2.0	220.0	75.0	1900.0	Yarra City Council	-37.801000	144.998900	Northern Metropolitan	4019.0
12	Abbotsford	403/609 Victoria St	2	u	542000.0	S	Dingle	2016-08-10	2.5	3067.0	1.0	1.0	97.5	95.0	1950.0	Yarra City Council	-37.803500	145.000850	Northern Metropolitan	4019.0
13	Abbotsford	25/84 Trenerry Cr.	2	u	760000.0	SP	Biggin	2016-10-12	2.5	3067.0	1.0	1.0	97.5	95.0	1950.0	Yarra City Council	-37.806000	145.002800	Northern Metropolitan	4019.0
14	Abbotsford	106/119 Turner St	1	u	481000.0	SP	Purplebricks	2016-10-12	2.5	3067.0	1.0	1.0	97.5	95.0	1950.0	Yarra City Council	-37.800500	145.004750	Northern Metropolitan	4019.0
15	Abbotsford	411/8 Grosvenor St	2	u	700000.0	VB	Jellis	2016-12-11	2.5	3067.0	2.0	1.0	97.5	95.0	1950.0	Yarra City Council	-37.811000	145.006700	Northern Metropolitan	4019.0
16	Abbotsford	40 Nicholson St	3	h	1350000.0	VB	Nelson	2016-12-11	2.5	3067.0	2.0	2.0	214.0	190.0	2005.0	Yarra City Council	-37.808500	144.996400	Northern Metropolitan	4019.0
17	Abbotsford	123/56 Nicholson St	2	u	750000.0	S	Biggin	2016-12-11	2.5	3067.0	2.0	1.0	97.5	94.0	2009.0	Yarra City Council	-37.807800	144.996500	Northern Metropolitan	4019.0
18	Abbotsford	22 Park St	4	h	1985000.0	S	Biggin	2016-12-11	2.5	3067.0	2.0	1.0	188.0	95.0	1950.0	Yarra City Council	-37.808400	144.994200	Northern Metropolitan	4019.0
19	Abbotsford	13/84 Trenerry Cr.	1	u	500000.0	S	Biggin	2016-12-11	2.5	3067.0	1.0	1.0	97.5	95.0	1950.0	Yarra City Council	-37.808400	144.995750	Northern Metropolitan	4019.0

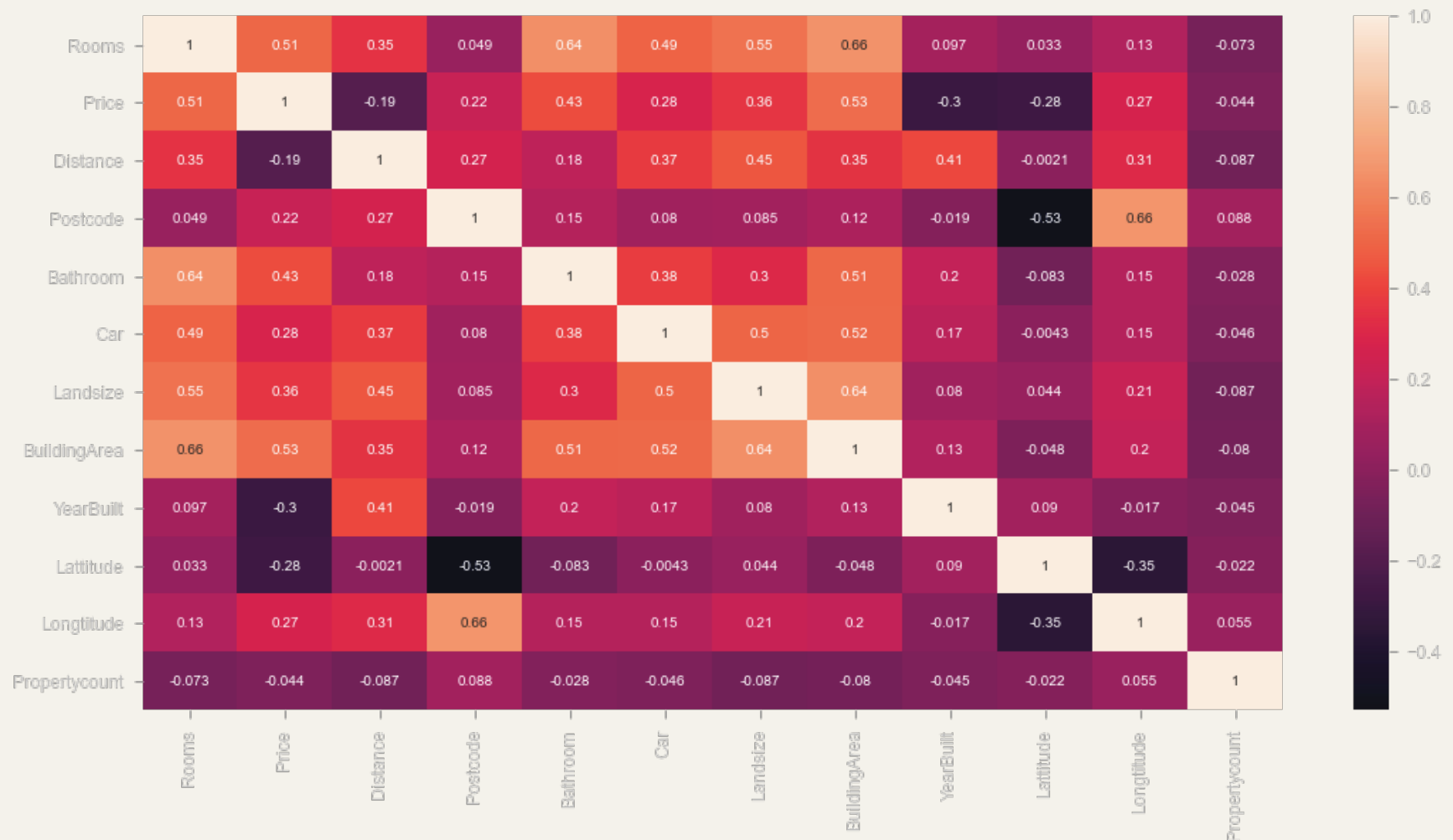
DESCRIPTIVE STATISTICS



	Features	D types	Null	Null%	Unique	Unique Value
0	Suburb	object	0	0.0	338	[Abbotsford, Airport West, Albert Park, Alphin...
1	Address	object	0	0.0	26580	[85 Turner St, 25 Bloomburg St, 5 Charles St, ...
2	Rooms	int64	0	0.0	12	[2, 3, 4, 1, 5, 6, 8, 7, 10, 9, 12, 16]
3	Type	object	0	0.0	3	[h, t, u]
4	Price	float64	0	0.0	2868	[1480000.0, 1035000.0, 1465000.0, 850000.0, 16...
5	Method	object	0	0.0	5	[S, SP, PI, VB, SA]
6	SellerG	object	0	0.0	349	[Biggin, Nelson, Jellis, Dingle, Purplebricks,...
7	Date	datetime64[ns]	0	0.0	78	[2016-03-12T00:00:00.000000000, 2016-04-02T00:...
8	Distance	float64	0	0.0	212	[2.5, 13.5, 3.3, 6.4, 13.8, 11.1, 6.3, 5.9, 11...
9	Postcode	float64	0	0.0	208	[3067.0, 3042.0, 3206.0, 3078.0, 3018.0, 3025....
10	Bathroom	float64	0	0.0	12	[1.0, 2.0, 3.0, 4.0, 2.5, 7.0, 5.0, 6.0, 9.0, ...
11	Car	float64	0	0.0	14	[1.0, 0.0, 2.0, 6.0, 5.0, 4.0, 3.0, 8.0, 7.0, ...
12	Landsize	float64	0	0.0	1607	[202.0, 156.0, 134.0, 94.0, 120.0, 181.0, 245....
13	BuildingArea	float64	0	0.0	715	[140.0, 79.0, 150.0, 95.0, 142.0, 210.0, 107.0...
14	YearBuilt	float64	0	0.0	153	[1950.0, 1900.0, 2014.0, 1910.0, 1890.0, 2005....
15	CouncilArea	object	0	0.0	33	[Yarra City Council, Moonee Valley City Council...
16	Latitude	float64	0	0.0	15687	[-37.7996, -37.8079, -37.8093, -37.7969, -37.8...
17	Longitude	float64	0	0.0	16849	[144.9984, 144.9934, 144.9944, 144.9969, 144.9...
18	Regionname	object	0	0.0	8	[Northern Metropolitan, Western Metropolitan, ...
19	Propertycount	float64	0	0.0	332	[4019.0, 3464.0, 3280.0, 2211.0, 5301.0, 5132....

	count	mean	std	min	25%	50%	75%	max
Rooms	27074.0	2.992059e+00	0.955581	1.00000	2.0000	3.000000	4.000000e+00	1.600000e+01
Price	27074.0	1.051512e+06	642080.313005	85000.00000	635125.0000	874500.000000	1.300000e+06	1.120000e+07
Distance	27074.0	1.125145e+01	6.771446	0.00000	6.4000	10.400000	1.400000e+01	4.810000e+01
Postcode	27074.0	3.113717e+03	110.687279	3000.00000	3046.0000	3088.000000	3.153000e+03	3.978000e+03
Bathroom	27074.0	1.543067e+00	0.675442	1.00000	1.0000	1.000000	2.000000e+00	9.000000e+00
Car	27074.0	1.662591e+00	0.903250	0.00000	1.0000	2.000000	2.000000e+00	1.800000e+01
Landsize	27074.0	5.306764e+02	3075.233141	1.00000	189.0000	465.000000	6.300000e+02	4.330140e+05
BuildingArea	27074.0	1.431750e+02	283.872566	0.00000	95.0000	135.000000	1.615000e+02	4.451500e+04
YearBuilt	27074.0	1.967284e+03	25.638785	1820.00000	1960.0000	1970.000000	1.980000e+03	2.019000e+03
Latitude	27074.0	-3.780775e+01	0.090862	-38.19043	-37.8618	-37.801698	-3.774903e+01	-3.739780e+01
Longitude	27074.0	1.449977e+02	0.118033	144.42379	144.9272	145.004500	1.450693e+02	1.455264e+02
Propertycount	27074.0	7.584355e+03	4490.911467	83.00000	4380.0000	6567.000000	1.041200e+04	2.165000e+04





.corr()
VISUALISATION

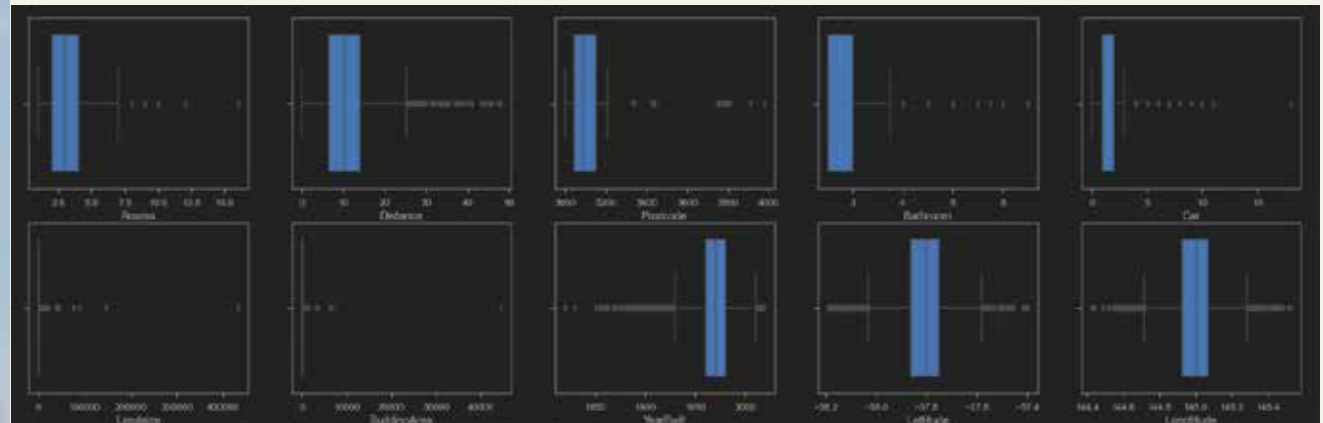
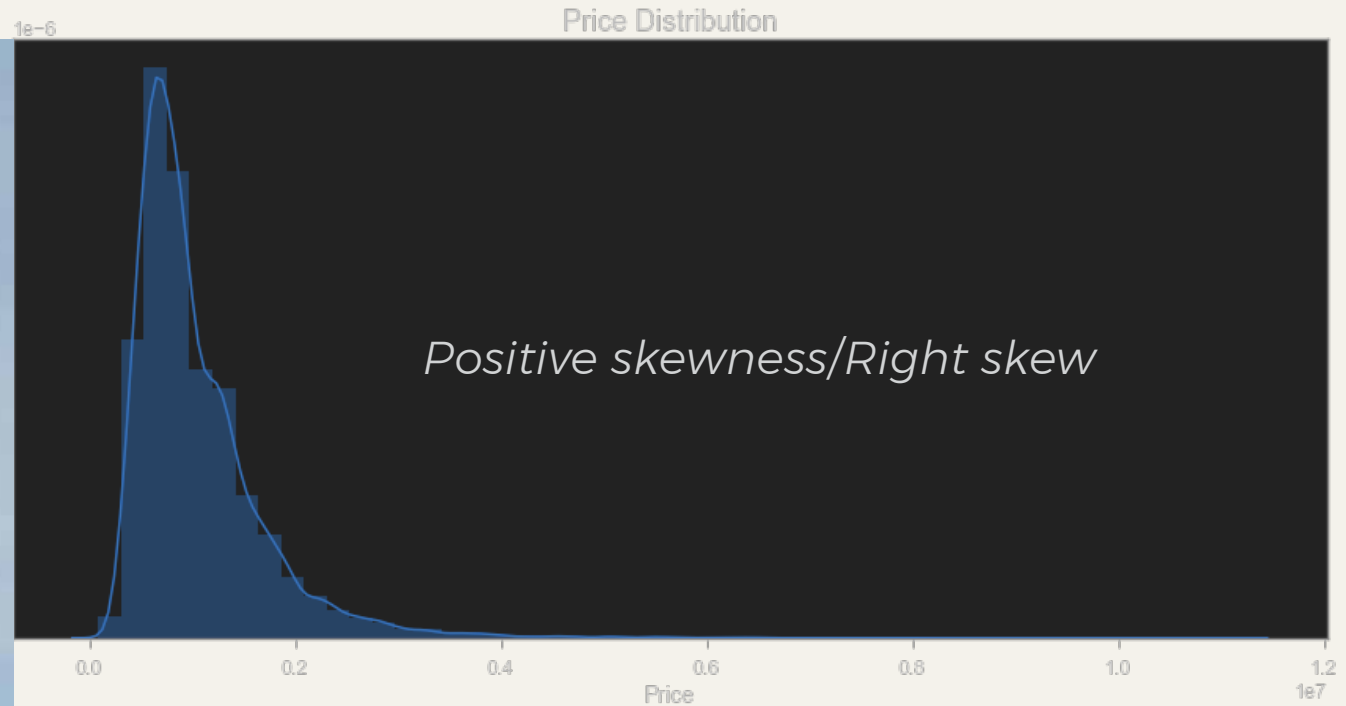
7.

Correlation Ratio:

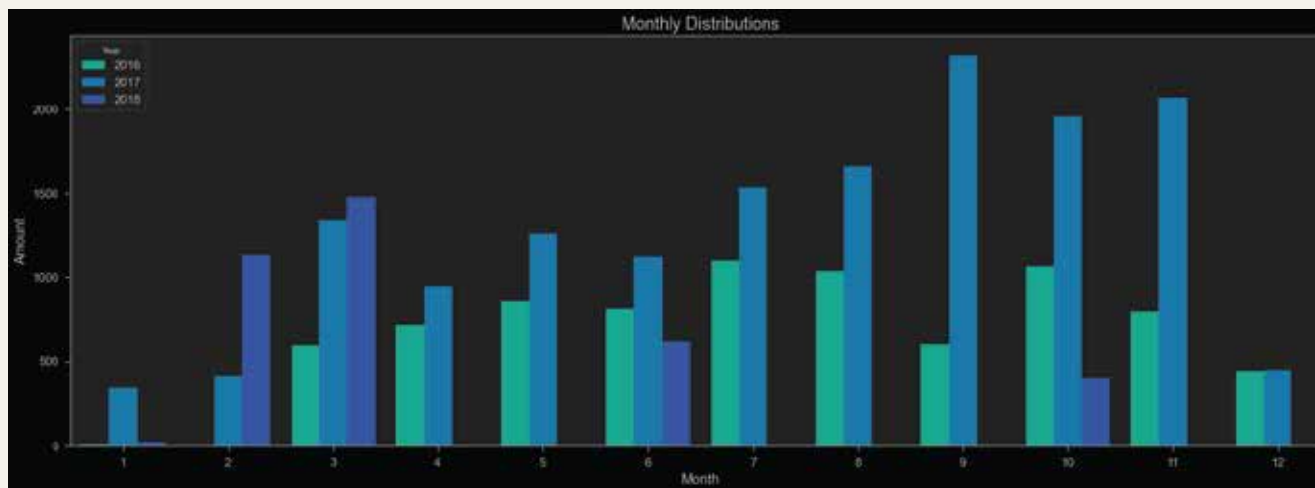
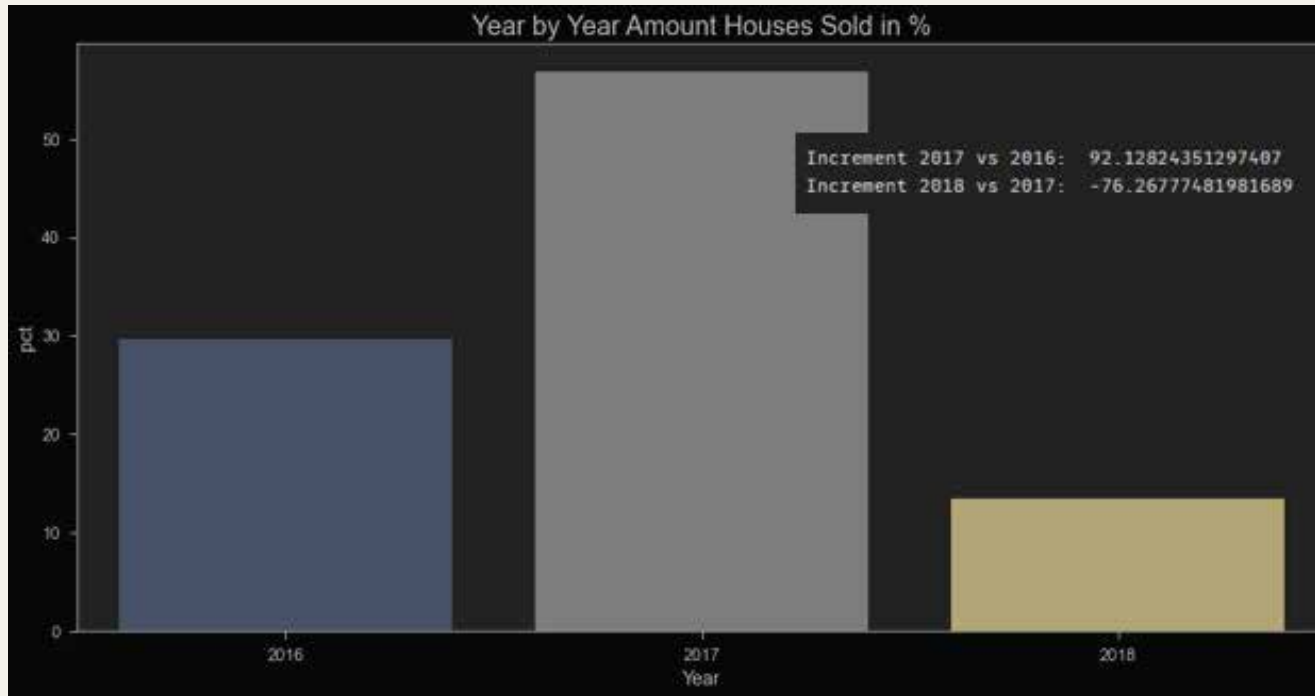
```
Suburb : 0.5759217135053036
Address : 0.9958163669497644
Type : 0.3707325090474201
Method : 0.1251149040954949
SellerG : 0.49058047581414943
CouncilArea : 0.488173577466723
Regionname : 0.3880299230200563
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8. EXPLORATORY DATA ANALYSIS

8.1 Univariate Analysis



8.2 Monthly and Yearly House Distributions



8.3 Multivariate Analysis

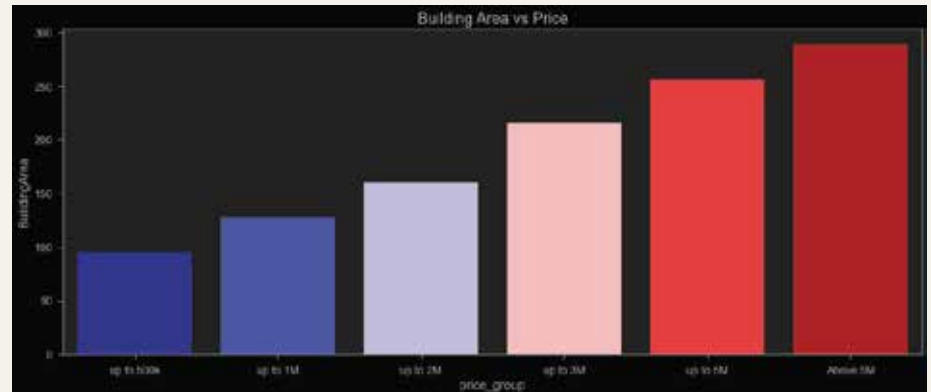
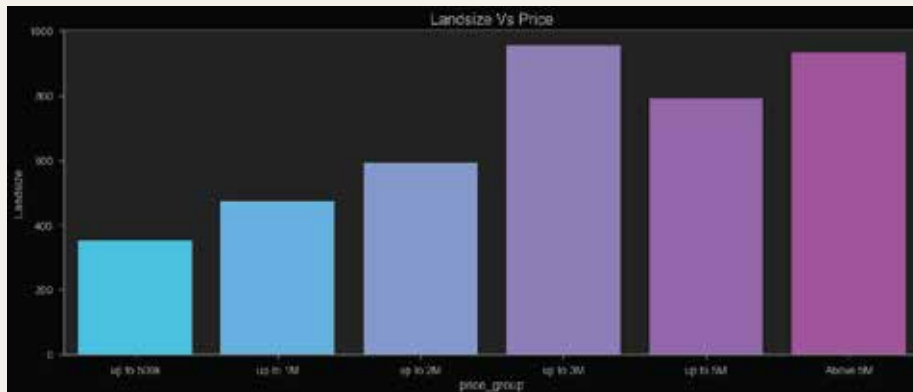


Bathrooms	Median Price
7	3,425,000
7.5	3,130,000
5	2,580,000
4	2,445,000
9	2,215,000
8	2,220,000
6	1,810,000
3	1,550,000
3.5	1,290,000
2	1,050,000
2.5	994,000
1	735,000

Rooms	Median Price
16	5,000,000
12	2,705,000
10	2,115,000
6	1,663,000
5	1,553,000
8	1,535,883
9	1,380,000
7	1,350,000
4	1,210,000
3	900,000
2	678,000
1	390,000



Basic Features of House vs Price



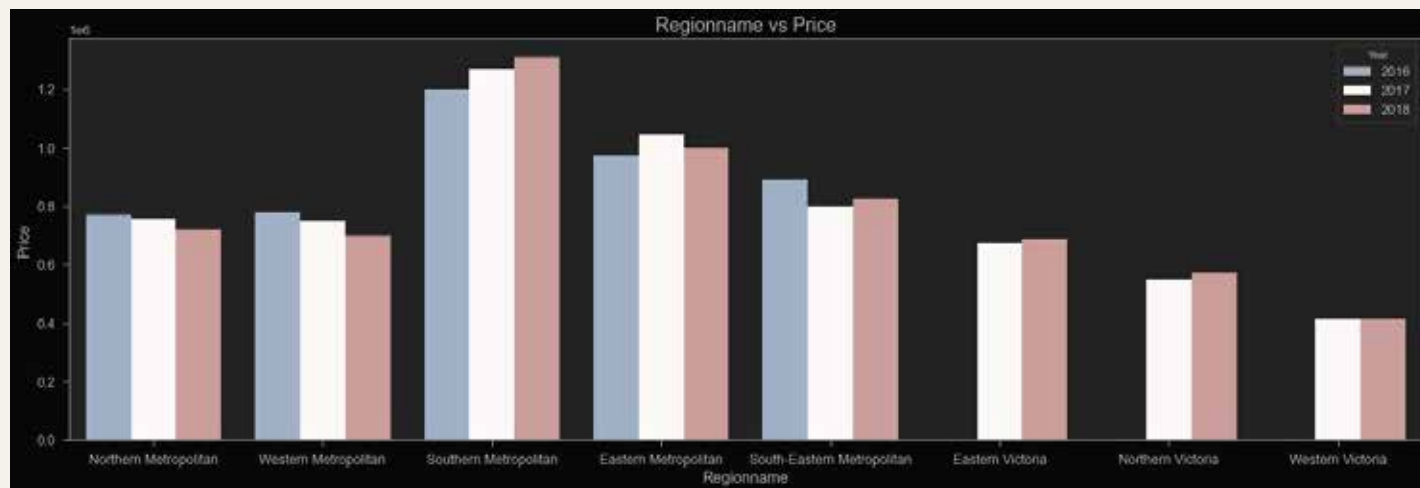
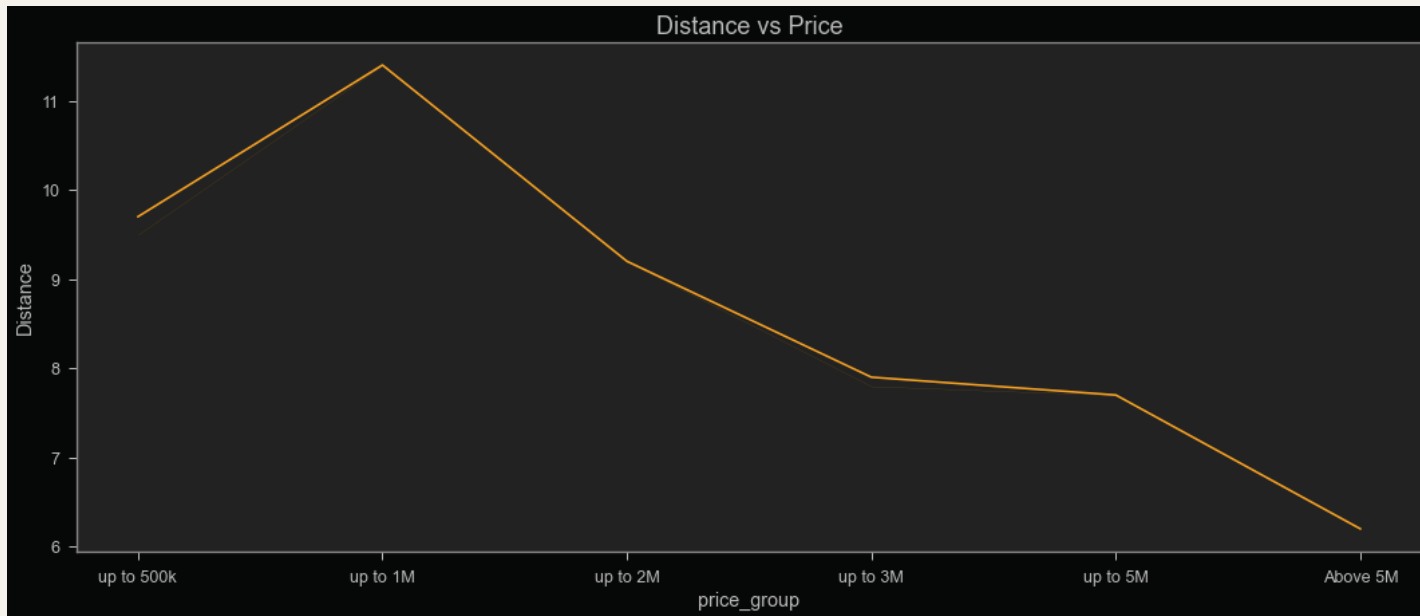
9. MELBOURNE HOUSE DISTRIBUTION MAP

Menggunakan folium map untuk melihat rumah berdasarkan price group



**Each category was sampled 200 data*

LOCATION VS PRICE 10.



CONCLUSION

1. Terjadi lonjakan permintaan (*demand*) terhadap properti pada tahun 2017 hingga naik 92% dibanding tahun 2016. Ini menandakan, *Housing Bubble* mencapai puncaknya di tahun 2017 sebelum akhirnya *demand* melambat di bulan Desember 2017.





2. Rumah yang *affordable* rata-rata terletak cukup jauh dari CBD Area. Hanya di beberapa *suburb* tertentu walau letaknya jauh dari CBD Area namun memang harga mediannya tinggi seperti **Canterbury**.
3. Reservoir adalah daerah suburbs yang paling diminati pembeli, karena *median price*-nya yang sangat terjangkau dan tempatnya yang sudah ramai dan memiliki berbagai fasilitas dan tempat hiburan.





4. Tipe properti rumah, jumlah kamar, kamar mandi, luas tanah, luas bangunan, daerah suburb dan jarak rumah ke CBD Area sangat mempengaruhi harga dari suatu rumah.

12.

SUGGESTION

1. Cek lokasi properti
 - Termasuk daerah Suburb dengan *median price* tinggi atau tidak
 - Ini faktor penting untuk menentukan harga properti agar tidak terlalu rendah
2. Umur sebuah properti bukan hal yang mempengaruhi harga properti.
3. Jarak properti dengan CBD sangat mempengaruhi harga rumah.
4. Untuk meningkatkan peluang menjual dengan harga yang tinggi, disarankan menggunakan jasa **Property Agent Marshall, Jellis** atau **Buxton**. Portfolio mereka berhasil menjual propertiy diatas 800 buah dengan nilai *median price* diatas 1 juta AUD.



REFERENCE

Case, Karl E. dan Robert J. Shiller, 2003, Is There a Bubble in the Housing Market? An Analysis, Prepared for the Brookings Panel on Economic Activity September 4-5, 2003

Roberts, Lawrence (2008), The Great House Bubble, Why did House Price Fall?, Monterey Cypress Publishing, a division of Monterey Cypress, LLC
Siegel, Jeremy J., 2003, What is an Asset Price Bubble? An Operational Definition, European Financial Management, Vol. 9, No. 1, 2003, 11-24.

