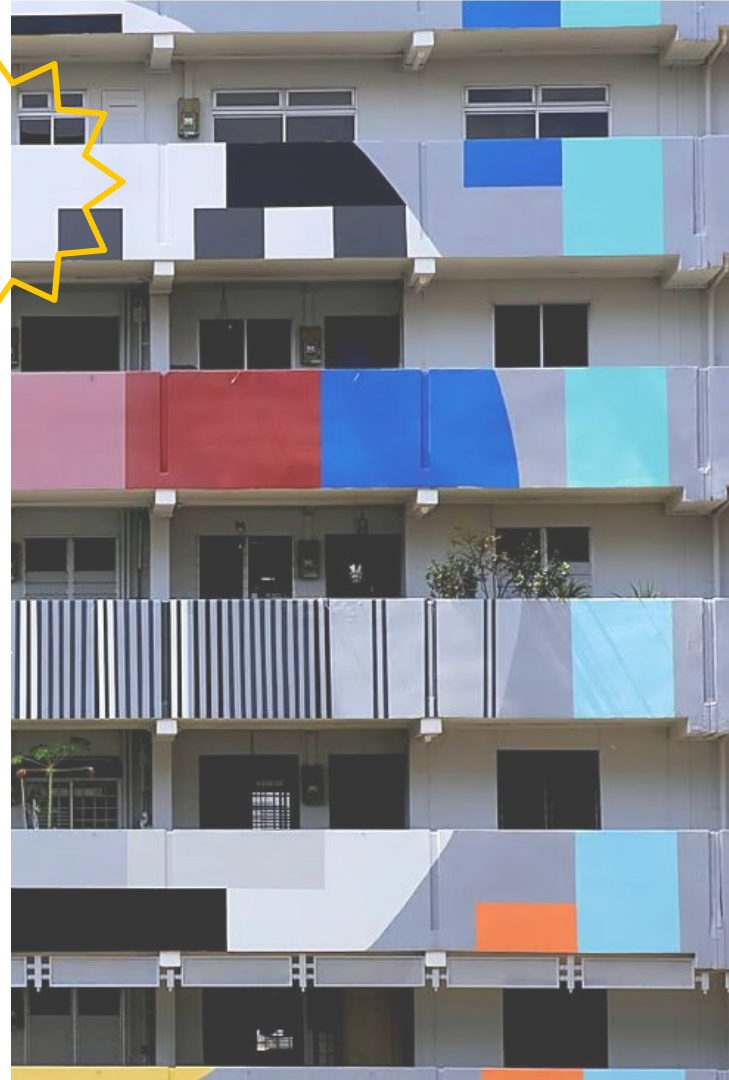
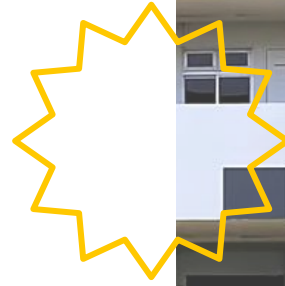
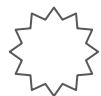


| Daphne | Hong Xiang | Li Shing | Sunil

# Anatomy of a resale HDB

An Analysis on HDB resale prices and its factors for predictions





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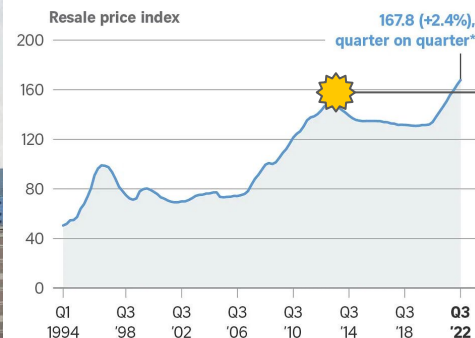
**PROJECT GOAL**

# PROJECT GOAL

HDB was set up in 1960 to house the nation. Today, 80% Singaporeans stay in HDB.



HDB resale prices rise for the 10th consecutive quarter



\*Flash estimate

Source: HDB  
STRAITS TIMES GRAPHICS

Price of HDB resale price has been increasing, despite cooling effort by government to address concerns over affordability.

# **PROJECT GOAL**

We are representing a property research company who aim for:



## **ACCURATE PRICE PREDICTION**

To provide insights into the current state of the housing market and helping buyers with budgeting.

Target Audience: Young Buyers



## **UNDERSTANDING FACTORS OF A DESIRABLE HDB FLAT**

ONE STOP SHOP FOR ANSWERS

**CHAT  
GPT** 



There are several factors that can affect the resale price of a Housing and Development Board (HDB) flat in Singapore. Some of these include:

1. Location: HDB flats located in prime locations such as near MRT stations, shopping malls, and good schools tend to have higher resale prices.
2. Age of the building: Older buildings typically have lower resale prices compared to newer ones, although there are exceptions for certain older buildings that are well-maintained or have been recently refurbished.
3. Size of the flat: Generally, larger flats command higher prices compared to smaller ones.
4. Floor level: Flats on higher floors tend to have higher resale prices due to better views and natural light.
5. Renovation: Renovated flats tend to command higher prices, especially if the renovations are modern and well-done.
6. Leasehold: The remaining leasehold of the flat also affects its resale price, with shorter leaseholds commanding lower prices.
7. Supply and demand: The overall supply and demand for HDB flats in a specific area can also affect resale prices, with higher demand leading to higher prices.

It is important to note that these factors may vary based on market conditions and individual circumstances, and the weight of each factor can also change over time.



S

In which order do these features (location, age of building, size of flat, floor level, renovation, leasehold, supply and demand) affect HDB resale prices?



The order in which these factors affect HDB resale prices can vary depending on the specific market conditions and individual circumstances. However, some factors may be considered more influential than others in general. Here is a rough guide to the relative importance of each factor:

1. Location: Location is typically considered one of the most important factors in determining HDB resale prices, as it affects both supply and demand for a particular area.
2. Age of building: Age of the building is also a significant factor in determining HDB resale prices, although it may be less important than location.
3. Size of flat: Size of the flat is also a factor in determining resale prices, as larger flats tend to command higher prices.
4. Floor level: Floor level is also a factor that can affect HDB resale prices, with higher floors typically commanding higher prices.
5. Renovation: Renovation can also be a significant factor, as renovated flats tend to command higher prices, especially if the renovations are modern and well-done.
6. Leasehold: Leasehold is another factor that affects HDB resale prices, with shorter leaseholds commanding lower prices.
7. Supply and demand: Supply and demand is also a factor in determining HDB resale prices, with higher demand leading to higher prices.

It is important to note that the relative importance of each factor can change over time, and in specific markets or individual circumstances, one factor may be more important than others.



Can you quantify the effect of the features that affect HDB resale prices?



It is difficult to quantify the exact effect of each factor on HDB resale prices as the real estate market is complex and dynamic, and various factors interact with each other to determine the price of a property. Additionally, the effect of each factor can vary depending on the specific market conditions and individual circumstances.

However, some general observations can be made:

1. Location: Location can have a significant effect on HDB resale prices, with flats located in prime areas commanding premium prices. The effect of location can be particularly pronounced in areas near MRT stations, shopping malls, and good schools.
2. Age of building: The age of a building can also have a significant effect on HDB resale prices, with older buildings typically commanding lower prices. However, well-maintained older buildings or those that have been recently refurbished can command premium prices.
3. Size of flat: Size of the flat is also a factor in determining HDB resale prices, with larger flats typically commanding higher prices. The exact effect of size can vary depending on the specific market conditions.

4. Floor level: Floor level can also have an effect on HDB resale prices, with higher floors typically commanding higher prices. The exact effect of floor level can depend on the height of the building and the views from different floors.
5. Renovation: Renovation can have a significant effect on HDB resale prices, with renovated flats typically commanding higher prices. The exact effect of renovation can depend on the quality of the renovations and the style of the renovations.
6. Leasehold: Leasehold can also have an effect on HDB resale prices, with shorter leaseholds typically commanding lower prices. The exact effect of leasehold can depend on the remaining leasehold of the flat and the market conditions.
7. Supply and demand: Supply and demand can also have an effect on HDB resale prices, with higher demand leading to higher prices. The exact effect of supply and demand can depend on the specific market conditions and the supply of available properties.

It is important to note that these are general observations and the exact effect of each factor can vary in specific market conditions and individual circumstances.

S

Can you predict the resale price of a HDB flat?



I'm sorry, but as a language model, I don't have access to real-time data or the ability to predict future market conditions, which would both be crucial in determining the resale price of a HDB flat. However, I can tell you that there are several factors that can affect the resale price of a HDB flat, including the location, age of the flat, size, condition, and amenities in the surrounding area. Additionally, the overall state of the housing market, the economy, and other factors can also play a role in determining the resale price. It would be best to consult a real estate agent or a property valuation expert for a more accurate estimate.

S

So you can't do it?



No, I'm unable to predict the exact resale price of a HDB flat as it is influenced by many dynamic and constantly changing factors such as market conditions, housing demand, and location-specific factors. Making a prediction about a specific property would require access to up-to-date information about the property, the local real estate market, and other relevant data that I don't have access to. While I can provide general information and insights, a real estate agent or a property valuation expert would be better equipped to provide a more accurate estimate of the resale price of a HDB flat.

# **PROJECT GOAL**

What are our goals?



**ACCURATE PRICE PREDICTION**



**UNDERSTANDING FACTORS OF A  
DESIRABLE HDB FLAT**

Price prediction

Extra value if price factors are interpretable and quantifiable

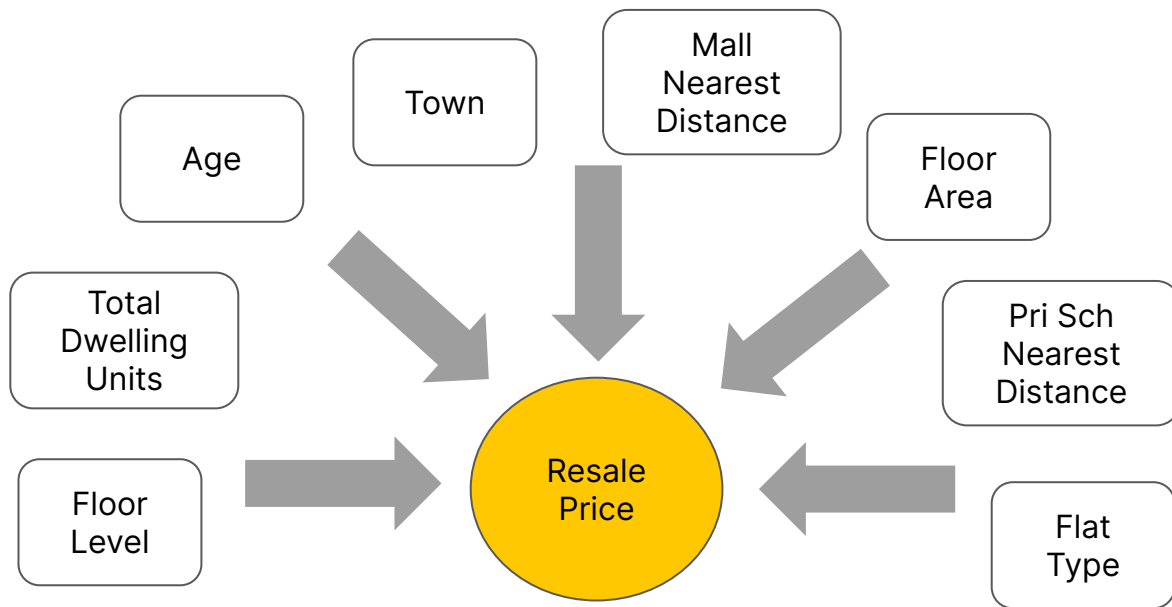
# 02

## DATASET

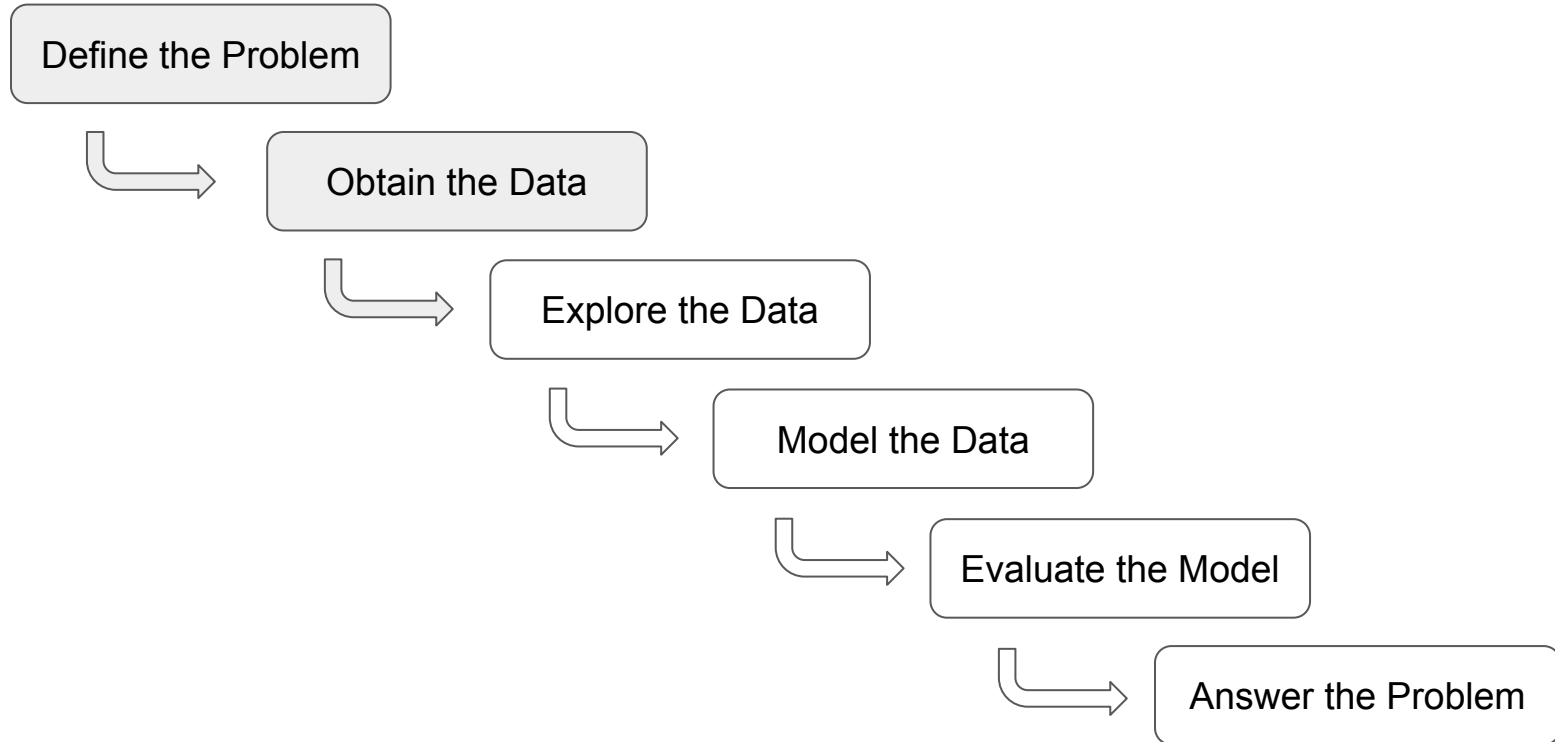
# DATASET

 **150,000** transaction data

 **77** features



# DATA SCIENCE PROCESS



# 03

## EXPLORATORY DATA ANALYSIS



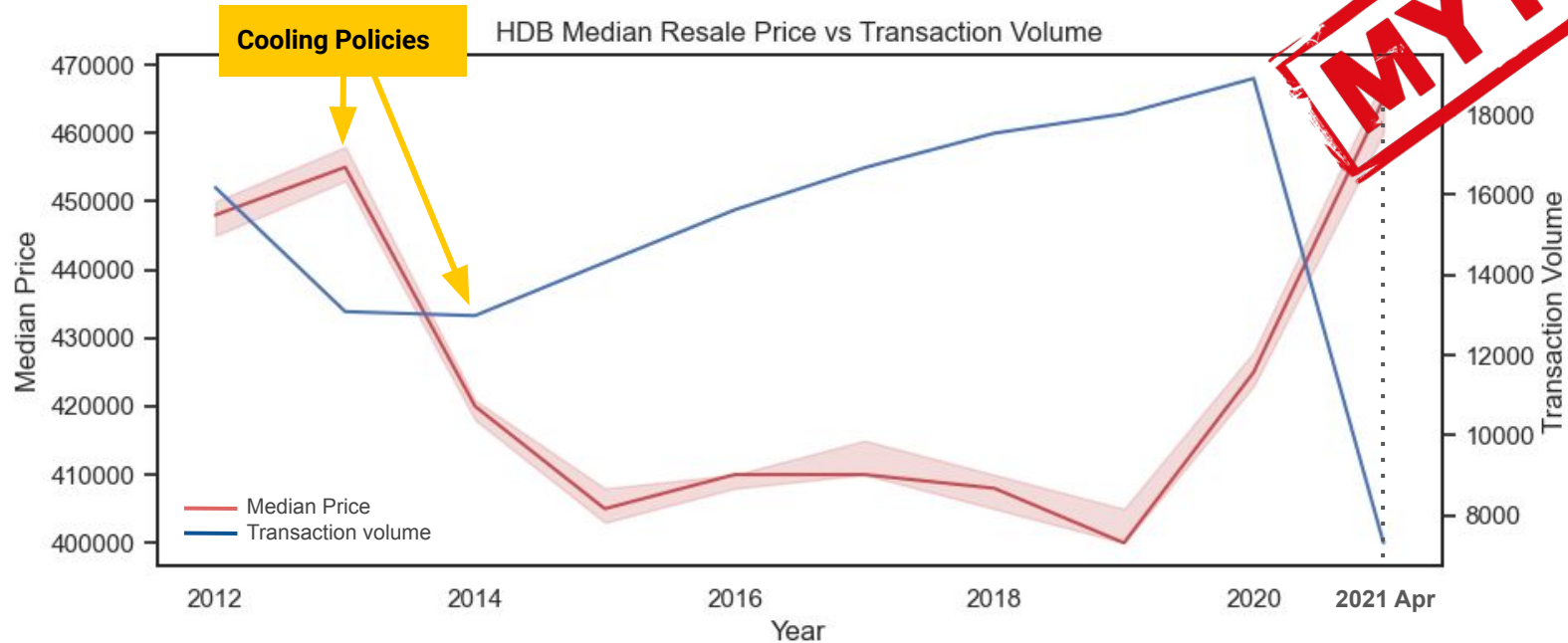
 **Myth #1: HDB price forever rising?**

 **Myth #2: *Location, Location, Location?***

 **Myth #3: Lease decay still relevant?**



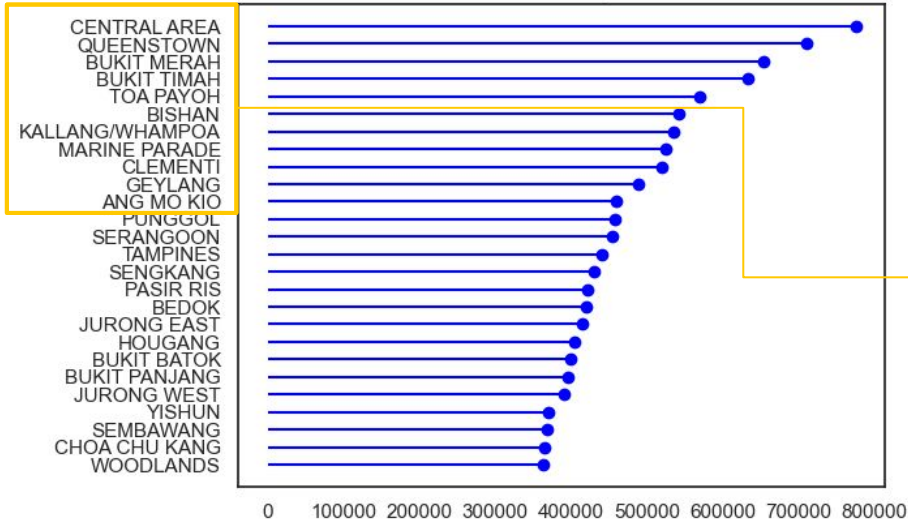
# Myth #1: HDB price forever rising?



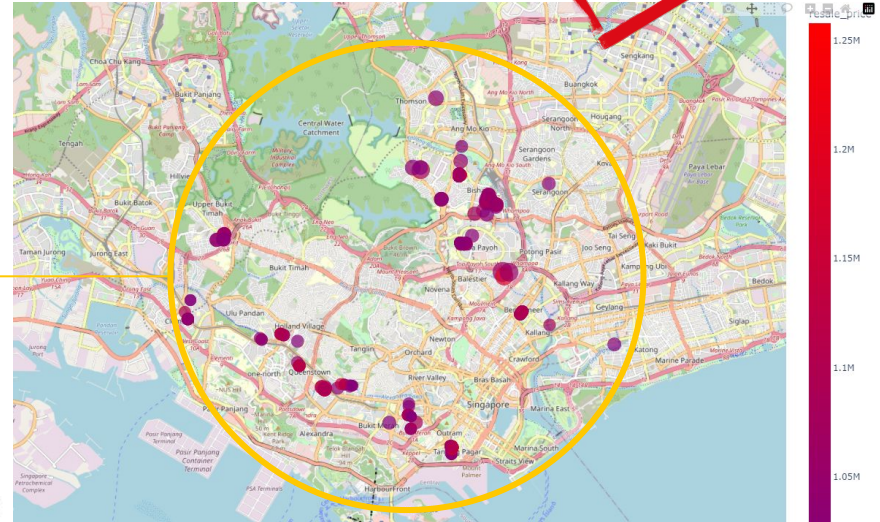
# Myth #2: Location, Location, Location?

**FACT**

4-ROOM HDB Median Resale Price by Town

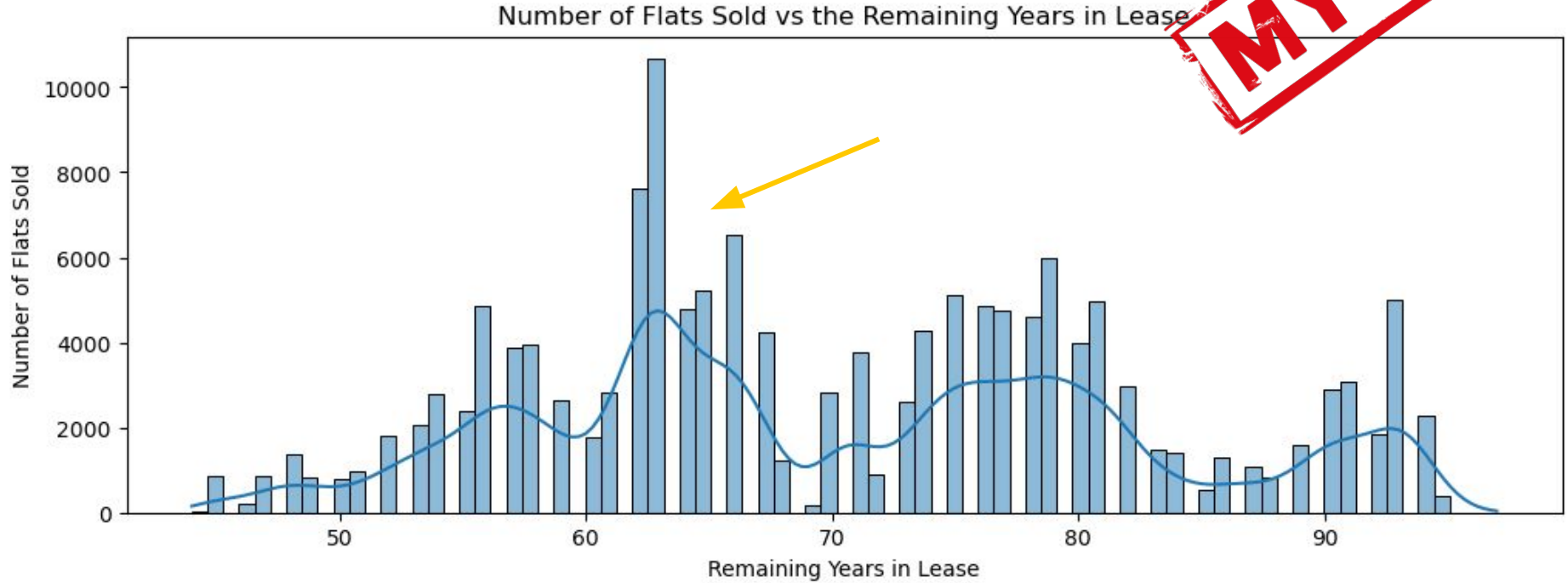


Where are the \$1mil flats located at?

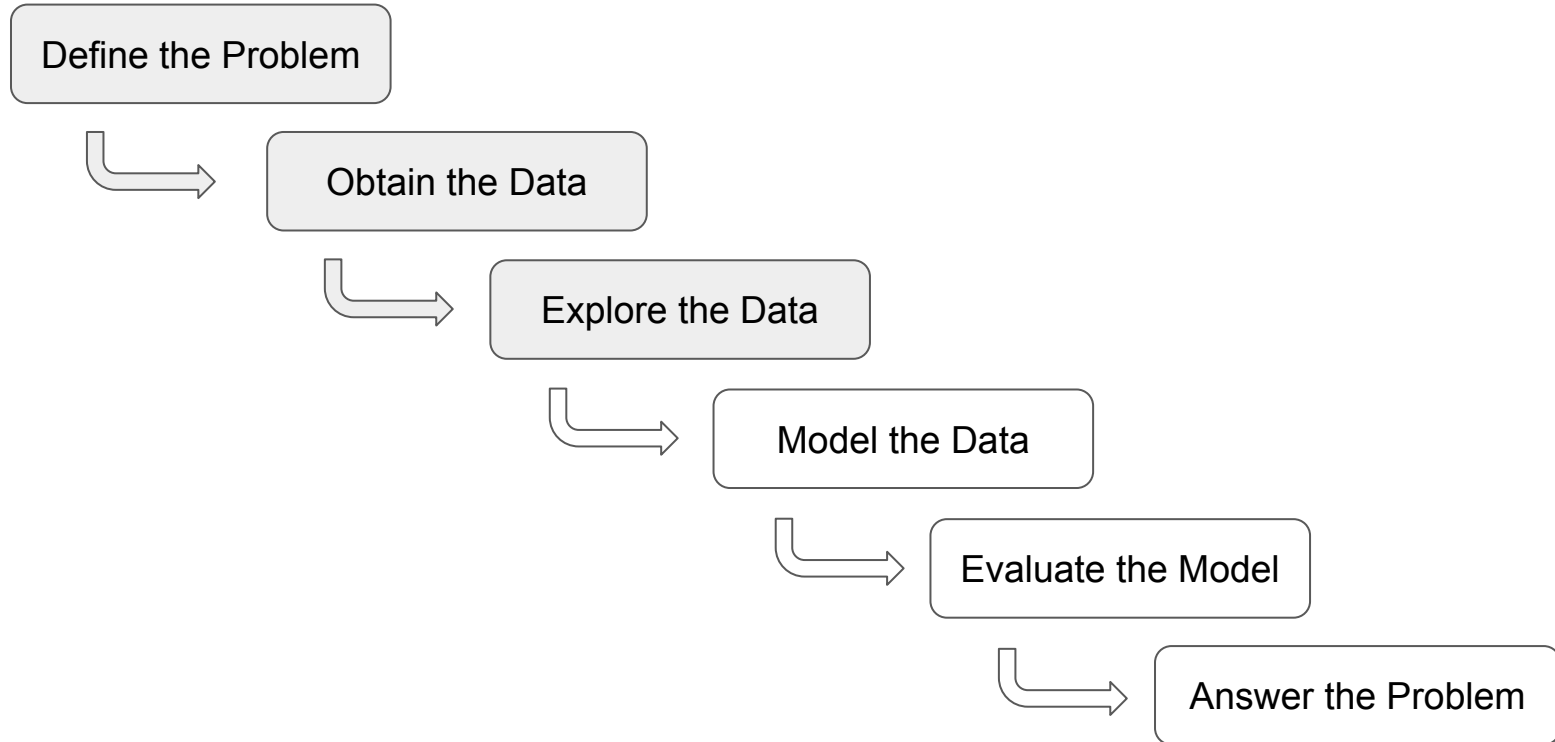


# Myth #3: Lease decay still relevant?

**MYTH**



# DATA SCIENCE PROCESS



# 04

## Model & Evaluation

# Data Preprocessing



## Input missing data

Input with median for missing, replace blanks with 0s



## Create/drop features

Create useful features, drop unnecessary features



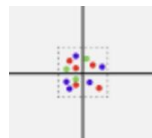
## Dummy code

Split categorical features into 1s and 0s



## Train/test split

80% train, 20% validate



## Scale features

Standardize the range of feature values



# Prediction Models

How can we quickly predict the price?

Use **Average Price**

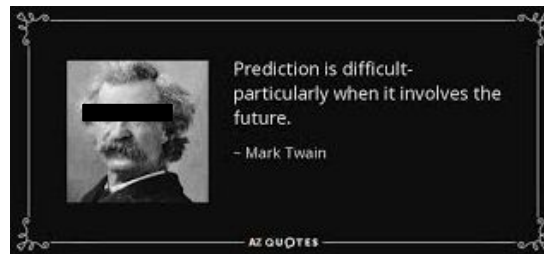
However, our predictions will be off by  $\sim 143k^1$ .

We try to improve accuracy of predictions using regression models:

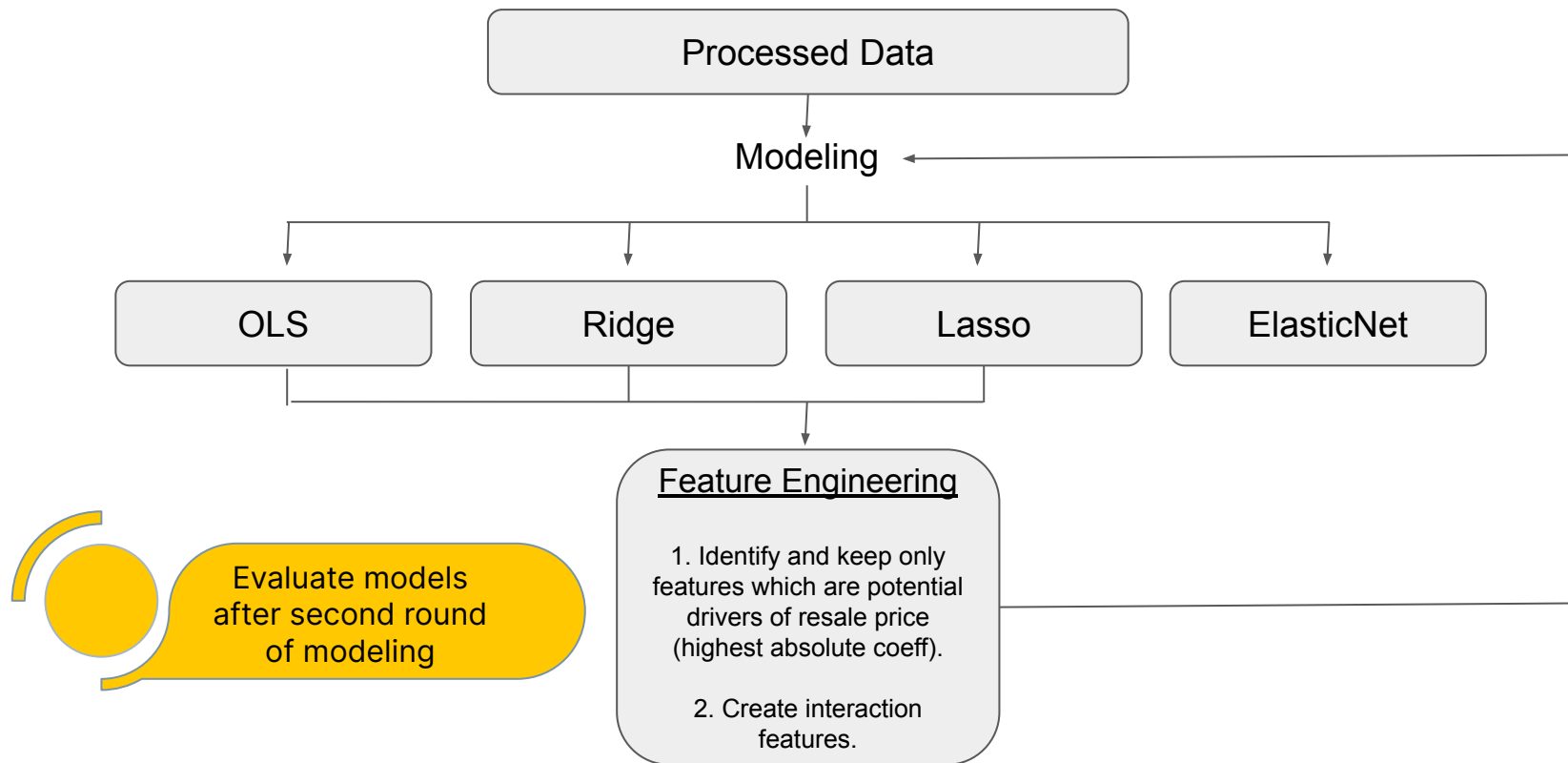
1. Ordinary Least Square
2. Ridge
3. Lasso
4. ElasticNet

Note:

<sup>1</sup> Based on Root Mean Squared Error (RMSE).

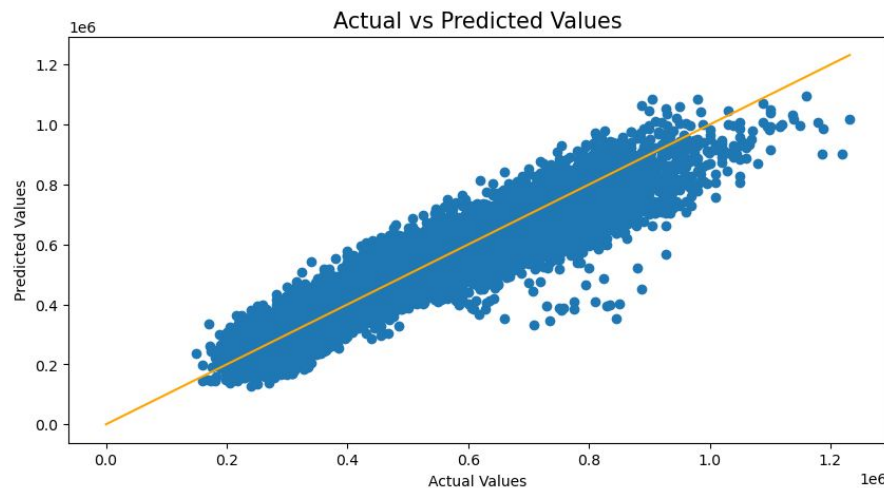


# Modeling Process



# Model Evaluation

	OLS	Ridge	Lasso	ElasticNet
Error in prediction (RMSE)	49,926	49,927	49,927	55,193
Accuracy of model ( $R^2$ )	0.88	0.88	0.88	0.85

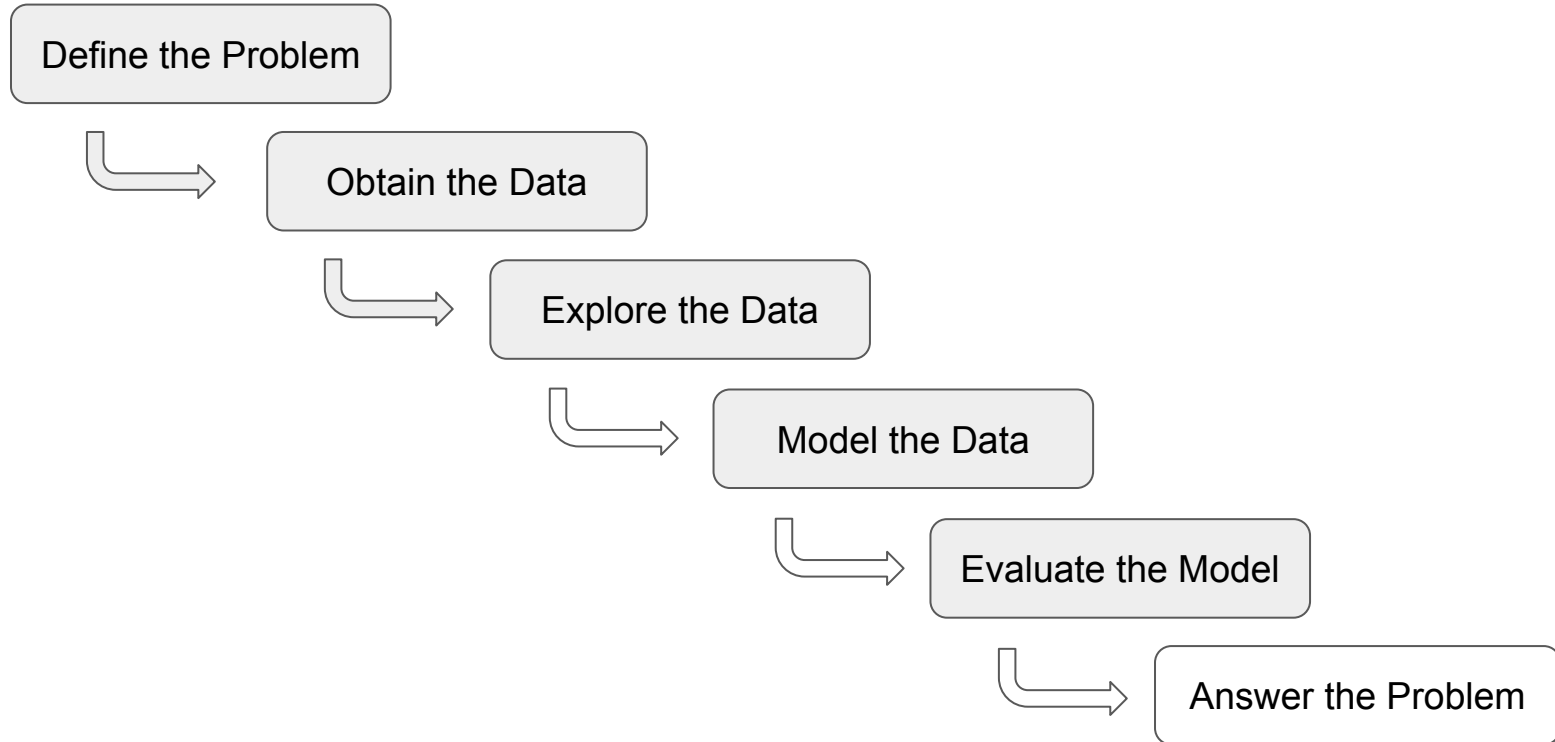


Our best model was able to account for 88% of the variability<sup>1</sup> of the resale prices in its predictions.

Note:

<sup>1</sup> Based on  $R^2$  score.

# DATA SCIENCE PROCESS



05

# **Conclusion & Recommendations**

# A recap of the project goals



**Have accurate price  
predictions**



**Understand the factors of a  
desirable HDB unit**

So our clients make informed investment decisions



# Conclusions to the project goal

## #1 Have accurate price predictions



How our model fare?

- Our best model was able to account for 88% of the variability<sup>1</sup> of the resale prices in its predictions.
- We have check the residuals against heteroskedasticity and found none. **This means the model is accurate and reliable**
- Predictions were off by ~50k on average

Note:

<sup>1</sup> Based on  $R^2$  score.

## #2 Understand the factors of a desirable HDB unit



What makes a 'good' resale HDB?

- Go for 50 years remaining lease - best value for money.
- The higher the storey, the higher the price. So you can find the right floor for your budget and comfort
- Consider Punggol (Northeast) as a Town for your next investment
- Distance to amenities such as Hawker and MRT for HDB are comparatively close regardless of location; thanks to the master plans from LTA and URA





# Conclusions to the project goal

## #1 Have accurate price predictions



How our model fare?

- We have check the residuals against heteroskedasticity and found none. **This means the model is accurate and reliable**
- Also, the model is
  - The accuracy of the model is high enough (88%)
  - The predicted resale price will deviate ~\$50k from the actual number

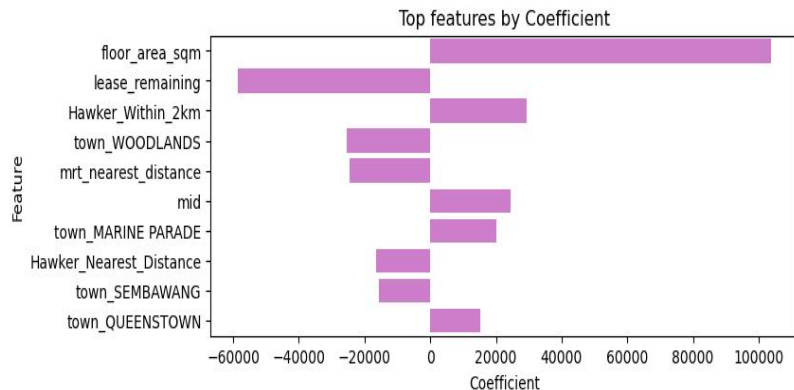
## #2 Understand the factors of a desirable HDB unit



What makes a 'good' resale HDB?

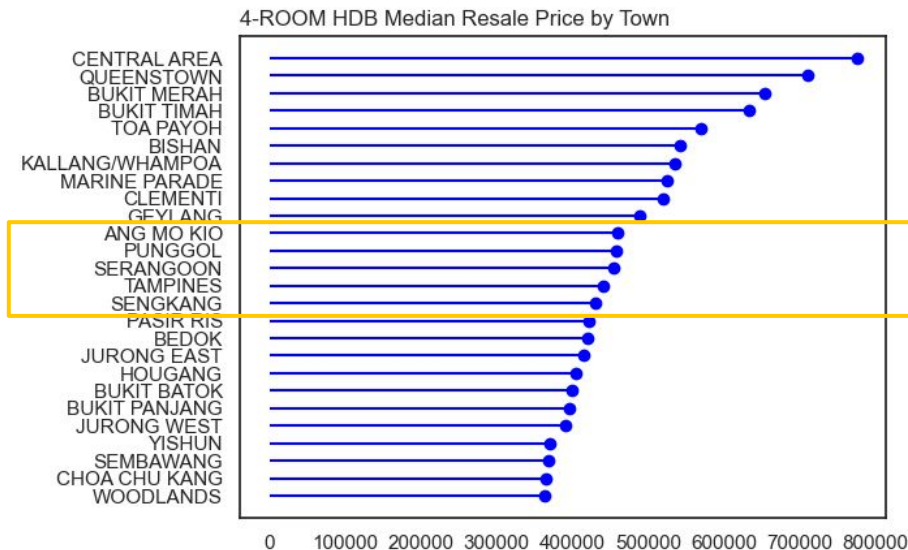
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# Findings



Top features:

- 1) Floor Area of apartment
- 2) Length of lease remaining
- 3) Nearest MRT distance
- 4) Nearest Hawker distance
- 5) Storey of apartment
- 6) Town





# Conclusions to the project goal

## #1 Have accurate price predictions



How our model fare?

- We have check the residuals against heteroskedasticity and found none. **This means the model is accurate and reliable**
- Also, the model is
  - The accuracy of the model is high enough (88%)
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## #2 Understand the factors of a desirable HDB unit



What makes a 'good' resale HDB?

- Go for 50 years remaining lease - best value for money.
- The higher the storey, the higher the price. So you can find the right floor for your budget and comfort
- Distance to amenities such as Hawker and MRT for HDB are comparatively close regardless of location; thanks to the master plans from LTA and URA
- **A 'good' town is a relative quality, and it depends on perception over time**

# Future Improvements

## Influence from Government Policies



To regulate the prices of resale HDB, government may introduce policies such as the Subsidy Clawback and 10 years MOP for Prime Location HDB flats

<https://www.straitstimes.com/singapore/housing/subsidy-clawback-10-year-mop-for-new-prime-location-hdb-flats-to-keep-them>

## Capture Seasonality and Macro Trends



Capture future demand on areas where MOP (Minimum Occupancy Period) is finishing; to anticipate a surge of prices by towns

<https://www.propertyguru.com.sg/property-guides/mop-hdb-resale-flats-43364>

## Data that can provide right insights



- Interior design becomes a more important factor. We will need this to study its effect on the resale price.
- Travel time to amenities might matter more than linear distance to Singapore residents

<https://www.homeguide.com.sg/how-to-boost-your-singapore-homes-resale-value-through-the-power-of-interior-design/>

[https://www.lta.gov.sg/content/dam/ltagov/who\\_we\\_are/our\\_work/land\\_transport\\_master\\_plan\\_2040/pdf/LTA%20LTP%202040%20eReport.pdf](https://www.lta.gov.sg/content/dam/ltagov/who_we_are/our_work/land_transport_master_plan_2040/pdf/LTA%20LTP%202040%20eReport.pdf)

# Thank you

Questions?

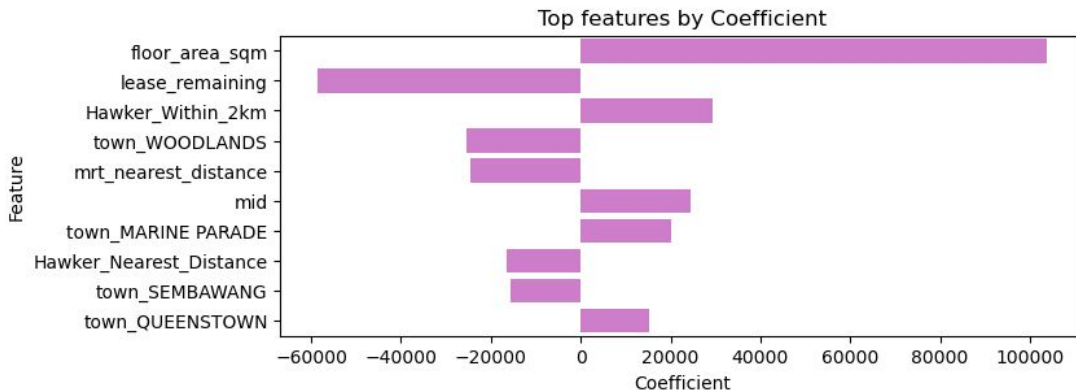
# Findings from Model

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Top features:

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Note:

<sup>1</sup> Based on  $R^2$  score.