

**HOUSE PRICE PREDICTION**  
**presented by**  
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# OUTLINE

- Introduction
- Problem statement
- Dataset & Cleaning
- Feature Engineering
- Outliers Detection & Filling
- One Hot Encoding
- Model Creation
- Output

# **INTRODUCTION**

- **This Project ,we have built a machine learning model to predict the house prices of an dataset from cities in india.**
- **This project will very helpful for the real estate market.**
- **Our model can be used by both house sellers and house buyers.**
- **Multiple Linear Regression algorithm is used to creat a model with great accuracy score**
- **We will aplly Lasso & Ridge models to find out the most optimum model with Maximum R-squared value.**

# **PROBLEM STATEMENT**

- **Real estate is not only the key sector of the national economy, but also one of the citizen's major concerns.**
- **With increasing demand of housing, prices of houses are also going up.**
- **Delivering precise forecasts for housing market prices is essential to address this growing challenge.**
- **Establishing fair and well-founded property valuations is crucial for restoring transparency and building consumer confidence, particularly in markets like India where trust is paramount.**

# **SPECIFICATIONS**

- **This project aims to forecast housing prices in cities in India analyzing key attributes.**
- **The predictive model is built using a dataset specifically containing some cities in India housing market data.**
- **We employ machine learning techniques to develop this forecasting tool.**
- **Specifically, the model is trained and evaluated using the Multiple Linear Regression algorithm and Ridge & Lasso .**

# **DATASET**

- The dataset is about House price Prediction
- Its contains 187531 rows × 21 columns
- The columns are : [Index, Title,Description,Amount(in rupees),Price (in rupees), location,Carpet Area,Status,Floor,Transaction,Furnishing,facing,overlooking,Society,Bathroom,Balcony,Car Parking,Ownership,Super Area,Dimensions,Plot Area]
- We have used a total of 9 features to train our machine learning model

# DATA LOADING

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JupyterLab Python [conda env:base] \*

```
import matplotlib.pyplot as plt
import seaborn as sns
```

```
[2]: house=pd.read_csv("C://Users//nisha//Downloads//house_prices.csv (1)//house_prices.csv")
house
```

```
[2]:
```

Index	Title	Description	Amount(in rupees)	Price (in rupees)	location	Carpet Area	Status	Floor	Transaction	...	facing	overlooking	Society	Bathroom	Ba
0	1 BHK Ready to Occupy Flat for sale in Srushti...	Bhiwandi, Thane has an attractive 1 BHK Flat f...	42 Lac	6000.0	thane	500 sqft	Ready to Move	10 out of 11	Resale	...	NaN	NaN	Srushti Siddhi Mangal Murti Complex	1	
1	2 BHK Ready to Occupy Flat for	One can find this stunning 2 BHK flat for	98 Lac	13799.0	thane	473 sqft	Ready to Move	3 out of 22	Resale	...	East	Garden/Park	Dosti Vihar	2	

# **DATA CLEANING**

- **The core purpose of data cleaning is to uncover and remove inaccuracies and repeated data points, ensuring the dataset is trustworthy and precise.**
- **This task is commonly performed with the help of the popular Python library, pandas.**
- **At the outset, columns irrelevant to predicting the final price are excluded from the Dataset**
- **Any rows containing missing information in one or more fields are eliminated to preserve data quality.**
- **Columns mixing textual and numerical data are cleaned by converting all values into integers for consistency.**



➤ Checking null values

```
[5]: house.isnull().mean()*100
```

```
[5]: Index      0.000000  
Title        0.000000  
Description  1.612000  
Amount(in rupees)  0.000000  
Price (in rupees)  9.419776  
location     0.000000  
Carpet Area  43.018488  
Status       0.327946  
Floor        3.773776  
Transaction  0.044259  
Furnishing   1.544811  
facing       37.451408  
overlooking  43.425354  
Society      58.485264  
Bathroom     0.441527  
Balcony      26.094352  
Car Parking  55.114621  
Ownership    34.936624
```

➤ Dropping unnecessary columns

```
[8]: house['Title']=house['Title'].str[:5]
```

```
[9]: house['Title']=house['Title'].replace({' Apar':1,'> 10 ':10,' Buil':3,' Stud':11})  
house
```

```
[9]:
```

	Title	Amount(in rupees)	location	Floor	Transaction	Furnishing	facing	Bathroom	Balcony
0	1 BHK	42 Lac	thane	10 out of 11	Resale	Unfurnished	NaN	1	2
1	2 BHK	98 Lac	thane	3 out of 22	Resale	Semi-Furnished	East	2	NaN
2	2 BHK	1.40 Cr	thane	10 out of 29	Resale	Unfurnished	East	2	NaN
3	1 BHK	25 Lac	thane	1 out of 3	Resale	Unfurnished	NaN	1	1
4	2 BHK	1.60 Cr	thane	20 out of 42	Resale	Unfurnished	West	2	NaN
...	...	...	...	...	...	...	...	...	...

➤ Extracting data & replacing

```
[11]: house['BHK'] = house['Title'].str.extract(r'(\d+)', expand=False)  
house['BHK'] = pd.to_numeric(house['BHK'], errors='coerce')  
house
```

```
[11]:
```

	Title	Amount(in rupees)	location	Floor	Transaction	Furnishing	facing	Bathroom	Balcony	BHK
0	1 BHK	42 Lac	thane	10 out of 11	Resale	Unfurnished	NaN	1	2	1.0
1	2 BHK	98 Lac	thane	3 out of 22	Resale	Semi-Furnished	East	2	NaN	2.0
2	2 BHK	1.40 Cr	thane	10 out of 29	Resale	Unfurnished	East	2	NaN	2.0

# **FEATURE ENGINEERING**

- **Feature engineering involves leveraging expert knowledge to derive meaningful attributes from unprocessed data using data mining methods. These crafted features play a crucial role in boosting the effectiveness of machine learning models. In essence, feature engineering can be viewed as a practical application of machine learning principles.**
- **To streamline our dataset, dimensionality reduction techniques are applied to eliminate less significant data points, focusing on those most relevant for predicting house prices.**

# ➤ Filling Null values and converting data types ➤ Code for convert values

```
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[12]: house['Amount(in rupees)'].fillna(house['Amount(in rupees)'].median(),inplace=True)
house['Amount(in rupees)']=pd.to_numeric(house['Amount(in rupees)'],errors='coerce')

##2.Extracting & converting to_numeric Floor
# Extract leading number from the floor string
house['Floor']=house['Floor'].astype(str)
house['Floor'] = house['Floor'].str.extract(r'(\d+)')
house['Floor'] = pd.to_numeric(house['Floor'], errors='coerce')
house['Floor'].fillna(house['Floor'].median(), inplace=True)

3.## filling Null values of Location with mode
house['location'].fillna(house['location'].mode()[0],inplace=True)

4.##Filling Null values of Transaction with mode
house['Transaction'].fillna(house['Transaction'].mode()[0],inplace=True)

##5.Filling Null Values Of Furnishing with mode
house['Furnishing'].fillna(house['Furnishing'].mode()[0],inplace=True)

##7.Filling Null Values of Bathrooms with Mode & Converting this into numeric
house['Bathroom'].fillna(house['Bathroom'].mode()[0],inplace=True)
house['Bathroom']=pd.to_numeric(house['Bathroom'],errors='coerce')

##8.Filling Null Values Of Balcony with Mode
house['Balcony'].fillna(house['Balcony'].mode()[0],inplace=True)
house['Balcony']=pd.to_numeric(house['Balcony'],errors='coerce')

##9.Filling Null Values of BHK with Mode
house['BHK'].fillna(house['BHK'].mode()[0],inplace=True)

house['facing'].fillna(house['facing'].mode()[0],inplace=True)
```

```
[13]: def convert(val):
        val=val.strip()
        if 'Lac' in val:
            return float(val.replace('Lac','').strip())*1e5
        elif 'Cr' in val:
            return float(val.replace('Cr','').strip())*1e7
        else:
            return None

[14]: house['Amount(in rupees)']=house['Amount(in rupees)'].apply(convert)
```

## **DETECTING OUTLIERS & FILLING**

- **Once an outlier is identified, attempt to correct the error if feasible; if not, exclude that data point from the dataset.**
- **Our dataset revealed inconsistencies in the relationships among certain attribute values.**
- **Consequently, such anomalous records are removed to ensure data integrity.**
- **Scatter plots serve as a visual tool to spot additional outliers, which are also eliminated from the dataset.**

## ➤ Checking Outliers & filling

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Code JupyterLab Python [conda env:base] \* 

```
[18]: q1=house['BHK'].quantile(0.25)
      q2=house['BHK'].quantile(0.75)
      iqr=q2-q1
      upper=q2+(1.5)*iqr
      lower=q1-(1.5)*iqr
      upper,lower
```

```
[18]: (4.5, 0.5)
```

```
[19]: mde=house['BHK'].median()
      house['BHK']=house['BHK'].apply(lambda x:mde if x <lower or x >upper else x )
```

```
[20]: house.boxplot(column='Amount(in rupees)')
      plt.show()
```

```
[22]: q1=house['Amount(in rupees)'].quantile(0.25)
      q2=house['Amount(in rupees)'].quantile(0.75)
      iqr=q2-q1
      upper=q2+(1.5)*iqr
      lower=q1-(1.5)*iqr
      upper,lower
```

```
[22]: (28990000.0, -9650000.0)
```

```
[23]: mde=house['Amount(in rupees)'].median()
```

# ➤ Filling Null values and converting datatypes

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JupyterLab🔗⚙️Python [conda env:base] \*🔵☰🔵

[69]:

house['Balcony']=house['Balcony'].fillna(0).astype(int)  
house['Balcony']=house['Balcony'].fillna(house['Balcony'].mean()).round().astype(int)  
house

[69]:

	Amount(in rupees)	location	Floor	Transaction	Furnishing	facing	Bathroom	Balcony	BHK
0	4200000.0	thane	10.0	Resale	Unfurnished	East	1.0	2	1.0
1	9800000.0	thane	3.0	Resale	Semi-Furnished	East	2.0	2	2.0

[71]:

house['Bathroom']=house['Bathroom'].fillna(0).astype(int)  
house['Bathroom']=house['Bathroom'].fillna(house['Bathroom'].mean()).round().astype(int)  
house

[71]:

	Amount(in rupees)	location	Floor	Transaction	Furnishing	facing	Bathroom	Balcony	BHK
0	4200000.0	thane	10.0	Resale	Unfurnished	East	1	2	1.0
1	9800000.0	thane	3.0	Resale	Semi-Furnished	East	2	2	2.0

## ➤ ONE HOT CODING

- **This approach transforms categorical data into numerical format, making it suitable for machine learning models.**
- **In our dataset, the categorical feature we focus on is "location."**
- **We applied one hot encoding to convert each location into a numeric representation.**

## ➤ ONE HOT CODING

```
[41]: x=house[['Floor','location',
            'Transaction', 'Furnishing', 'Bathroom', 'Balcony','BHK']]
      y=house['Amount(in rupees)']

[42]: house['location'].unique()

[42]: array(['thane', 'other', 'mumbai', 'ahmedabad', 'bangalore', 'chennai',
            'gurgaon', 'hyderabad', 'jaipur', 'kolkata', 'new-delhi', 'noida',
            'pune', 'bhiwadi', 'chandigarh', 'faridabad', 'goa',
            'greater-noida', 'kochi', 'mohali', 'ranchi', 'surat', 'vadodara',
            'visakhapatnam', 'zirakpur'], dtype=object)

[102]: x=x['location_encoded'] = house['location'].map(house.groupby('location')['Amount(in rupees)'].mean())
      x
```

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JupyterLab 🔗 ⚙ Python [conda env:base] \* ○ ≡ ☰

```
[108]: cat=x.select_dtypes(exclude='number')
      num=x.select_dtypes(include='number')
```

```
[110]: cat_x=pd.get_dummies(cat)
      cat_x
```

```
[110]:
```

	Transaction_New Property	Transaction_Other	Transaction_Rent/Lease	Transaction_Resale	Furnishing_Furnished	Furnishing_Semi- Furnished	Furnishing_Unfurnished	facing_East	facing_West
0	False	False	False	True	False	False	True	True	False
1	False	False	False	True	False	True	False	True	False



## ➤ MODEL BUILDING

- Modeling involves training a machine learning algorithm to accurately forecast labels based on input features.
- We applied the Linear Regression technique for both training and evaluating our model.
- Our model achieved an accuracy of 100%, reflecting strong predictive performance.

### model training

```
[129]: from sklearn.linear_model import LinearRegression, Ridge, Lasso  
      from sklearn.metrics import mean_squared_error, r2_score
```

```
[131]: model = LinearRegression()  
      model.fit(x_train, y_train)
```

```
[131]: ▼ LinearRegression ⓘ ⓘ  
      LinearRegression()
```

# jupyter House Price Prediction Last Checkpoint: 3 hours ago



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JupyterLab 🔗 ⚙ Python [conda env:base] \* 🔍 ☰

```
[142]: print('Test Mean squared error :',mean_squared_error(y_test,test_pred))
```

```
Test Mean squared error : 2.7900281376731636e-13
```

```
[144]: print('Train Mean squared error :',mean_squared_error(y_train,train_pred))
```

```
Train Mean squared error : 2.805622538822866e-13
```

```
[146]: print('Test R2 error :',r2_score(y_test,test_pred))
```

```
Test R2 error : 1.0
```

```
[148]: print('Train R2 error :',r2_score(y_train,train_pred))
```

```
Train R2 error : 1.0
```

```
[134]: test_pred=model.predict(x_test)
test_pred
```

```
[134]: array([12100000.00000015,  7200000.00000045, 14999999.99999998 , ...,
        5100000.00000002 ,  7799999.99999993,  6400000.00000052])
```

```
[136]: y_test
```

```
[136]: 94353      12100000.0
20969       7200000.0
90081      15000000.0
160714     4420000.0
80704      7800000.0
...
```



## Ridge Model

```
[151]: ridge_model=Ridge(alpha=0.1)
       ridge_model.fit(x_train,y_train)
```

```
C:\Users\nisha\anaconda3\Lib\site-packages\sklearn\linear_model\_ridge.py:216: LinAlgWarning: Ill-conditioned matrix (rcond=1.66969e-20):
result may not be accurate.
    return linalg.solve(A, Xy, assume_a="pos", overwrite_a=True).T
```

```
[151]: Ridge
       Ridge(alpha=0.1)
```

```
[153]: ridge_test=ridge_model.predict(x_test)
       ridge_train=ridge_model.predict(x_train)
```

```
[155]: print('Ridge Model of MSE of train :',mean_squared_error(y_train,ridge_train))
```

```
Ridge Model of MSE of train : 2.114008490639501e-11
```

```
[159]: print('Ridge model of R2 of train :',r2_score(y_train,ridge_train))
```

```
Ridge model of R2 of train : 1.0
```

```
[161]: print('Ridge Model of R2 of test :',r2_score(y_test,ridge_test))
```

```
Ridge Model of R2 of test : 1.0
```

## ▼ Lasso model



```
[ ]: Lasso_model=Lasso(alpha=0.1)
Lasso_model.fit(x_train,y_train)

[ ]: Lasso_test=Lasso_model.predict(x_test)
Lasso_train=Lasso_model.predict(x_train)

[ ]: print('Lasso Model of MSE of train :',mean_squared_error(y_train,Lasso_train))

[ ]: print('Lasso Model of MSE of test:',mean_squared_error(y_test,Lasso_test))
```

Lasso(alpha=0.1)

```
[166]: Lasso_test=Lasso_model.predict(x_test)
Lasso_train=Lasso_model.predict(x_train)

[168]: print('Lasso Model of MSE of train :',mean_squared_error(y_train,Lasso_train))

Lasso Model of MSE of train : 1.3580493466373543e-14

[170]: print('Lasso Model of MSE of test:',mean_squared_error(y_test,Lasso_test))

Lasso Model of MSE of test: 1.3522017256084456e-14

[172]: print('Lasso model of R2 of train :',r2_score(y_train,Lasso_train))

Lasso model of R2 of train : 1.0

[174]: print('Lasso model of R2 of test :',r2_score(y_test,Lasso_test))

Lasso model of R2 of test : 1.0
```

## ➤ OUTPUT

- We created a function to predict the house price.
- Using Linear Regression & Lasso & Ridge Completed Building Prediction .
- When we pass the values into our function, it will predict house price for us.
- Where we got R-Squared value as 100% Accuracy.
- The Mean Squared error also in good .
- In real world it's Rare to come this type of values .
- It's a good fit.

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

```
house=pd.read_csv("C://Users//nisha//Downloads//house_prices.csv
(1)//house_prices.csv")
house
```

	Index	Title \
0	0	1 BHK Ready to Occupy Flat for sale in Srushti...
1	1	2 BHK Ready to Occupy Flat for sale in Dosti V...
2	2	2 BHK Ready to Occupy Flat for sale in Sunrise...
3	3	1 BHK Ready to Occupy Flat for sale Kasheli
4	4	2 BHK Ready to Occupy Flat for sale in TenX Ha...
...	...	...
187526	187526	3 BHK Ready to Occupy Flat for sale in Bollywo...
187527	187527	3 BHK Ready to Occupy Flat for sale in Sushma ...
187528	187528	3 BHK Ready to Occupy Flat for sale in Bollywo...
187529	187529	2 BHK Ready to Occupy Flat for sale in Friends...
187530	187530	3 BHK Ready to Occupy Flat for sale in Affinit...

	Description	Amount(in rupees) \
0	Bhiwandi, Thane has an attractive 1 BHK Flat f...	42 Lac
1	One can find this stunning 2 BHK flat for sale...	98 Lac
2	Up for immediate sale is a 2 BHK apartment in ...	1.40 Cr
3	This beautiful 1 BHK Flat is available for sal...	25 Lac
4	This lovely 2 BHK Flat in Pokhran Road, Thane ...	1.60 Cr
...	...	...
...	...	...
187526	This magnificent 3 BHK Flat is available for s...	63 Lac
187527	Have a look at this immaculate 3 BHK flat for ...	55 Lac
187528	Gazipur, Zirakpur has an appealing 3 BHK flat ...	76 Lac
187529	Up for immediate sale is a 2 BHK apartment in ...	30 Lac
187530	This exquisite 3 BHK Flat is offered for sale ...	1.18 Cr

	Price (in rupees)	location	Carpet Area	Status
Floor \				
0	6000.0	thane	500 sqft	Ready to Move 10 out

of 11						
1	13799.0	thane	473 sqft	Ready to Move	3 out	
of 22						
2	17500.0	thane	779 sqft	Ready to Move	10 out	
of 29						
3	NaN	thane	530 sqft	Ready to Move	1	
out of 3						
4	18824.0	thane	635 sqft	Ready to Move	20 out	
of 42						
...	...	...	...	...	...	
...						
187526	3225.0	zirakpur	NaN	Ready to Move	2	
out of 4						
187527	3274.0	zirakpur	NaN	Ready to Move	4	
out of 6						
187528	4343.0	zirakpur	1250 sqft	Ready to Move	1	
out of 3						
187529	4231.0	zirakpur	NaN	Ready to Move	2	
out of 2						
187530	6162.0	zirakpur	NaN	Ready to Move	5 out	
of 13						

	Transaction	...	facing	overlooking \
0	Resale	...	NaN	NaN
1	Resale	...	East	Garden/Park
2	Resale	...	East	Garden/Park
3	Resale	...	NaN	NaN
4	Resale	...	West	Garden/Park, Main Road
...	...	...	...	...
187526	New Property	...	East	Garden/Park
187527	Resale	...	North - East	Garden/Park, Main Road
187528	Resale	...	East	Garden/Park, Main Road
187529	Resale	...	NaN	Main Road
187530	Resale	...	North - East	Garden/Park, Pool

		Society Bathroom Balcony Car
Parking \		
0	Srushti Siddhi Mangal Murti Complex	1 2
NaN		
1	Dosti Vihar	2 NaN 1
Open		
2	Sunrise by Kalpataru	2 NaN 1
Covered		
3	NaN	1 1
NaN		
4	TenX Habitat Raymond Realty	2 NaN 1
Covered		
...	...	...
..		

187526	Bollywood Esencia	3	3	1
Covered				
187527	Sushma Urban Views	3	NaN	1
Covered				
187528	Bollywood Esencia	3	2	1
Covered,				
187529	Friends Enclave	2	NaN	
NaN				
187530	Affinity Greens	4	4	1
Covered				

	Ownership	Super	Area	Dimensions	Plot	Area
0	NaN		NaN	NaN		NaN
1	Freehold		NaN	NaN		NaN
2	Freehold		NaN	NaN		NaN
3	NaN		NaN	NaN		NaN
4	Co-operative Society		NaN	NaN		NaN
...	...		...	...		...
187526	Freehold	1953	sqft	NaN		NaN
187527	NaN	1680	sqft	NaN		NaN
187528	Freehold		NaN	NaN		NaN
187529	NaN	709	sqft	NaN		NaN
187530	Freehold	1915	sqft	NaN		NaN

[187531 rows x 21 columns]

house.columns

```
Index(['Index', 'Title', 'Description', 'Amount(in rupees)',
      'Price (in rupees)', 'location', 'Carpet Area', 'Status',
      'Floor',
      'Transaction', 'Furnishing', 'facing', 'overlooking',
      'Society',
      'Bathroom', 'Balcony', 'Car Parking', 'Ownership', 'Super
Area',
      'Dimensions', 'Plot Area'],
      dtype='object')
```

house.info()

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 187531 entries, 0 to 187530
Data columns (total 21 columns):
#   Column                                Non-Null Count  Dtype
---  -
0   Index                                187531 non-null  int64
1   Title                                187531 non-null  object
2   Description                           184508 non-null  object
3   Amount(in rupees)                     187531 non-null  object
4   Price (in rupees)                     169866 non-null  float64
```



```

5    location      187531 non-null object
6    Carpet Area   106858 non-null object
7    Status        186916 non-null object
8    Floor         180454 non-null object
9    Transaction    187448 non-null object
10   Furnishing     184634 non-null object
11   facing         117298 non-null object
12   overlooking    106095 non-null object
13   Society        77853 non-null object
14   Bathroom       186703 non-null object
15   Balcony        138596 non-null object
16   Car Parking    84174 non-null object
17   Ownership      122014 non-null object
18   Super Area     79846 non-null object
19   Dimensions     0 non-null float64
20   Plot Area      0 non-null float64

```

```
dtypes: float64(3), int64(1), object(17)
```

```
memory usage: 30.0+ MB
```

```
house.isnull().mean()*100
```

```

Index      0.000000
Title      0.000000
Description 1.612000
Amount(in rupees) 0.000000
Price (in rupees) 9.419776
location   0.000000
Carpet Area 43.018488
Status     0.327946
Floor      3.773776
Transaction 0.044259
Furnishing 1.544811
facing     37.451408
overlooking 43.425354
Society    58.485264
Bathroom   0.441527
Balcony    26.094352
Car Parking 55.114621
Ownership  34.936624
Super Area 57.422506
Dimensions 100.000000
Plot Area  100.000000

```

```
dtype: float64
```

```
house.shape
```

```
(187531, 21)
```

```
## Dropping columns
```

```
house.drop(['Index', 'Price (in
```

```
rupees)','Description','Status','overlooking','Car
Parking','Society','Dimensions','Ownership','Carpet Area','Super
Area','Plot Area'],axis=1,inplace=True)
```

```
house['Title']=house['Title'].str[:5]
```

```
house['Title']=house['Title'].replace({' Apar':1,'> 10 ':10,'
Buil':3,' Stud':11})
```

```
house
```

	Title	Amount(in rupees)	location	Floor	Transaction
\					
0	1 BHK	42 Lac	thane	10 out of 11	Resale
1	2 BHK	98 Lac	thane	3 out of 22	Resale
2	2 BHK	1.40 Cr	thane	10 out of 29	Resale
3	1 BHK	25 Lac	thane	1 out of 3	Resale
4	2 BHK	1.60 Cr	thane	20 out of 42	Resale
...	...	...	...	...	...
187526	3 BHK	63 Lac	zirakpur	2 out of 4	New Property
187527	3 BHK	55 Lac	zirakpur	4 out of 6	Resale
187528	3 BHK	76 Lac	zirakpur	1 out of 3	Resale
187529	2 BHK	30 Lac	zirakpur	2 out of 2	Resale
187530	3 BHK	1.18 Cr	zirakpur	5 out of 13	Resale

	Furnishing	facing	Bathroom	Balcony
0	Unfurnished	NaN	1	2
1	Semi-Furnished	East	2	NaN
2	Unfurnished	East	2	NaN
3	Unfurnished	NaN	1	1
4	Unfurnished	West	2	NaN
...	...	...	...	...
187526	Semi-Furnished	East	3	3
187527	Unfurnished	North - East	3	NaN
187528	Furnished	East	3	2
187529	Semi-Furnished	NaN	2	NaN
187530	Semi-Furnished	North - East	4	4

```
[187531 rows x 9 columns]
```

```
house['Title'].unique()
```

```
array(['1 BHK', '2 BHK', '3 BHK', '4 BHK', '5 BHK', 11, '6 BHK', 1,
      '8 BHK', '7 BHK', 10, '9 BHK', '10 BH', 3], dtype=object)
```

```
house['BHK'] = house['Title'].str.extract(r'(\d+)', expand=False)
house['BHK'] = pd.to_numeric(house['BHK'], errors='coerce')
house
```

	Title	Amount(in rupees)	location	Floor	Transaction
\					
0	1 BHK	42 Lac	thane	10 out of 11	Resale
1	2 BHK	98 Lac	thane	3 out of 22	Resale
2	2 BHK	1.40 Cr	thane	10 out of 29	Resale
3	1 BHK	25 Lac	thane	1 out of 3	Resale
4	2 BHK	1.60 Cr	thane	20 out of 42	Resale
...	...	...	...	...	...
187526	3 BHK	63 Lac	zirakpur	2 out of 4	New Property
187527	3 BHK	55 Lac	zirakpur	4 out of 6	Resale
187528	3 BHK	76 Lac	zirakpur	1 out of 3	Resale
187529	2 BHK	30 Lac	zirakpur	2 out of 2	Resale
187530	3 BHK	1.18 Cr	zirakpur	5 out of 13	Resale

	Furnishing	facing	Bathroom	Balcony	BHK
0	Unfurnished	NaN	1	2	1.0
1	Semi-Furnished	East	2	NaN	2.0
2	Unfurnished	East	2	NaN	2.0
3	Unfurnished	NaN	1	1	1.0
4	Unfurnished	West	2	NaN	2.0
...	...	...	...	...	...
187526	Semi-Furnished	East	3	3	3.0
187527	Unfurnished	North - East	3	NaN	3.0
187528	Furnished	East	3	2	3.0
187529	Semi-Furnished	NaN	2	NaN	2.0
187530	Semi-Furnished	North - East	4	4	3.0

```
[187531 rows x 10 columns]
```

```
house.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 187531 entries, 0 to 187530
```

```
Data columns (total 10 columns):
#      Column      Non-Null Count  Dtype
---  -
0     Title        187531 non-null  object
1     Amount(in rupees) 187531 non-null  object
2     location       187531 non-null  object
3     Floor         180454 non-null  object
4     Transaction    187448 non-null  object
5     Furnishing     184634 non-null  object
6     facing         117298 non-null  object
7     Bathroom      186703 non-null  object
8     Balcony        138596 non-null  object
9     BHK           186578 non-null  float64
```

```
dtypes: float64(1), object(9)
```

```
memory usage: 14.3+ MB
```

```
def convert(val):
    val=val.strip()
    if 'Lac' in val:
        return float(val.replace('Lac','').strip())*1e5
    elif 'Cr' in val:
        return float(val.replace('Cr','').strip())*1e7
    else:
        return None
```

```
house['Amount(in rupees)']=house['Amount(in rupees)'].apply(convert)
```

```
house
```

	Title	Amount(in rupees)	location	Floor	Transaction
0	1 BHK	4200000.0	thane	10 out of 11	Resale
1	2 BHK	9800000.0	thane	3 out of 22	Resale
2	2 BHK	14000000.0	thane	10 out of 29	Resale
3	1 BHK	2500000.0	thane	1 out of 3	Resale
4	2 BHK	16000000.0	thane	20 out of 42	Resale
...	...	...	...	...	...
187526	3 BHK	6300000.0	zirakpur	2 out of 4	New Property
187527	3 BHK	5500000.0	zirakpur	4 out of 6	Resale
187528	3 BHK	7600000.0	zirakpur	1 out of 3	Resale
187529	2 BHK	3000000.0	zirakpur	2 out of 2	Resale

187530 3 BHK 11800000.0 zirakpur 5 out of 13 Resale

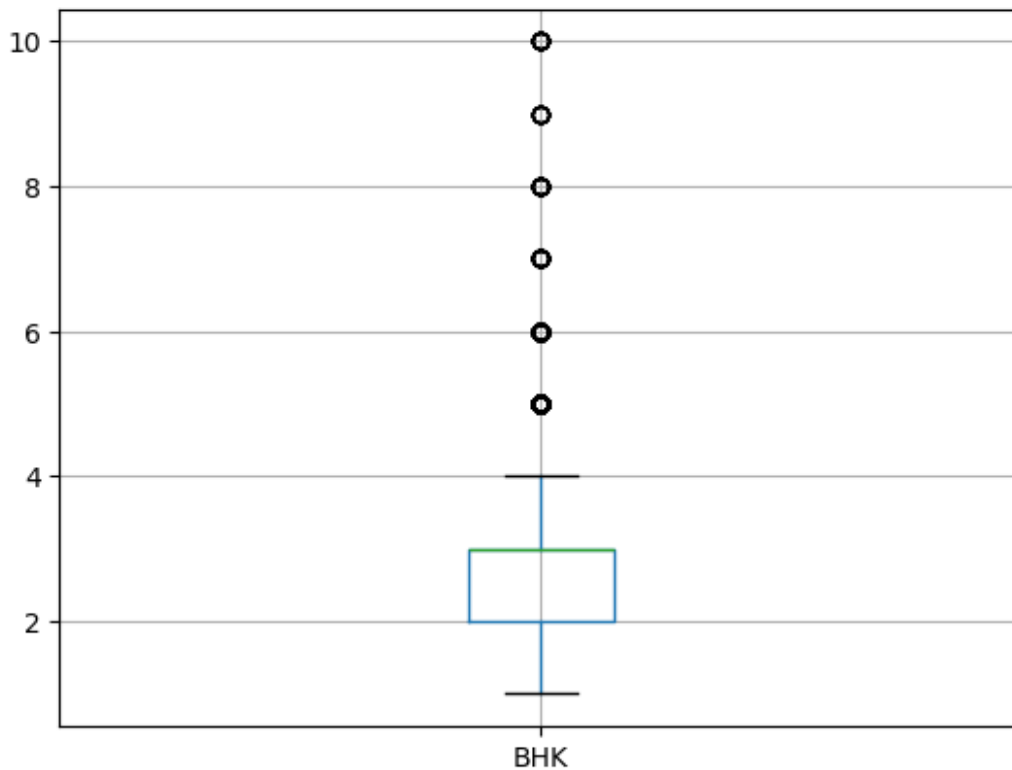
	Furnishing	facing	Bathroom	Balcony	BHK
0	Unfurnished	NaN	1	2	1.0
1	Semi-Furnished	East	2	NaN	2.0
2	Unfurnished	East	2	NaN	2.0
3	Unfurnished	NaN	1	1	1.0
4	Unfurnished	West	2	NaN	2.0
...	...	...	...	...	...
187526	Semi-Furnished	East	3	3	3.0
187527	Unfurnished	North - East	3	NaN	3.0
187528	Furnished	East	3	2	3.0
187529	Semi-Furnished	NaN	2	NaN	2.0
187530	Semi-Furnished	North - East	4	4	3.0

[187531 rows x 10 columns]

```
house['Amount(in rupees)'].nunique()
```

1559

```
house.boxplot(column='BHK')  
plt.show()
```



```

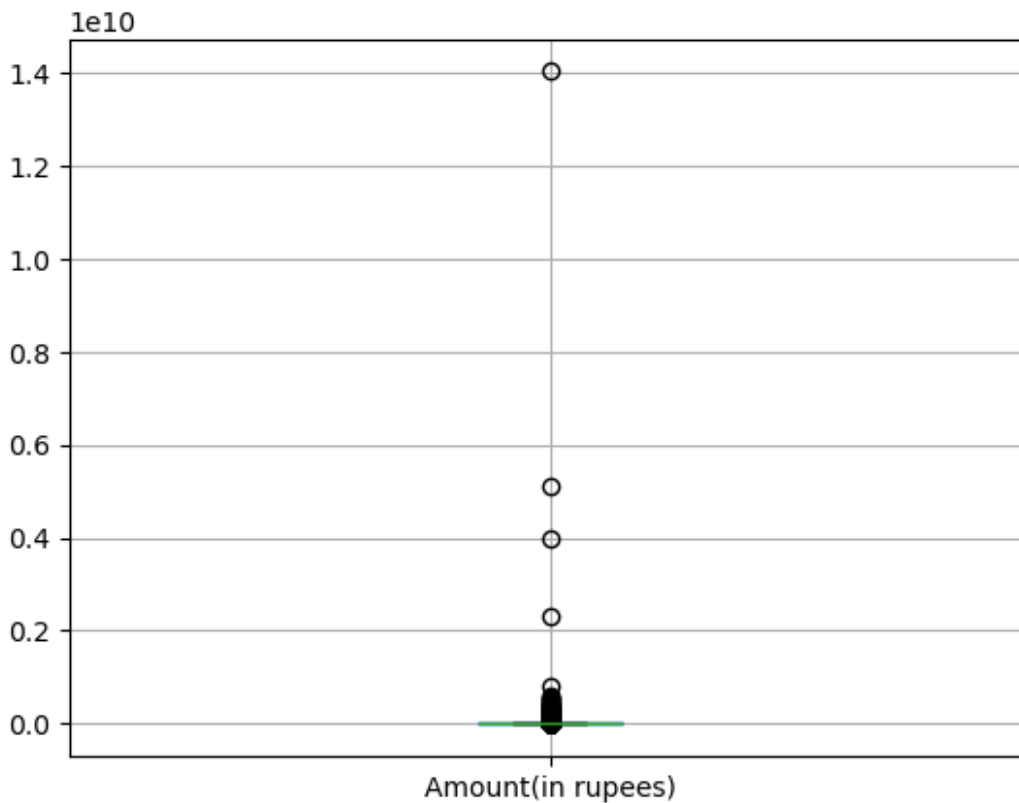
q1=house['BHK'].quantile(0.25)
q2=house['BHK'].quantile(0.75)
iqr=q2-q1
upper=q2+(1.5)*iqr
lower=q1-(1.5)*iqr
upper,lower

(4.5, 0.5)

mde=house['BHK'].median()
house['BHK']=house['BHK'].apply(lambda x:mde if x <lower or x >upper
else x )

house.boxplot(column='Amount(in rupees)')
plt.show()

```



```
house['Amount(in rupees)'].describe()
```

count	1.778470e+05
mean	1.198134e+07
std	3.943827e+07
min	1.000000e+05
25%	4.840000e+06
50%	7.800000e+06
75%	1.450000e+07

```

max      1.400300e+10
Name: Amount(in rupees), dtype: float64

q1=house['Amount(in rupees)'].quantile(0.25)
q2=house['Amount(in rupees)'].quantile(0.75)
iqr=q2-q1
upper=q2+(1.5)*iqr
lower=q1-(1.5)*iqr
upper,lower

(28990000.0, -9650000.0)

mde=house['Amount(in rupees)'].median()
house['Amount(in rupees)']=house['Amount(in rupees)'].apply(lambda
x:mde if x <lower or x >upper else x )

house.info()

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 187531 entries, 0 to 187530
Data columns (total 10 columns):
 #   Column                Non-Null Count  Dtype
---  -
 0   Title                 187531 non-null object
 1   Amount(in rupees)    177847 non-null float64
 2   location              187531 non-null object
 3   Floor                 180454 non-null object
 4   Transaction           187448 non-null object
 5   Furnishing            184634 non-null object
 6   facing                117298 non-null object
 7   Bathroom              186703 non-null object
 8   Balcony               138596 non-null object
 9   BHK                   186578 non-null float64
dtypes: float64(2), object(8)
memory usage: 14.3+ MB

house.isnull().mean()*100

Title                0.000000
Amount(in rupees)    5.163946
location              0.000000
Floor                3.773776
Transaction           0.044259
Furnishing            1.544811
facing               37.451408
Bathroom              0.441527
Balcony               26.094352
BHK                   0.508183
dtype: float64

house.columns

```

```
Index(['Title', 'Amount(in rupees)', 'location', 'Floor',  
      'Transaction',  
      'Furnishing', 'facing', 'Bathroom', 'Balcony', 'BHK'],  
      dtype='object')
```

*1.## converting 'Amount(in rupees)' to numeric & filling Null values with median*

```
house['Amount(in rupees)'].fillna(house['Amount(in  
rupees)'].median(),inplace=True)  
house['Amount(in rupees)']=pd.to_numeric(house['Amount(in  
rupees)'],errors='coerce')
```

*##2.Extracting & converting to\_numeric Floor  
# Extract leading number from the floor string*

```
house['Floor']=house['Floor'].astype(str)  
house['Floor'] = house['Floor'].str.extract(r'(\d+)')  
house['Floor'] = pd.to_numeric(house['Floor'], errors='coerce')  
house['Floor'].fillna(house['Floor'].median(), inplace=True)
```

*3.## filling Null values of Location with mode*

```
house['location'].fillna(house['location'].mode()[0],inplace=True)
```

*4.##Filling Null values of Transaction with mode*

```
house['Transaction'].fillna(house['Transaction'].mode()  
[0],inplace=True)
```

*##5.Filling Null Values Of Furnishing with mode*

```
house['Furnishing'].fillna(house['Furnishing'].mode()[0],inplace=True)
```

*##7.Filling Null Values of Bathrooms with Mode & Converting this into numeric*

```
house['Bathroom'].fillna(house['Bathroom'].mode()[0],inplace=True)  
house['Bathroom']=pd.to_numeric(house['Bathroom'],errors='coerce')
```

*##8.Filling Null Values Of Balcony with Mode*

```
house['Balcony'].fillna(house['Balcony'].mode()[0],inplace=True)  
house['Balcony']=pd.to_numeric(house['Balcony'],errors='coerce')
```

*##9.Filling Null Values of BHK with Mode*

```
house['BHK'].fillna(house['BHK'].mode()[0],inplace=True)
```

```
house['facing'].fillna(house['facing'].mode()[0],inplace=True)
```

C:\Users\nisha\AppData\Local\Temp\ipykernel\_2572\2565815676.py:2:

FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained assignment using an inplace method.

The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are setting values always behaves as a copy.

For example, when doing 'df[col].method(value, inplace=True)', try



using 'df.method({col: value}, inplace=True)' or df[col] = df[col].method(value) instead, to perform the operation inplace on the original object.

```
house['Amount(in rupees)'].fillna(house['Amount(in rupees)'].median(),inplace=True)
```

C:\Users\nisha\AppData\Local\Temp\ipykernel\_2572\2565815676.py:10:  
FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained assignment using an inplace method.  
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are setting values always behaves as a copy.

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[col].method(value) instead, to perform the operation inplace on the original object.

```
house['Floor'].fillna(house['Floor'].median(), inplace=True)
```

C:\Users\nisha\AppData\Local\Temp\ipykernel\_2572\2565815676.py:13:  
FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained assignment using an inplace method.  
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are setting values always behaves as a copy.

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[col].method(value) instead, to perform the operation inplace on the original object.

```
house['location'].fillna(house['location'].mode()[0],inplace=True)
```

C:\Users\nisha\AppData\Local\Temp\ipykernel\_2572\2565815676.py:16:  
FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained assignment using an inplace method.  
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are setting values always behaves as a copy.

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[col].method(value) instead, to perform the operation inplace on the original object.

```
house['Transaction'].fillna(house['Transaction'].mode()[0],inplace=True)
```

```
C:\Users\nisha\AppData\Local\Temp\ipykernel_2572\2565815676.py:19:
FutureWarning: A value is trying to be set on a copy of a DataFrame or
Series through chained assignment using an inplace method.
The behavior will change in pandas 3.0. This inplace method will never
work because the intermediate object on which we are setting values
always behaves as a copy.
```

For example, when doing `'df[col].method(value, inplace=True)'`, try using `'df.method({col: value}, inplace=True)'` or `df[col] = df[col].method(value)` instead, to perform the operation inplace on the original object.

```
house['Furnishing'].fillna(house['Furnishing'].mode()
[0],inplace=True)
```

```
C:\Users\nisha\AppData\Local\Temp\ipykernel_2572\2565815676.py:22:
FutureWarning: A value is trying to be set on a copy of a DataFrame or
Series through chained assignment using an inplace method.
The behavior will change in pandas 3.0. This inplace method will never
work because the intermediate object on which we are setting values
always behaves as a copy.
```

For example, when doing `'df[col].method(value, inplace=True)'`, try using `'df.method({col: value}, inplace=True)'` or `df[col] = df[col].method(value)` instead, to perform the operation inplace on the original object.

```
house['Bathroom'].fillna(house['Bathroom'].mode()[0],inplace=True)
C:\Users\nisha\AppData\Local\Temp\ipykernel_2572\2565815676.py:26:
FutureWarning: A value is trying to be set on a copy of a DataFrame or
Series through chained assignment using an inplace method.
The behavior will change in pandas 3.0. This inplace method will never
work because the intermediate object on which we are setting values
always behaves as a copy.
```

For example, when doing `'df[col].method(value, inplace=True)'`, try using `'df.method({col: value}, inplace=True)'` or `df[col] = df[col].method(value)` instead, to perform the operation inplace on the original object.

```
house['Balcony'].fillna(house['Balcony'].mode()[0],inplace=True)
C:\Users\nisha\AppData\Local\Temp\ipykernel_2572\2565815676.py:30:
FutureWarning: A value is trying to be set on a copy of a DataFrame or
Series through chained assignment using an inplace method.
The behavior will change in pandas 3.0. This inplace method will never
work because the intermediate object on which we are setting values
always behaves as a copy.
```

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[col].method(value) instead, to perform the operation inplace on the original object.

```
house['BHK'].fillna(house['BHK'].mode()[0],inplace=True)
```

C:\Users\nisha\AppData\Local\Temp\ipykernel\_2572\2565815676.py:32:  
FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained assignment using an inplace method.  
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are setting values always behaves as a copy.

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[col].method(value) instead, to perform the operation inplace on the original object.

```
house['facing'].fillna(house['facing'].mode()[0],inplace=True)
```

```
house.drop(['Title'],inplace=True,axis=1)
```

house

	Amount(in rupees)	location	Floor	Transaction	
Furnishing \					
0	4200000.0	thane	10.0	Resale	
Unfurnished					
1	9800000.0	thane	3.0	Resale	Semi-
Furnished					
2	14000000.0	thane	10.0	Resale	
Unfurnished					
3	2500000.0	thane	1.0	Resale	
Unfurnished					
4	16000000.0	thane	20.0	Resale	
Unfurnished					
...	...	...	...	...	.
..					
187526	6300000.0	zirakpur	2.0	New Property	Semi-
Furnished					
187527	5500000.0	zirakpur	4.0	Resale	
Unfurnished					
187528	7600000.0	zirakpur	1.0	Resale	
Furnished					
187529	3000000.0	zirakpur	2.0	Resale	Semi-
Furnished					
187530	11800000.0	zirakpur	5.0	Resale	Semi-
Furnished					

		facing	Bathroom	Balcony	BHK
0		East	1	2	1.0
1		East	2	2	2.0
2		East	2	2	2.0
3		East	1	1	1.0
4		West	2	2	2.0
...		...	...	...	...
187526		East	3	3	3.0
187527	North -	East	3	2	3.0
187528		East	3	2	3.0
187529		East	2	2	2.0
187530	North -	East	4	4	3.0

[187531 rows x 9 columns]

house.duplicated().sum()

129323

house.isnull().mean()\*100

Amount(in rupees)	0.0
location	0.0
Floor	0.0
Transaction	0.0
Furnishing	0.0
facing	0.0
Bathroom	0.0
Balcony	0.0
BHK	0.0

dtype: float64

house['Amount(in rupees)'].describe()

count	1.875310e+05
mean	9.023123e+06
std	5.955705e+06
min	1.000000e+05
25%	5.000000e+06
50%	7.800000e+06
75%	1.140000e+07
max	2.890000e+07

Name: Amount(in rupees), dtype: float64

loc=house['location'].value\_counts()

cl=loc[loc >=1000].index

house['location']=house['location'].map(lambda x:x if x in cl else 'other' )

house

	Amount(in rupees)	location	Floor	Transaction	
Furnishing \					
0	4200000.0	thane	10.0	Resale	
Unfurnished					
1	9800000.0	thane	3.0	Resale	Semi-
Furnished					
2	14000000.0	thane	10.0	Resale	
Unfurnished					
3	2500000.0	thane	1.0	Resale	
Unfurnished					
4	16000000.0	thane	20.0	Resale	
Unfurnished					
...	...	...	...	...	.
..					
187526	6300000.0	zirakpur	2.0	New Property	Semi-
Furnished					
187527	5500000.0	zirakpur	4.0	Resale	
Unfurnished					
187528	7600000.0	zirakpur	1.0	Resale	
Furnished					
187529	3000000.0	zirakpur	2.0	Resale	Semi-
Furnished					
187530	11800000.0	zirakpur	5.0	Resale	Semi-
Furnished					
	facing	Bathroom	Balcony	BHK	
0	East	1	2	1.0	
1	East	2	2	2.0	
2	East	2	2	2.0	
3	East	1	1	1.0	
4	West	2	2	2.0	
...	...	...	...	...	
187526	East	3	3	3.0	
187527	North - East	3	2	3.0	
187528	East	3	2	3.0	
187529	East	2	2	2.0	
187530	North - East	4	4	3.0	

[187531 rows x 9 columns]

```
house['location'].value_counts()
house['location'].nunique()
```

25

```
house['Balcony']=house['Balcony'].fillna(0).astype(int)
house['Balcony']=house['Balcony'].fillna(house['Balcony'].mean()).round().astype(int)
house
```

	Amount(in rupees)	location	Floor	Transaction	
Furnishing \					
0	4200000.0	thane	10.0	Resale	
Unfurnished					
1	9800000.0	thane	3.0	Resale	Semi-
Furnished					
2	14000000.0	thane	10.0	Resale	
Unfurnished					
3	2500000.0	thane	1.0	Resale	
Unfurnished					
4	16000000.0	thane	20.0	Resale	
Unfurnished					
...	...	...	...	...	.
..					
187526	6300000.0	zirakpur	2.0	New Property	Semi-
Furnished					
187527	5500000.0	zirakpur	4.0	Resale	
Unfurnished					
187528	7600000.0	zirakpur	1.0	Resale	
Furnished					
187529	3000000.0	zirakpur	2.0	Resale	Semi-
Furnished					
187530	11800000.0	zirakpur	5.0	Resale	Semi-
Furnished					
	facing	Bathroom	Balcony	BHK	
0	East	1	2	1.0	
1	East	2	2	2.0	
2	East	2	2	2.0	
3	East	1	1	1.0	
4	West	2	2	2.0	
...	...	...	...	...	
187526	East	3	3	3.0	
187527	North - East	3	2	3.0	
187528	East	3	2	3.0	
187529	East	2	2	2.0	
187530	North - East	4	4	3.0	

[187531 rows x 9 columns]

```
house['Bathroom']=house['Bathroom'].fillna(0).astype(int)
house['Bathroom']=house['Bathroom'].fillna(house['Bathroom'].mean()).round().astype(int)
house
```

	Amount(in rupees)	location	Floor	Transaction	
Furnishing \					
0	4200000.0	thane	10.0	Resale	
Unfurnished					
1	9800000.0	thane	3.0	Resale	Semi-

Furnished					
2	14000000.0	thane	10.0	Resale	
Unfurnished					
3	2500000.0	thane	1.0	Resale	
Unfurnished					
4	16000000.0	thane	20.0	Resale	
Unfurnished					
...	...	...	...	...	.
..					
187526	6300000.0	zirakpur	2.0	New Property	Semi-
Furnished					
187527	5500000.0	zirakpur	4.0	Resale	
Unfurnished					
187528	7600000.0	zirakpur	1.0	Resale	
Furnished					
187529	3000000.0	zirakpur	2.0	Resale	Semi-
Furnished					
187530	11800000.0	zirakpur	5.0	Resale	Semi-
Furnished					

	facing	Bathroom	Balcony	BHK
0	East	1	2	1.0
1	East	2	2	2.0
2	East	2	2	2.0
3	East	1	1	1.0
4	West	2	2	2.0
...	...	...	...	...
187526	East	3	3	3.0
187527	North - East	3	2	3.0
187528	East	3	2	3.0
187529	East	2	2	2.0
187530	North - East	4	4	3.0

[187531 rows x 9 columns]

```
house['Balcony'].unique()
```

```
array([2, 1, 3, 4, 0, 6, 5])
```

```
house['Balcony'] = house['Balcony'].map(lambda x: '6' if int(x) > 5
else str(x))
```

```
house['Balcony']=house['Balcony'].astype(int)
```

```
house
```

	Amount(in rupees)	location	Floor	Transaction
Furnishing \				
0	4200000.0	thane	10.0	Resale
Unfurnished				
1	9800000.0	thane	3.0	Resale
Furnished				

2	14000000.0	thane	10.0	Resale
Unfurnished				
3	2500000.0	thane	1.0	Resale
Unfurnished				
4	16000000.0	thane	20.0	Resale
Unfurnished				
...	...	...	...	...
..				
187526	6300000.0	zirakpur	2.0	New Property
Furnished				Semi-
187527	5500000.0	zirakpur	4.0	Resale
Unfurnished				
187528	7600000.0	zirakpur	1.0	Resale
Furnished				
187529	3000000.0	zirakpur	2.0	Resale
Furnished				Semi-
187530	11800000.0	zirakpur	5.0	Resale
Furnished				Semi-

	facing	Bathroom	Balcony	BHK
0	East	1	2	1.0
1	East	2	2	2.0
2	East	2	2	2.0
3	East	1	1	1.0
4	West	2	2	2.0
...	...	...	...	...
187526	East	3	3	3.0
187527 North -	East	3	2	3.0
187528	East	3	2	3.0
187529	East	2	2	2.0
187530 North -	East	4	4	3.0

[187531 rows x 9 columns]

house.isnull().sum()

Amount(in rupees)	0
location	0
Floor	0
Transaction	0
Furnishing	0
facing	0
Bathroom	0
Balcony	0
BHK	0

dtype: int64

```
x=house[['Floor','location',
          'Transaction', 'Furnishing', 'Bathroom', 'Balcony','BHK']]
y=house['Amount(in rupees)']
```



```

house['location'].unique()

array(['thane', 'other', 'mumbai', 'ahmedabad', 'bangalore',
      'chennai',
      'gurgaon', 'hyderabad', 'jaipur', 'kolkata', 'new-delhi',
      'noida',
      'pune', 'bhiwadi', 'chandigarh', 'faridabad', 'goa',
      'greater-noida', 'kochi', 'mohali', 'ranchi', 'surat',
      'vadodara',
      'visakhapatnam', 'zirakpur'], dtype=object)

```

```

x=x['location_encoded'] =
house['location'].map(house.groupby('location')['Amount(in
rupees)'].mean())
x

```

```

-----
-----
RecursionError                                Traceback (most recent call
last)

```

```

File ~\anaconda3\Lib\site-packages\IPython\core\formatters.py:711, in
PlainTextFormatter.__call__(self, obj)

```

```

    704 stream = StringIO()
    705 printer = pretty.RepresentationPrinter(stream, self.verbose,
    706     self.max_width, self.newline,
    707     max_seq_length=self.max_seq_length,
    708     singleton_pprinters=self.singleton_pprinters,
    709     type_pprinters=self.type_pprinters,
    710     deferred_pprinters=self.deferred_pprinters)
--> 711 printer.pretty(obj)
    712 printer.flush()
    713 return stream.getvalue()

```

```

File ~\anaconda3\Lib\site-packages\IPython\lib\pretty.py:419, in
RepresentationPrinter.pretty(self, obj)

```

```

    408         return meth(obj, self, cycle)
    409         if (
    410             cls is not object
    411             # check if cls defines __repr__
    412             (...)
    413             and callable(_safe_getattr(cls,
    414             "__repr__", None))
    415             ):
--> 419         return _repr_pprint(obj, self, cycle)
    421     return _default_pprint(obj, self, cycle)
    422 finally:

```

```

File ~\anaconda3\Lib\site-packages\IPython\lib\pretty.py:787, in
_repr_pprint(obj, p, cycle)

```

```

    785 """A pprint that just redirects to the normal repr

```

```

function."""
    786 # Find newlines and replace them with p.break_()
--> 787 output = repr(obj)
    788 lines = output.splitlines()
    789 with p.group():

```

```

File ~\anaconda3\Lib\site-packages\pandas\core\series.py:1784, in
Series.__repr__(self)
    1782 # pylint: disable=invalid-repr-returned
    1783 repr_params = fmt.get_series_repr_params()
-> 1784 return self.to_string(**repr_params)

```

```

File ~\anaconda3\Lib\site-packages\pandas\core\series.py:1883, in
Series.to_string(self, buf, na_rep, float_format, header, index,
length, dtype, name, max_rows, min_rows)
    1831 """
    1832 Render a string representation of the Series.
    1833
    (...)
    1869 '0      1\\n1      2\\n2      3'
    1870 """
    1871 formatter = fmt.SeriesFormatter(
    1872     self,
    1873     name=name,
    (...)
    1881     max_rows=max_rows,
    1882 )
-> 1883 result = formatter.to_string()
    1885 # catch contract violations
    1886 if not isinstance(result, str):

```

```

File ~\anaconda3\Lib\site-packages\pandas\io\formats\format.py:320, in
SeriesFormatter.to_string(self)
    318 else:
    319     fmt_index = index._format_flat(include_name=True)
--> 320 fmt_values = self._get_formatted_values()
    322 if self.is_truncated_vertically:
    323     n_header_rows = 0

```

```

File ~\anaconda3\Lib\site-packages\pandas\io\formats\format.py:297, in
SeriesFormatter._get_formatted_values(self)
    296 def _get_formatted_values(self) -> list[str]:
--> 297     return format_array(
    298         self.tr_series._values,
    299         None,
    300         float_format=self.float_format,
    301         na_rep=self.na_rep,
    302         leading_space=self.index,
    303     )

```

```
File ~\anaconda3\Lib\site-packages\pandas\io\formats\format.py:1161,
in format_array(values, formatter, float_format, na_rep, digits,
space, justify, decimal, leading_space, quoting, fallback_formatter)
```

```
    1145     digits = get_option("display.precision")
    1147     fmt_obj = fmt_klass(
    1148         values,
    1149         digits=digits,
    1150         (...)
    1151         fallback_formatter=fallback_formatter,
    1152     )
-> 1161     return fmt_obj.get_result()
```

```
File ~\anaconda3\Lib\site-packages\pandas\io\formats\format.py:1194,
in _GenericArrayFormatter.get_result(self)
```

```
    1193     def get_result(self) -> list[str]:
-> 1194         fmt_values = self._format_strings()
    1195         return _make_fixed_width(fmt_values, self.justify)
```

```
File ~\anaconda3\Lib\site-packages\pandas\io\formats\format.py:1259,
in _GenericArrayFormatter._format_strings(self)
```

```
    1257     for i, v in enumerate(vals):
    1258         if (not is_float_type[i] or self.formatter is not None)
and leading_space:
-> 1259             fmt_values.append(f" {_format(v)}")
    1260         elif is_float_type[i]:
    1261             fmt_values.append(float_format(v))
```

```
File ~\anaconda3\Lib\site-packages\pandas\io\formats\format.py:1234,
in _GenericArrayFormatter._format_strings.<locals>._format(x)
```

```
    1232         return self.na_rep
    1233     elif isinstance(x, PandasObject):
-> 1234         return str(x)
    1235     elif isinstance(x, StringDtype):
    1236         return repr(x)
```

```
File ~\anaconda3\Lib\site-packages\pandas\core\series.py:1784, in
Series.__repr__(self)
```

```
    1782     # pylint: disable=invalid-repr-returned
    1783     repr_params = fmt.get_series_repr_params()
-> 1784     return self.to_string(**repr_params)
```

```
File ~\anaconda3\Lib\site-packages\pandas\core\series.py:1883, in
Series.to_string(self, buf, na_rep, float_format, header, index,
length, dtype, name, max_rows, min_rows)
```

```
    1831     """
    1832     Render a string representation of the Series.
    1833
    1834     (...)
    1869     '0      1\\n1      2\\n2      3'
    1870     """
```

```

1871 formatter = fmt.SeriesFormatter(
1872     self,
1873     name=name,
1874     ...)
1881     max_rows=max_rows,
1882 )
-> 1883 result = formatter.to_string()
1885 # catch contract violations
1886 if not isinstance(result, str):

```

File ~\anaconda3\Lib\site-packages\pandas\io\formats\format.py:320, in SeriesFormatter.to\_string(self)

```

318 else:
319     fmt_index = index._format_flat(include_name=True)
-> 320 fmt_values = self._get_formatted_values()
322 if self.is_truncated_vertically:
323     n_header_rows = 0

```

File ~\anaconda3\Lib\site-packages\pandas\io\formats\format.py:297, in SeriesFormatter.\_get\_formatted\_values(self)

```

296 def _get_formatted_values(self) -> list[str]:
-> 297     return format_array(
298         self.tr_series._values,
299         None,
300         float_format=self.float_format,
301         na_rep=self.na_rep,
302         leading_space=self.index,
303     )

```

File ~\anaconda3\Lib\site-packages\pandas\io\formats\format.py:1161, in format\_array(values, formatter, float\_format, na\_rep, digits, space, justify, decimal, leading\_space, quoting, fallback\_formatter)

```

1145     digits = get_option("display.precision")
1147 fmt_obj = fmt_klass(
1148     values,
1149     digits=digits,
1150     ...)
1158     fallback_formatter=fallback_formatter,
1159 )
-> 1161 return fmt_obj.get_result()

```

File ~\anaconda3\Lib\site-packages\pandas\io\formats\format.py:1194, in \_GenericArrayFormatter.get\_result(self)

```

1193 def get_result(self) -> list[str]:
-> 1194     fmt_values = self._format_strings()
1195     return _make_fixed_width(fmt_values, self.justify)

```

File ~\anaconda3\Lib\site-packages\pandas\io\formats\format.py:1259, in \_GenericArrayFormatter.\_format\_strings(self)

```

1257 for i, v in enumerate(vals):

```

```

1258     if (not is_float_type[i] or self.formatter is not None)
and leading_space:
-> 1259         fmt_values.append(f" {_format(v)}")
1260     elif is_float_type[i]:
1261         fmt_values.append(float_format(v))

```

File ~\anaconda3\Lib\site-packages\pandas\io\formats\format.py:1234, in \_GenericArrayFormatter.\_format\_strings.<locals>.\_format(x)

```

1232     return self.na_rep
1233 elif isinstance(x, PandasObject):
-> 1234     return str(x)
1235 elif isinstance(x, StringDtype):
1236     return repr(x)

```

[... skipping similar frames: Series.\_\_repr\_\_ at line 1784 (368 times), \_GenericArrayFormatter.\_format\_strings.<locals>.\_format at line 1234 (367 times), \_GenericArrayFormatter.\_format\_strings at line 1259 (367 times), SeriesFormatter.\_get\_formatted\_values at line 297 (367 times), format\_array at line 1161 (367 times), \_GenericArrayFormatter.get\_result at line 1194 (367 times), Series.to\_string at line 1883 (367 times), SeriesFormatter.to\_string at line 320 (367 times)]

File ~\anaconda3\Lib\site-packages\pandas\core\series.py:1883, in Series.to\_string(self, buf, na\_rep, float\_format, header, index, length, dtype, name, max\_rows, min\_rows)

```

1831 """
1832 Render a string representation of the Series.
1833
1834 (...)
1869 '0      1\\n1      2\\n2      3'
1870 """
1871 formatter = fmt.SeriesFormatter(
1872     self,
1873     name=name,
1874     (...)
1881     max_rows=max_rows,
1882 )
-> 1883 result = formatter.to_string()
1885 # catch contract violations
1886 if not isinstance(result, str):

```

File ~\anaconda3\Lib\site-packages\pandas\io\formats\format.py:320, in SeriesFormatter.to\_string(self)

```

318 else:
319     fmt_index = index._format_flat(include_name=True)
--> 320 fmt_values = self._get_formatted_values()
322 if self.is_truncated_vertically:
323     n_header_rows = 0

```

File ~\anaconda3\Lib\site-packages\pandas\io\formats\format.py:297, in SeriesFormatter.\_get\_formatted\_values(self)

```
296 def _get_formatted_values(self) -> list[str]:
--> 297     return format_array(
298         self.tr_series._values,
299         None,
300         float_format=self.float_format,
301         na_rep=self.na_rep,
302         leading_space=self.index,
303     )
```

File ~\anaconda3\Lib\site-packages\pandas\io\formats\format.py:1161, in format\_array(values, formatter, float\_format, na\_rep, digits, space, justify, decimal, leading\_space, quoting, fallback\_formatter)

```
1145     digits = get_option("display.precision")
1147     fmt_obj = fmt_klass(
1148         values,
1149         digits=digits,
1150         (...)
1158         fallback_formatter=fallback_formatter,
1159     )
-> 1161 return fmt_obj.get_result()
```

File ~\anaconda3\Lib\site-packages\pandas\io\formats\format.py:1194, in \_GenericArrayFormatter.get\_result(self)

```
1193 def get_result(self) -> list[str]:
-> 1194     fmt_values = self._format_strings()
1195     return _make_fixed_width(fmt_values, self.justify)
```

File ~\anaconda3\Lib\site-packages\pandas\io\formats\format.py:1259, in \_GenericArrayFormatter.\_format\_strings(self)

```
1257 for i, v in enumerate(vals):
1258     if (not is_float_type[i] or self.formatter is not None)
and leading_space:
-> 1259     fmt_values.append(f" {_format(v)}")
1260     elif is_float_type[i]:
1261         fmt_values.append(float_format(v))
```

File ~\anaconda3\Lib\site-packages\pandas\io\formats\format.py:1234, in \_GenericArrayFormatter.\_format\_strings.<locals>.\_format(x)

```
1232     return self.na_rep
1233 elif isinstance(x, PandasObject):
-> 1234     return str(x)
1235 elif isinstance(x, StringDtype):
1236     return repr(x)
```

File ~\anaconda3\Lib\site-packages\pandas\core\series.py:1784, in Series.\_\_repr\_\_(self)

```
1782 # pylint: disable=invalid-repr-returned
1783 repr_params = fmt.get_series_repr_params()
```

```
-> 1784 return self.to_string(**repr_params)
```

File ~\anaconda3\Lib\site-packages\pandas\core\series.py:1871, in Series.to\_string(self, buf, na\_rep, float\_format, header, index, length, dtype, name, max\_rows, min\_rows)

```
1818 def to_string(
1819     self,
1820     buf: FilePath | WriteBuffer[str] | None = None,
1821     (...)
1829     min_rows: int | None = None,
1830 ) -> str | None:
1831     """
1832     Render a string representation of the Series.
1833     (...)
1869     '0    1\\n1    2\\n2    3'
1870     """
-> 1871     formatter = fmt.SeriesFormatter(
1872         self,
1873         name=name,
1874         length=length,
1875         header=header,
1876         index=index,
1877         dtype=dtype,
1878         na_rep=na_rep,
1879         float_format=float_format,
1880         min_rows=min_rows,
1881         max_rows=max_rows,
1882     )
1883     result = formatter.to_string()
1885     # catch contract violations
```

File ~\anaconda3\Lib\site-packages\pandas\io\formats\format.py:223, in SeriesFormatter.\_\_init\_\_(self, series, length, header, index, na\_rep, name, float\_format, dtype, max\_rows, min\_rows)

```
221 self.float_format = float_format
222 self.dtype = dtype
--> 223 self.adj = printing.get_adjustment()
225 self._chk_truncate()
```

File ~\anaconda3\Lib\site-packages\pandas\io\formats\printing.py:572, in get\_adjustment()

```
570     return _EastAsianTextAdjustment()
571 else:
--> 572     return _TextAdjustment()
```

File ~\anaconda3\Lib\site-packages\pandas\io\formats\printing.py:508, in \_TextAdjustment.\_\_init\_\_(self)

```
507 def __init__(self) -> None:
--> 508     self.encoding = get_option("display.encoding")
```

```
File ~\anaconda3\Lib\site-packages\pandas\_config\config.py:274, in
CallableDynamicDoc.__call__(self, *args, **kwargs)
    273 def __call__(self, *args, **kwargs) -> T:
--> 274     return self.__func__(*args, **kwargs)
```

```
File ~\anaconda3\Lib\site-packages\pandas\_config\config.py:146, in
_get_option(pat, silent)
    145 def _get_option(pat: str, silent: bool = False) -> Any:
--> 146     key = _get_single_key(pat, silent)
    148     # walk the nested dict
    149     root, k = _get_root(key)
```

```
File ~\anaconda3\Lib\site-packages\pandas\_config\config.py:138, in
_get_single_key(pat, silent)
    135 key = keys[0]
    137 if not silent:
--> 138     _warn_if_deprecated(key)
    140 key = _translate_key(key)
    142 return key
```

```
File ~\anaconda3\Lib\site-packages\pandas\_config\config.py:696, in
_warn_if_deprecated(key)
    688 def _warn_if_deprecated(key: str) -> bool:
    689     """
    690     Checks if `key` is a deprecated option and if so, prints a
warning.
    691
    (...)
    694     bool - True if `key` is deprecated, False otherwise.
    695     """
--> 696     d = _get_deprecated_option(key)
    697     if d:
    698         if d.msg:
```

RecursionError: maximum recursion depth exceeded

```
x=house.drop('location',axis=1,inplace=False)
x
```

	Amount(in rupees)	Floor	Transaction	Furnishing
facing \				
0	4200000.0	10.0	Resale	Unfurnished
East				
1	9800000.0	3.0	Resale	Semi-Furnished
East				
2	14000000.0	10.0	Resale	Unfurnished
East				
3	2500000.0	1.0	Resale	Unfurnished
East				



4	16000000.0	20.0	Resale	Unfurnished	
West					
...	...	...	...	...	...
...					
187526	6300000.0	2.0	New Property	Semi-Furnished	
East					
187527	5500000.0	4.0	Resale	Unfurnished	North
- East					
187528	7600000.0	1.0	Resale	Furnished	
East					
187529	3000000.0	2.0	Resale	Semi-Furnished	
East					
187530	11800000.0	5.0	Resale	Semi-Furnished	North
- East					

	Bathroom	Balcony	BHK
0	1	2	1.0
1	2	2	2.0
2	2	2	2.0
3	1	1	1.0
4	2	2	2.0
...	...	...	...
187526	3	3	3.0
187527	3	2	3.0
187528	3	2	3.0
187529	2	2	2.0
187530	4	4	3.0

[187531 rows x 8 columns]

```
house['location']=x['location']
```

```
-----
-----
KeyError                                Traceback (most recent call
last)
```

```
File ~\anaconda3\Lib\site-packages\pandas\core\indexes\base.py:3805,
in Index.get_loc(self, key)
```

```
3804 try:
```

```
-> 3805     return self._engine.get_loc(casted_key)
```

```
3806 except KeyError as err:
```

```
File index.pyx:167, in pandas._libs.index.IndexEngine.get_loc()
```

```
File index.pyx:196, in pandas._libs.index.IndexEngine.get_loc()
```

```
File pandas\_libs\hashtable_class_helper.pxi:7081, in
pandas._libs.hashtable.PyObjectHashTable.get_item()
```

```
File pandas\_libs\hashtable_class_helper.pxi:7089, in
```

```
pandas._libs.hashtable.PyObjectHashTable.get_item()
```

```
KeyError: 'location'
```

The above exception was the direct cause of the following exception:

```
KeyError                                Traceback (most recent call  
last)
```

```
Cell In[104], line 1
```

```
----> 1 house['location']=x['location']
```

```
File ~\anaconda3\Lib\site-packages\pandas\core\series.py:1121, in
```

```
Series.__getitem__(self, key)
```

```
    1118     return self._values[key]
```

```
    1120 elif key_is_scalar:
```

```
-> 1121     return self._get_value(key)
```

```
    1123 # Convert generator to list before going through hashable part
```

```
    1124 # (We will iterate through the generator there to check for  
slices)
```

```
    1125 if is_iterator(key):
```

```
File ~\anaconda3\Lib\site-packages\pandas\core\series.py:1237, in
```

```
Series._get_value(self, label, takeable)
```

```
    1234     return self._values[label]
```

```
    1236 # Similar to Index.get_value, but we do not fall back to  
positional
```

```
-> 1237 loc = self.index.get_loc(label)
```

```
    1239 if is_integer(loc):
```

```
    1240     return self._values[loc]
```

```
File ~\anaconda3\Lib\site-packages\pandas\core\indexes\base.py:3812,  
in Index.get_loc(self, key)
```

```
    3807     if isinstance(casted_key, slice) or (
```

```
    3808         isinstance(casted_key, abc.Iterable)
```

```
    3809         and any(isinstance(x, slice) for x in casted_key)
```

```
    3810     ):
```

```
    3811         raise InvalidIndexError(key)
```

```
-> 3812     raise KeyError(key) from err
```

```
    3813 except TypeError:
```

```
    3814     # If we have a listlike key, _check_indexing_error will  
raise
```

```
    3815     # InvalidIndexError. Otherwise we fall through and re-  
raise
```

```
    3816     # the TypeError.
```

```
    3817     self._check_indexing_error(key)
```

```
KeyError: 'location'
```

```
cat=x.select_dtypes(exclude='number')
num=x.select_dtypes(include='number')
```

```
cat_x=pd.get_dummies(cat)
cat_x
```

	Transaction_New Property	Transaction_Other
Transaction_Rent/Lease \		
0	False	False
False		
1	False	False
False		
2	False	False
False		
3	False	False
False		
4	False	False
False		
...	...	...
...		
187526	True	False
False		
187527	False	False
False		
187528	False	False
False		
187529	False	False
False		
187530	False	False
False		

	Transaction_Resale	Furnishing_Furnished	Furnishing_Semi-
Furnished \			
0	True	False	
False			
1	True	False	
True			
2	True	False	
False			
3	True	False	
False			
4	True	False	
False			
...	...	...	
...			
187526	False	False	
True			
187527	True	False	
False			
187528	True	True	

False		
187529	True	False
True		
187530	True	False
True		

	Furnishing_Unfurnished	facing_East	facing_North	\
0	True	True	False	
1	False	True	False	
2	True	True	False	
3	True	True	False	
4	True	False	False	
...	...	...	...	
187526	False	True	False	
187527	True	False	False	
187528	False	True	False	
187529	False	True	False	
187530	False	False	False	

	facing_North - East	facing_North - West	facing_South	\
0	False	False	False	
1	False	False	False	
2	False	False	False	
3	False	False	False	
4	False	False	False	
...	...	...	...	
187526	False	False	False	
187527	True	False	False	
187528	False	False	False	
187529	False	False	False	
187530	True	False	False	

	facing_South - East	facing_South -West	facing_West
0	False	False	False
1	False	False	False
2	False	False	False
3	False	False	False
4	False	False	True
...	...	...	...
187526	False	False	False
187527	False	False	False
187528	False	False	False
187529	False	False	False
187530	False	False	False

[187531 rows x 15 columns]

cat\_x

Transaction_New Transaction_Rent/Lease	Property \	Transaction_Other
0	False	False
False		
1	False	False
False		
2	False	False
False		
3	False	False
False		
4	False	False
False		
...	...	...
...		
187526	True	False
False		
187527	False	False
False		
187528	False	False
False		
187529	False	False
False		
187530	False	False
False		

Transaction_Resale Furnished	Furnishing_Furnished \	Furnishing_Semi-
0	True	False
False		
1	True	False
True		
2	True	False
False		
3	True	False
False		
4	True	False
False		
...	...	...
...		
187526	False	False
True		
187527	True	False
False		
187528	True	True
False		
187529	True	False
True		
187530	True	False
True		

	Furnishing_Unfurnished	facing_East	facing_North	\
0	True	True	False	
1	False	True	False	
2	True	True	False	
3	True	True	False	
4	True	False	False	
...	...	...	...	
187526	False	True	False	
187527	True	False	False	
187528	False	True	False	
187529	False	True	False	
187530	False	False	False	

	facing_North - East	facing_North - West	facing_South	\
0	False	False	False	
1	False	False	False	
2	False	False	False	
3	False	False	False	
4	False	False	False	
...	...	...	...	
187526	False	False	False	
187527	True	False	False	
187528	False	False	False	
187529	False	False	False	
187530	True	False	False	

	facing_South - East	facing_South - West	facing_West
0	False	False	False
1	False	False	False
2	False	False	False
3	False	False	False
4	False	False	True
...	...	...	...
187526	False	False	False
187527	False	False	False
187528	False	False	False
187529	False	False	False
187530	False	False	False

[187531 rows x 15 columns]

cat\_x.describe()

	Transaction_New Property	Transaction_Other
Transaction_Rent/Lease \		
count	187531	187531
unique	2	2

top	False	False
False		
freq	144966	186822
187529		

	Transaction_Resale	Furnishing_Furnished	Furnishing_Semi-
Furnished \			
count	187531	187531	
187531			
unique	2	2	
2			
top	True	False	
False			
freq	144255	167369	
96316			

	Furnishing_Unfurnished	facing_East	facing_North	facing_North -
East \				
count	187531	187531	187531	
187531				
unique	2	2	2	
2				
top	False	True	False	
False				
freq	111377	124974	170998	
163311				

	facing_North - West	facing_South	facing_South - East	\
count	187531	187531	187531	
unique	2	2	2	
top	False	False	False	
freq	183688	182837	184909	

	facing_South -West	facing_West
count	187531	187531
unique	2	2
top	False	False
freq	185460	178957

```
x=pd.concat([cat_x,num],axis=1)
x
```

	Transaction_New	Property	Transaction_Other
Transaction_Rent/Lease \			
0	False	False	False
False			
1	False	False	False
False			
2	False	False	False
False			

3	False	False
False		
4	False	False
False		
...	...	...
...		
187526	True	False
False		
187527	False	False
False		
187528	False	False
False		
187529	False	False
False		
187530	False	False
False		

	Transaction_Resale	Furnishing_Furnished	Furnishing_Semi-
Furnished \			
0	True	False	
False			
1	True	False	
True			
2	True	False	
False			
3	True	False	
False			
4	True	False	
False			
...	...	...	
...			
187526	False	False	
True			
187527	True	False	
False			
187528	True	True	
False			
187529	True	False	
True			
187530	True	False	
True			

	Furnishing_Unfurnished	facing_East	facing_North \
0	True	True	False
1	False	True	False
2	True	True	False
3	True	True	False
4	True	False	False
...	...	...	...



187526	False	True	False
187527	True	False	False
187528	False	True	False
187529	False	True	False
187530	False	False	False

	facing_North - East	facing_North - West	facing_South \
0	False	False	False
1	False	False	False
2	False	False	False
3	False	False	False
4	False	False	False
...	...	...	...
187526	False	False	False
187527	True	False	False
187528	False	False	False
187529	False	False	False
187530	True	False	False

	facing_South - East	facing_South -West	facing_West \
0	False	False	False
1	False	False	False
2	False	False	False
3	False	False	False
4	False	False	True
...	...	...	...
187526	False	False	False
187527	False	False	False
187528	False	False	False
187529	False	False	False
187530	False	False	False

	Amount(in rupees)	Floor	Bathroom	Balcony	BHK
0	4200000.0	10.0	1	2	1.0
1	9800000.0	3.0	2	2	2.0
2	14000000.0	10.0	2	2	2.0
3	2500000.0	1.0	1	1	1.0
4	16000000.0	20.0	2	2	2.0
...	...	...	...	...	...
187526	6300000.0	2.0	3	3	3.0
187527	5500000.0	4.0	3	2	3.0
187528	7600000.0	1.0	3	2	3.0
187529	3000000.0	2.0	2	2	2.0
187530	11800000.0	5.0	4	4	3.0

[187531 rows x 20 columns]

```

from sklearn.model_selection import train_test_split

x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.1,random_state=7)

y_train
9680      5100000.0
169371    15500000.0
54600     12500000.0
105030     2500000.0
101109     3100000.0
...
66455     3500000.0
53459     8500000.0
10742     5000000.0
49689     6900000.0
61615     7800000.0
Name: Amount(in rupees), Length: 168777, dtype: float64

print(x_train.shape,x_test.shape,y_train.shape,y_test.shape)

(168777, 20) (18754, 20) (168777,) (18754,)

```

## model training

```

from sklearn.linear_model import LinearRegression,Ridge,Lasso
from sklearn.metrics import mean_squared_error,r2_score

model=LinearRegression()
model.fit(x_train,y_train)

LinearRegression()

```

## model testing

```

test_pred=model.predict(x_test)
test_pred

array([12100000.00000015,  7200000.00000045, 14999999.9999998 , ...,
        5100000.00000002 ,  7799999.99999993,  6400000.00000052])

y_test
94353     12100000.0
20969      7200000.0
90081     15000000.0
160714     4420000.0
80704      7800000.0
...
33483      7800000.0

```

```

3148      6500000.0
87503     5100000.0
20526     7800000.0
25629     6400000.0
Name: Amount(in rupees), Length: 18754, dtype: float64

train_pred=model.predict(x_train)
train_pred

array([ 5100000.00000017, 15499999.99999926, 12499999.99999952, ...,
        5000000.00000002,  6900000.00000039,  7800000.00000006 ])

(y_train)

9680      5100000.0
169371    15500000.0
54600     12500000.0
105030     2500000.0
101109     3100000.0
...
66455     3500000.0
53459     8500000.0
10742     5000000.0
49689     6900000.0
61615     7800000.0
Name: Amount(in rupees), Length: 168777, dtype: float64

print('Test Mean squared
error : ',mean_squared_error(y_test,test_pred))

Test Mean squared error : 2.7900281376731636e-13

print('Train Mean squared
error : ',mean_squared_error(y_train,train_pred))

Train Mean squared error : 2.805622538822866e-13

print('Test R2 error : ',r2_score(y_test,test_pred))

Test R2 error : 1.0

print('Train R2 error : ',r2_score(y_train,train_pred))

Train R2 error : 1.0

```

## Ridge Model

```

ridge_model=Ridge(alpha=0.1)
ridge_model.fit(x_train,y_train)

C:\Users\nisha\anaconda3\Lib\site-packages\sklearn\linear_model\
_ridge.py:216: LinAlgWarning: Ill-conditioned matrix (rcond=1.66969e-

```

```

20): result may not be accurate.
    return linalg.solve(A, Xy, assume_a="pos", overwrite_a=True).T

Ridge(alpha=0.1)

ridge_test=ridge_model.predict(x_test)
ridge_train=ridge_model.predict(x_train)

print('Ridge Model of MSE of
train :',mean_squared_error(y_train,ridge_train))

Ridge Model of MSE of train : 2.114008490639501e-11

print('Ridge Model of MSE of
test :',mean_squared_error(y_test,ridge_test))

Ridge Model of MSE of test : 1.4487198345135523e-11

print('Ridge model of R2 of train :',r2_score(y_train,ridge_train))

Ridge model of R2 of train : 1.0

print('Ridge Model of R2 of test :',r2_score(y_test,ridge_test))

Ridge Model of R2 of test : 1.0

```

## Lasso model

```

Lasso_model=Lasso(alpha=0.1)
Lasso_model.fit(x_train,y_train)

Lasso(alpha=0.1)

Lasso_test=Lasso_model.predict(x_test)
Lasso_train=Lasso_model.predict(x_train)

print('Lasso Model of MSE of
train :',mean_squared_error(y_train,Lasso_train))

Lasso Model of MSE of train : 1.3580493466373543e-14

print('Lasso Model of MSE of
test:',mean_squared_error(y_test,Lasso_test))

Lasso Model of MSE of test: 1.3522017256084456e-14

print('Lasso model of R2 of train :',r2_score(y_train,Lasso_train))

Lasso model of R2 of train : 1.0

print('Lasso model of R2 of test :',r2_score(y_test,Lasso_test))

Lasso model of R2 of test : 1.0

```

```
from sklearn.preprocessing import StandardScaler
scaler = StandardScaler()
x_scaled = scaler.fit_transform(x)
x_scaled

from sklearn.linear_model import Lasso
from sklearn.model_selection import GridSearchCV

alphas = [0.0001, 0.001, 0.01, 0.1, 1, 10]
grid = GridSearchCV(Lasso(), param_grid={'alpha': alphas}, cv=5)
grid.fit(x_train, y_train)

print("Best alpha:", grid.best_params_)
print("Train R²:", grid.score(x_train, y_train))
print("Test R²:", grid.score(x_test, y_test))
```