أكاديمية سدايا
SDAIA Academy

Project report : linear regression model

Predict apartment rental prices

By

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- ## Problem

  Apartment owners face difficulty in determining the right price for rent, with price competition between apartment owners, apartment owners need a way to help them determine the right price for the consumer, based on the specific characteristics of each property

- ## Solution

  In this project, we will develop a linear regression model to predict apartment rent prices according to their characteristics. Which will help the owners to determine the best price

- ## Tools

  Pandas

  Sklearn

  beautifulsoup

- ## Data Source

  We have used Web Scrapping to collect our data and the source was Aqar site and Wekipedia

- ## Data columns

Columns	Type
DISTRICT	**String**
PRICE	**Integer**
BED	**Integer**
BATH	**Integer**
LIVING	**Integer**
AGE	**Integer**
IMAGES	**Integer**
FLOOR	**String**
TARGET	**String**
FURNISHED	**String**
KITCHEN	**String**
ANNEXE	**String**
PARKING	**String**
ELEVATOR	**String**
AC	**String**

- ## Data cleaning & engineering

Number of rows = 6978

Number of features = 17

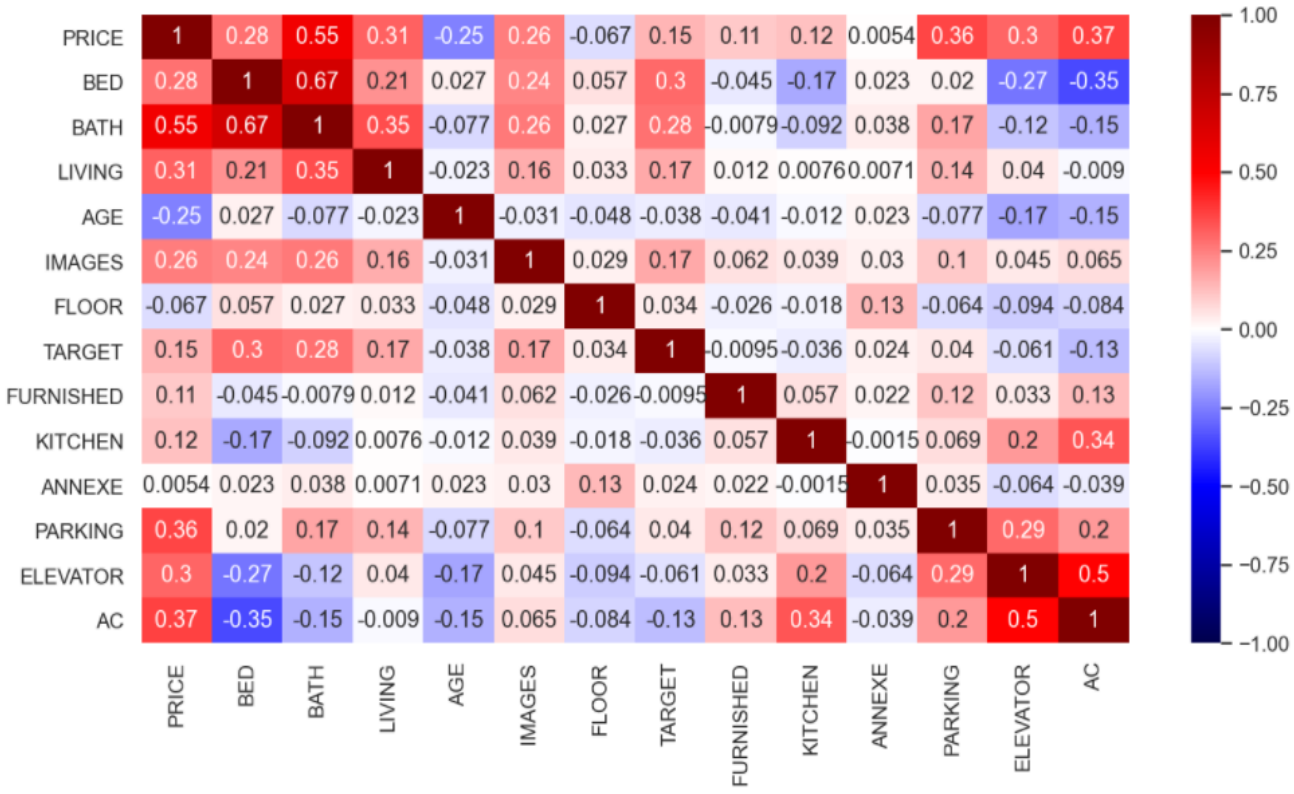
- Remove empty values
- Remove the outlier values in the (Price) and (BED) columns
- remove redundancy
- Convert the variable type to numeric
- Add a column with the name (Amanat)
- Add a column with the name (Regions)

After Data cleaning & engineering

Number of rows = 5146

Number of features = 19

- ## Relations



- ## Results

		Linear Regression	Ridge Regression	Polynomial Regression
X1 =	All features Using Amanat Drop District & Regions	Train R^2 = 0.71 Validation R^2 = 0.71 Test R^2 = 0.72	Train R^2 = 0.71 Validation R^2 = 0.71 Test R^2 = 0.72	Train R^2 = 0.83 Validation R^2 = 0.76 Test R^2 = 0.78
X2 =	All features Using District Drop Amanat & Regions	Train R^2 = 0.83 Validation R^2 = -4.0 Test R^2 = -4.2	Train R^2 = 0.83 Validation R^2 = -4.0 Test R^2 = -4.2	Train R^2 = 0.91 Validation R^2 = -900 Test R^2 = -800
X3 =	All features Using Regions Drop Amanat & district	Train R^2 = 0.70 Validation R^2 = 0.70 Test R^2 = 0.71	Train R^2 = 0.70 Validation R^2 = 0.70 Test R^2 = 0.71	Train R^2 = 0.78 Validation R^2 = 0.75 Test R^2 = 0.76
X4 =	Scaling Log10 All features Using Amanat Drop District & Regions	Train R^2 = 0.784 Validation R^2 = 0.78 Test R^2 = 0.77	Train R^2 = 0.785 Validation R^2 = 0.78 Test R^2 = 0.71	Train R^2 = 0.82 Validation R^2 = -111 Test R^2 = -087

In X2 we found overfitting so we need to perform cross validation

CV mean = -5e+15

- ## Prediction

	Actual Price	LinearRegressionModel	LinearRegressionScaledLog10	PolynomialRegression
0	20,000	20,809	21,193	24,478
1	60,000	48,129	48,993	54,305
2	20,000	12,224	11,997	14,990
3	22,000	16,347	16,278	11,240
4	35,000	23,744	23,309	29,736

- ## Conclusion

After the results of the model appeared, and the comparison between the results of each model, we concluded that the best model is the model with the highest R^2.

We seek to improve the accuracy of the model in the future by adding additional features such as (the average income of the population in each neighborhood - the number of residents in each neighborhood), which helps us in developing the project and determining the rental prices of apartments based on specifications