UTILIZING MULTIPLE REGRESSION ANALYSIS TO PREDICT HOUSE PRICES IN KING COUNTY

TEAM PRESENTATION

CONTRIBUTORS

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OVERVIEW

Source: [Mashvisor].
"Upgrading older properties with renovations like kitchen and bathroom updates, adding bedrooms, and improving curb appeal increases their value by 20%. “

BUSINESS UNDERSTANDING

Some homeowners are eager to sell, but certain houses are undervalued due to wear and tear. Housing prices can fluctuate based on market trends and buyer preferences. Homeowners aim to increase their property value for higher selling prices, but they lack knowledge and insights on effective strategies to do so.

Our analysis and modelling aimed to help homeowners make informed decisions by assessing how factors like home condition, size, renovations and more can impact their home's estimated value.

BUSINESS QUESTIONS

1. Does the year the house was built and/or renovated affect the sale price of a house?

2. Do qualitative features of a house (grade, condition e.tc) affect its sale price?

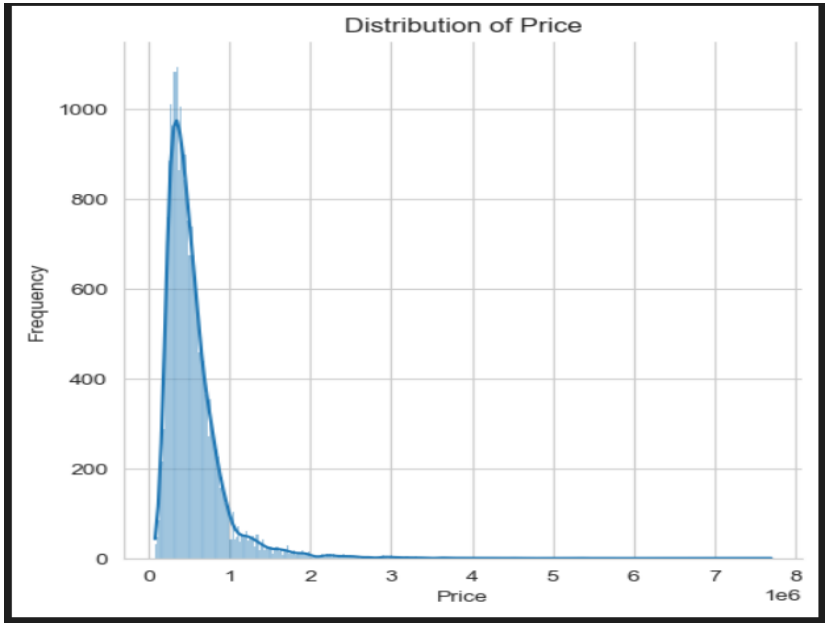
3. Do quantitative features of a house (bedrooms, sqft of spaces) affect it's sale price ?

DATA UNDERSTANDING

- The analysis was based on King County data set.
- It had a total of 21,597 records, containing 20 columns and 21, 597 rows.
- Timeframe of the data 2014 to 2015.
- Each raw contains data of an individual house, which is indexed by a unique house id.
- The data has numerical and categorical variables

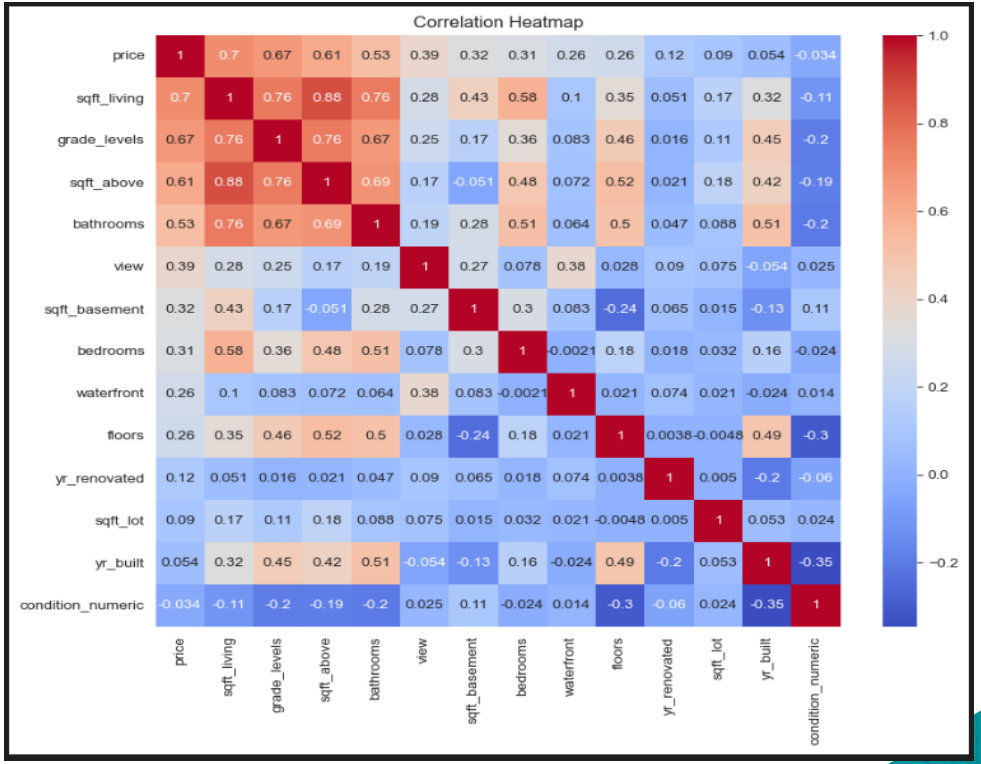
PRICE DISTRIBUTION

Linear regression is the optimal method for this extensive dataset due to the non-normal distribution of the dependent variable, price.



CORRELATION OF THE VARIABLES

- The dark red shows positive correlation.
- The dark blue shows negative correlation.



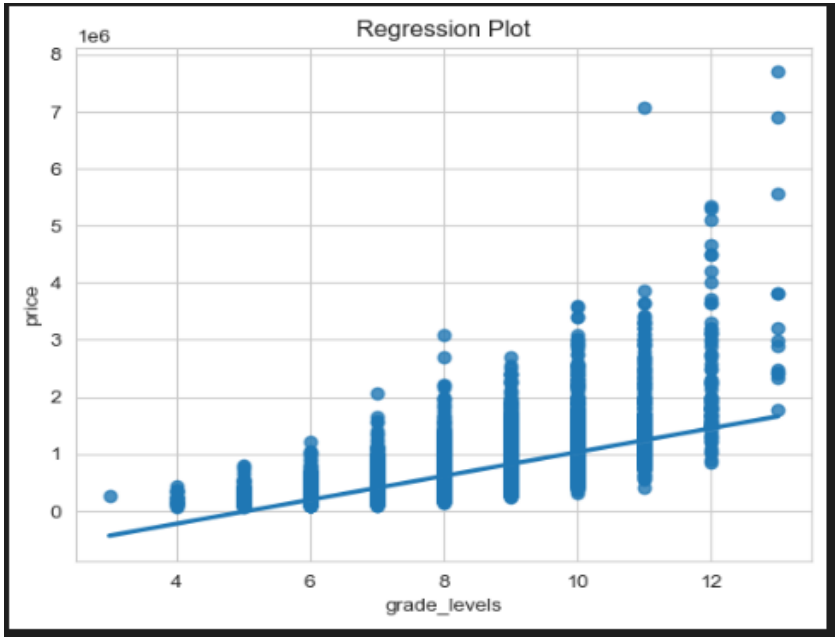
MODELLING

6 models were built, all with price as the dependent variable:

- Base Model (Grade)
- All features excluding the dropped features
- The time factor (year built and year renovated.
- Qualitative features (categorical variables).
- Quantitative features (numerical variables).
- Quantitative features, adding a qualitative feature at a time.

EFFECT OF GRADE ON PRICE (BASE MODEL)

High grade impacts positively on the price of a house.



MODEL INTERPRETATION

OLS Regression Results

Dep. Variable:	price	R-squared (uncentered):	0.843
Model:	OLS	Adj. R-squared (uncentered):	0.843
Method:	Least Squares	F-statistic:	1.939e+04
Date:	Fri, 02 Jun 2023	Prob (F-statistic):	0.00
Time:	18:52:23	Log-Likelihood:	-2.9977e+05
No. Observations:	21595	AIC:	5.996e+05
Df Residuals:	21589	BIC:	5.996e+05
Df Model:	6		
Covariance Type:	nonrobust		

The model that incorporated the numerical features, was the most favorable, with an R squared of 0.84 . Approximately 84.3% of the variation in the dependent variable (price) can be explained by the numerical independent variables.

Other statistics of the model are:

F-statistic 0f 2.188e+04 – indicating that the regression model is statistically significant

p-values (below 0.05) – indicating statistical significance of the coefficients.

MODEL INTERPRETATION (cont..)

	coef	std err	t	P>|t|	[0.025	0.975]
bedrooms	-4.684e+04	1868.199	-25.075	0.000	-5.05e+04	-4.32e+04
bathrooms	1.264e+04	3845.501	3.287	0.001	5101.895	2.02e+04
sqft_lot	-0.3060	0.043	-7.041	0.000	-0.391	-0.221
sqft_basement	334.8356	4.996	67.015	0.000	325.042	344.629
sqft_above	299.5537	3.321	90.192	0.000	293.044	306.064
floors	2.706e+04	3899.782	6.939	0.000	1.94e+04	3.47e+04

- floors: Houses with an additional floor have a predicted price increase of approximately $27,060 ($p < 0.001$).
- bathrooms: For each additional bathroom, the predicted price increases by approximately $12,640 ($p = 0.001$).
- sqft_basement: For each additional square foot of basement area, the predicted price increases by approximately $334.84 ($p < 0.001$).

REGRESSION RESULTS

The model is a good fit since the training data and test data do not over fit or underfit

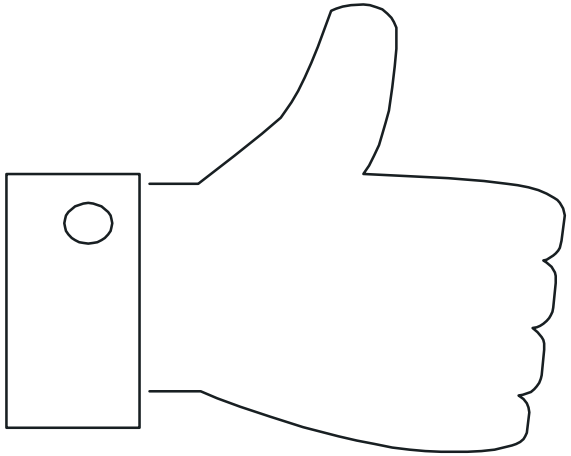
RECOMMENDATIONS

Our advise to Home sellers is:

- Consider increasing the space of the house, by increasing the number of floors, bathrooms & the size of basement & above ground area
- Highly graded houses fetch higher prices. Waterfront and views, also increase the value of houses.
- The newer the house, the higher the price, similarly, the most recently renovated houses fetch higher prices. Therefore, sellers need to renovated their houses.

NEXT STEPS

- Explore the effect of additional amenities such as proximity to schools, hospitals and shopping centres on price of a house.
- Investigate whether the geographical features, such as topography, waterbodies and weather conditions of an area have an impact on the value of a property.
- Look more specifically price fluctuations of homes across the months of the year, e.g summer, winter seasons.



Thanks

Any questions?

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