Analyzing the Determinants of House Prices in Ames, Iowa

By

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Problem Statement

*What are the key factors that drive house prices in Ames City?*

- Findings to be published in the City Assessor's Office "End of Year Digest" (& other informational pamphlets/ material relating to mortgages.

- The aim is to educate and inform first-time home buyers.

- Help them make more informed decisions, before **and** after buying a home.

Data

- **Property Size** : Lot Area (sq. ft.), Above grade Living Area (sq. ft.)

- **Location desirability**: Nearness & adjacency to positive features e.g. parks, negative features e.g. railroads, busy streets.

- **Number of rooms**: Bedrooms , full bathrooms (both above grade).

- **Quality of property:** Property age (year built - year sold), quality of construction materials, overall condition of the home.

- **"Aesthetics"** : Lot shape, land contour, building type, paved driveway (or not), presence or absence of a fireplace.
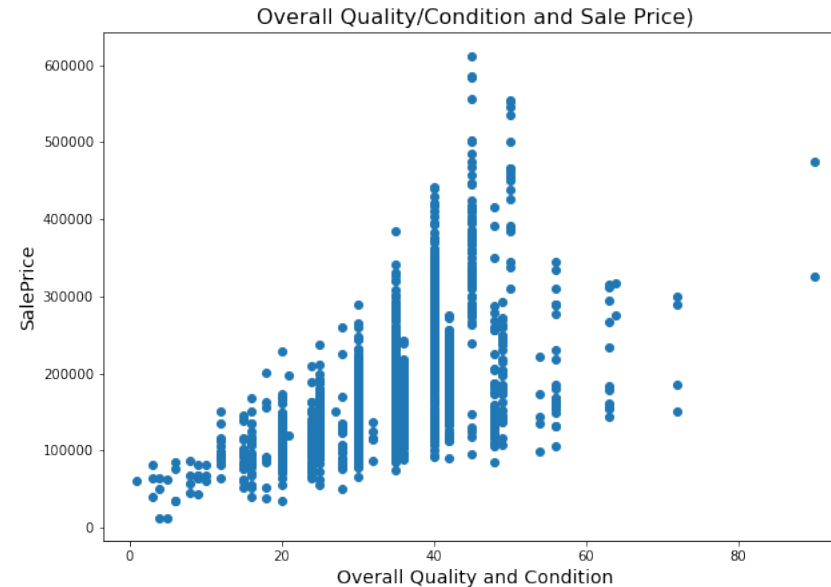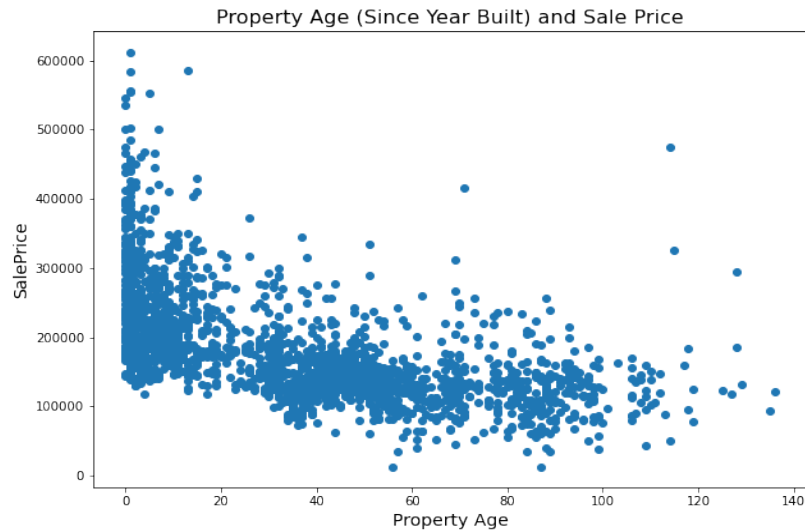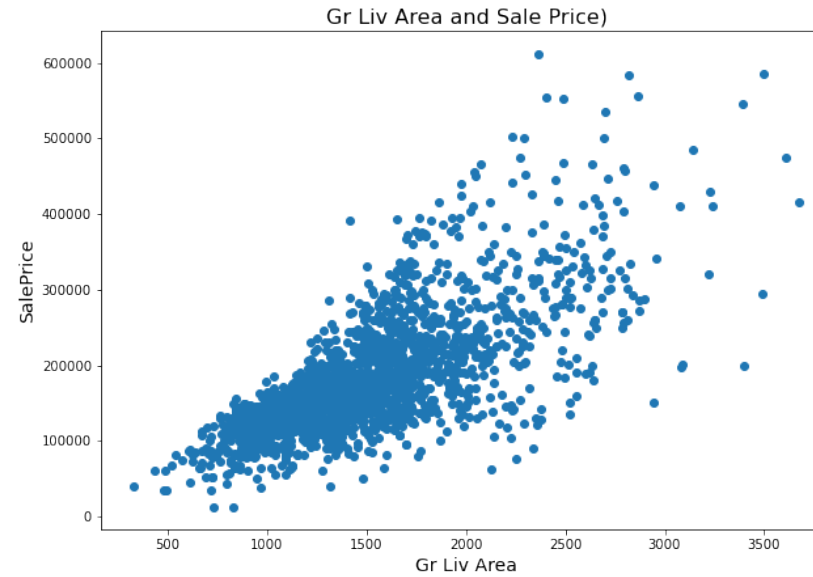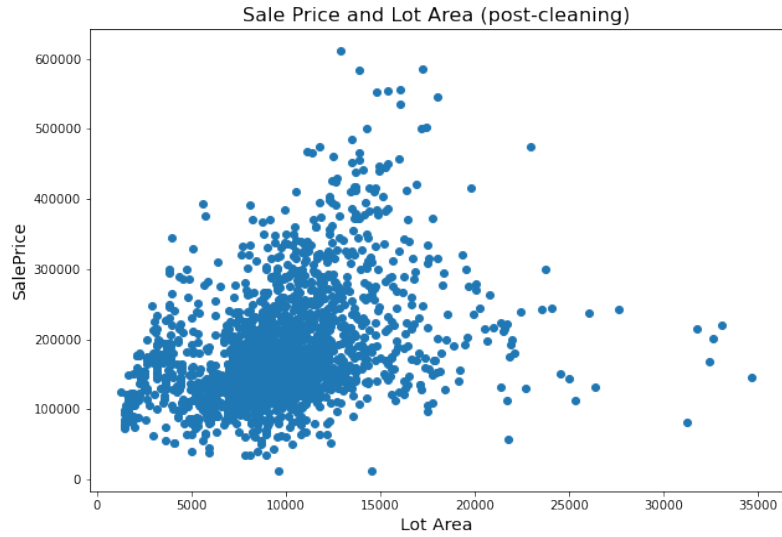
Some visuals..

Median Sale Price by Building Type
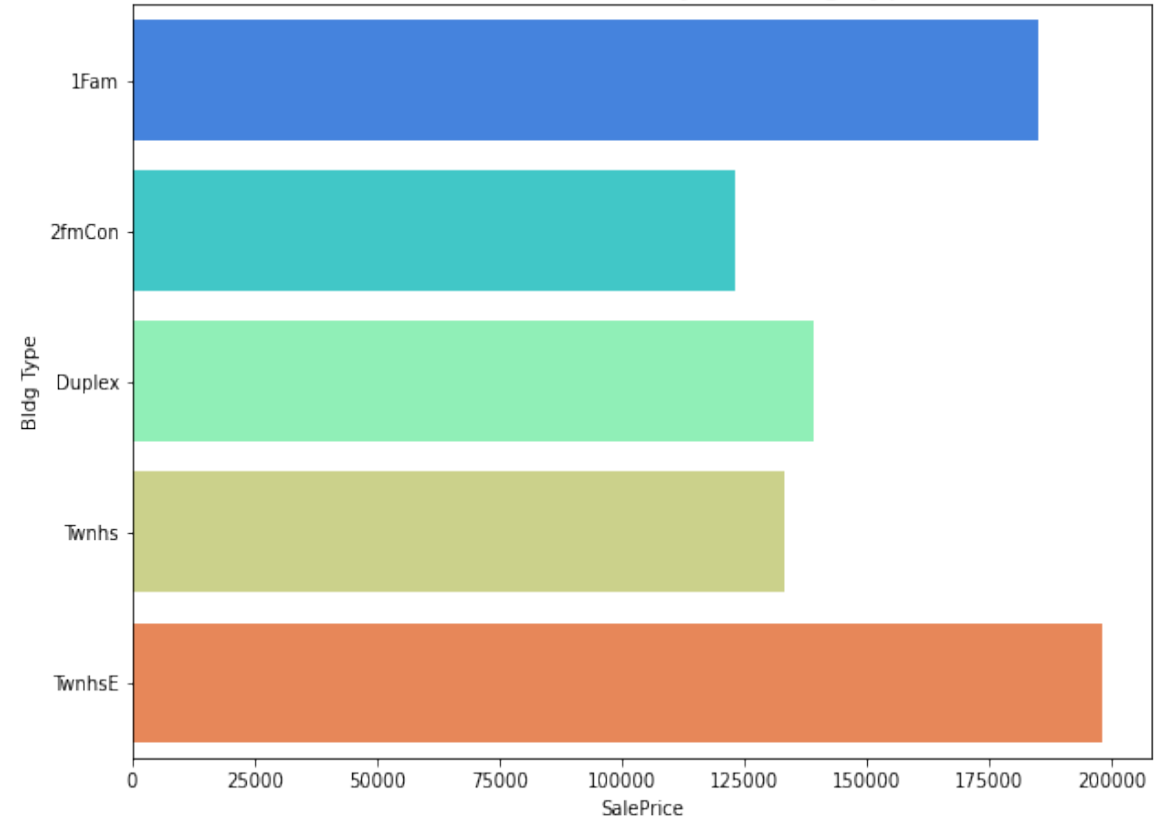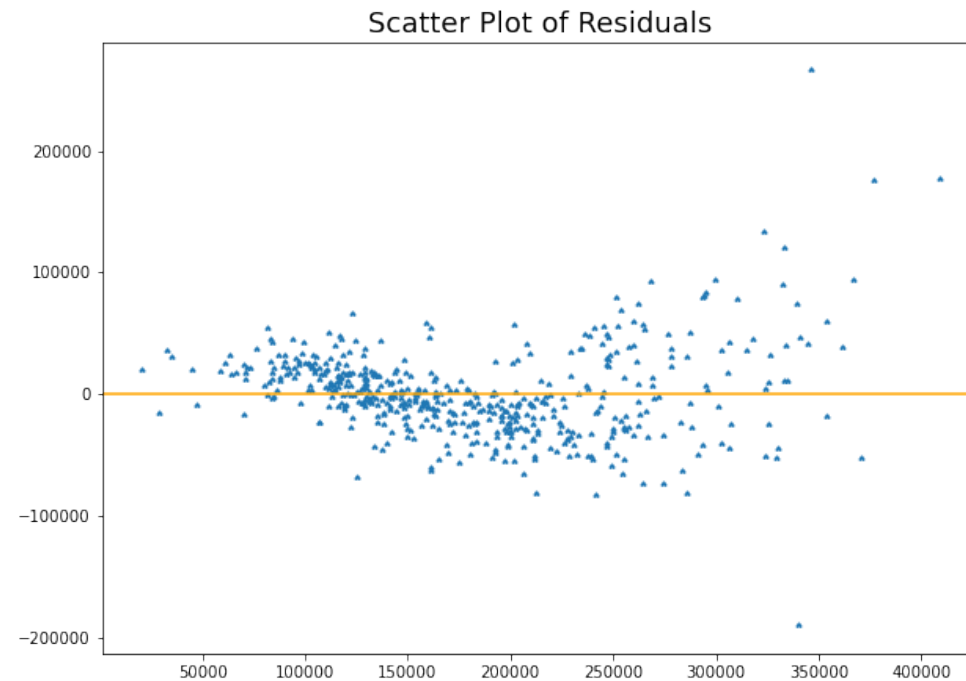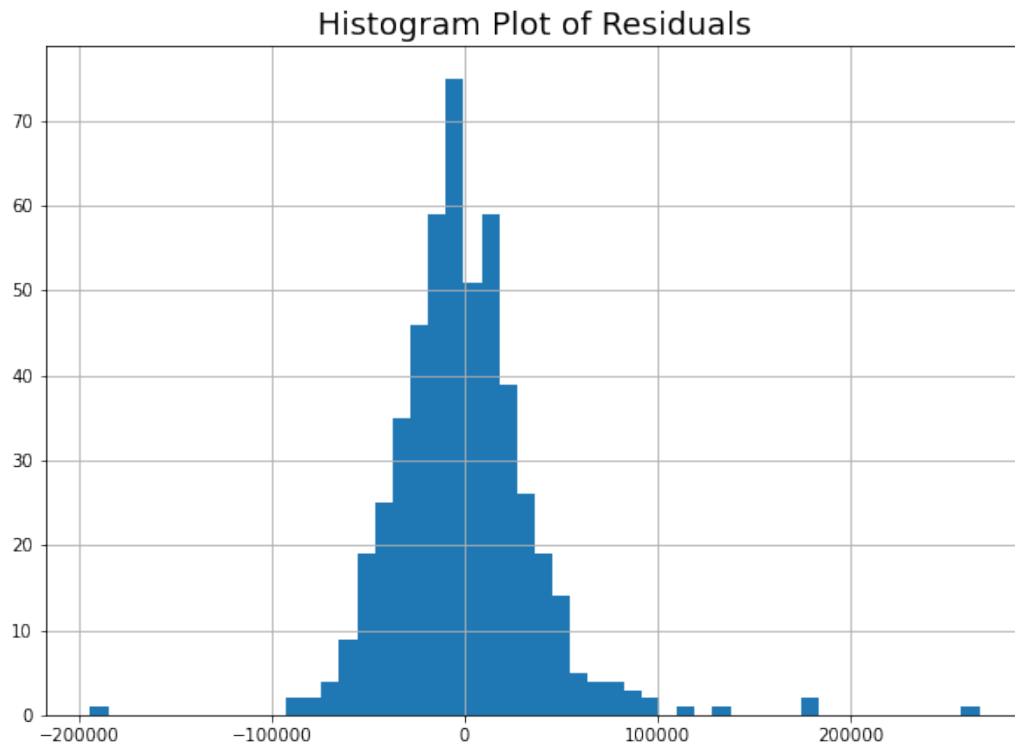

Visualizing Sales Prices by Type of Sale
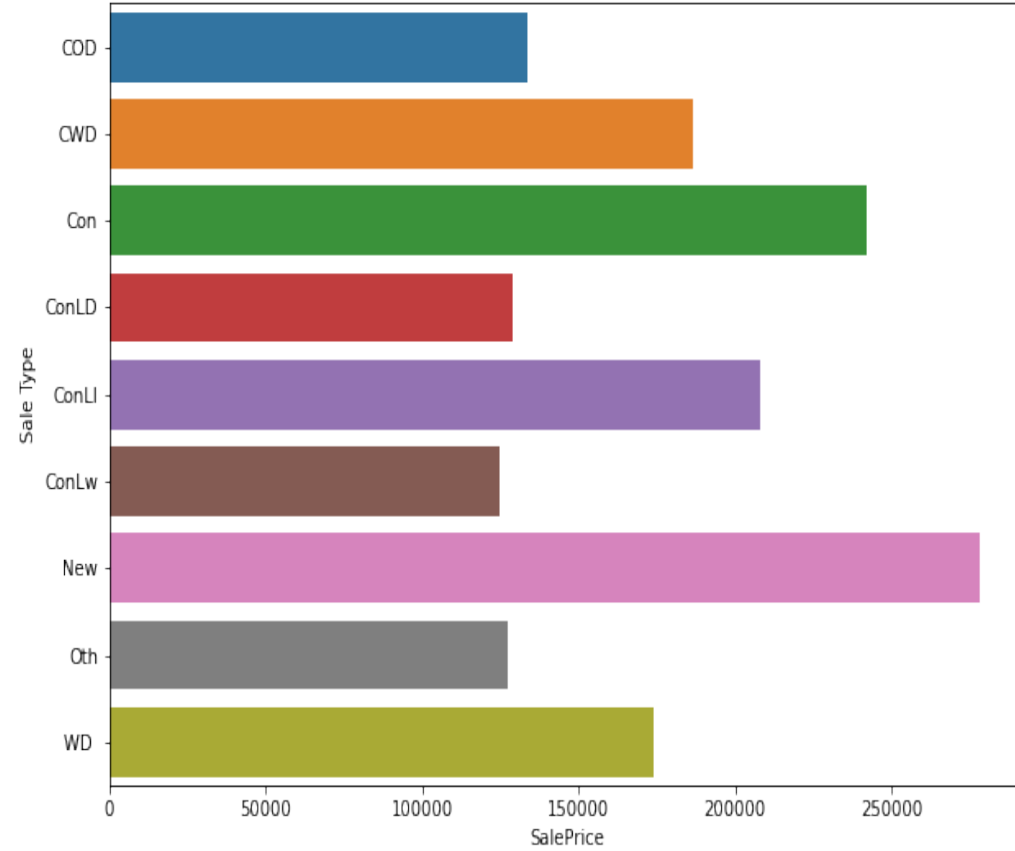
OLS Regression: *L.I.N.E* Assumption- Linearity

OLS Regression Assumptions contd.

L.I.***N.E*** Assumption: Normality, Equality of variance

Results: OLS, Ridge CV, Lasso CV

Feature	OLS Coef.	Ridge CV Coef.	Lasso CV Coef.
Lot Area	2.40	9,597.86	9,532.10
Gr Liv Area	94.85	44,823.91	45,423.86
Full Bath	-6,517.74	-2,986.44	-3,346.26
Bedroom AbvGr	-18,523.08	-15,126.45	-15,403.44
Lot Shape	3,833.72	1,777.33	1,833.20
Land Contour	-7,293.76	-2,113.42	-2,105.71
Fireplaces	4,603.41	2,449.26	2,301.21
Paved Drive	-4,107.33	-1,115.47	1,203.33
Property age	-1,017.14	-30,832.48	-31,117.02
Garage	-4,457.79	-993.18	-1,026.90

Results: OLS, Ridge CV, Lasso CV (2)

Feature	OLS	Ridge	Lasso
Near rail road	-17,398.56	-3069.32	-3068.35
Near major str	-6,183.58	-1724.24	-1708.08
Near Pos feature	5,669.64	762.98	773.72
Overall qual & Cond	2,198.88	20340.61	20353.07
Bldg type_2fmCon	-350.77	-92.75	-54.46
Bldg type_Duplex	-7635.17	-1458.51	-1410.98
Bldg type_Twnhs	-25582.28	-4714.24	-4769.82
Bldg type_Twnhs (end unit)	-5830.49	-1489.40	-1574.25

Model Metrics

Metric	OLS	Ridge	Lasso
MAE	$25,947.47	$25,961.28	$26,034.78
SSE	$676,673,943,875.3	$682,858,047,918.18	$684,196,188,685.68
MSE	$1,332,035,322.59	$1,344,208,755.74	$1,346,842,891.11
RMSE	$36,497.06	$36,663.45	$36,699.36
R2 (test)	0.79	0.79	0.79
R2 (train)	0.81	0.81	0.81

Regression Plot Showing the Relationship between Price and Predicted Price
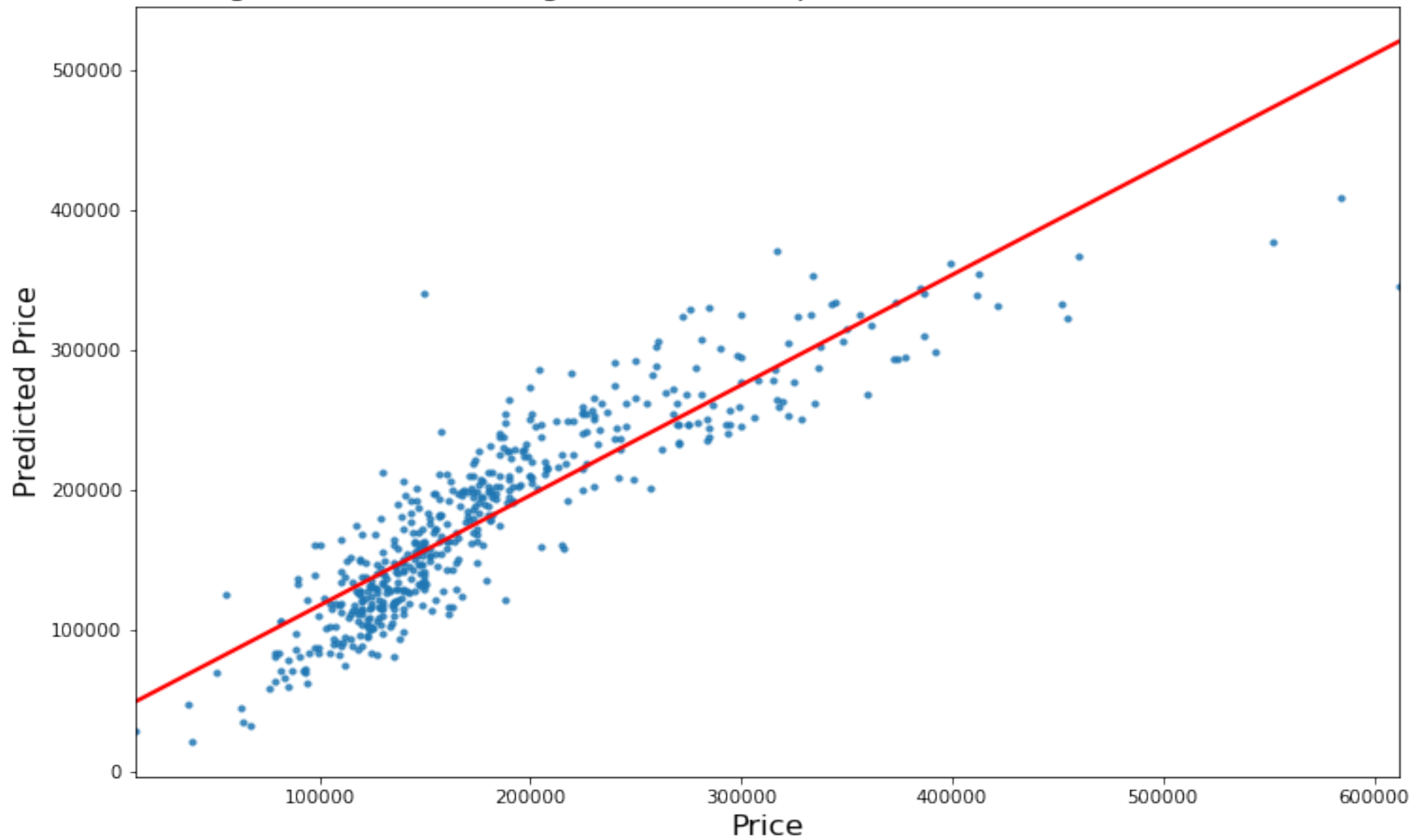
Conclusion

- Property size is the most important factor that influences sale price. For Ames City, the size of living area (above grade) is valued over lot size.

- The quality and condition of a home are fundamental too, and the most important indicator to look out for, is the age of a property

- Location matters, and it appears negative features have a greater effect on sale price, than positive features do.

- A fireplace is a very important feature that affects sale price. The shape of the lot, and land contour are key as well.

- End unit town houses cost a lot more than inside unit town houses.

- For further study, analyzing features by neighborhood will interesting to generate inferences that can be generalized for other contexts.

Recommendations

- Prospective home buyers should pay close attention to understand property location variables. What is the property close to? How busy is the street?

- Details such as land contour, whether or not a fireplace is present, are important details to look out for.

- Property size matters, and in Ames, inside space is valued over outside space.

- Spending on a paved driveway and/or a garage may not be profitable.

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