PREDICTING PRICES OF LOOSE DIAMONDS

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PHOTO BY LEAH KELLEY FROM PEXELS

GOALS

To explore the relationship between the physical properties of loose diamonds and diamond prices

Can we build a highly predictive linear regression model?

Apply the model to loose diamond data obtained from a different source

Can this model predict consistently across a different dataset?

DATA

blue nile®
THE SOURCE OF BRILLIANCE™

BLUENILE.COM

RETAILER

52,372 SAMPLES

$500 - $13,000

ROUND

GIA GRADED

11 FEATURES

DATA

BRILLIANCE.COM

WHOLESALER

21,782 SAMPLES

$500 - $13,000

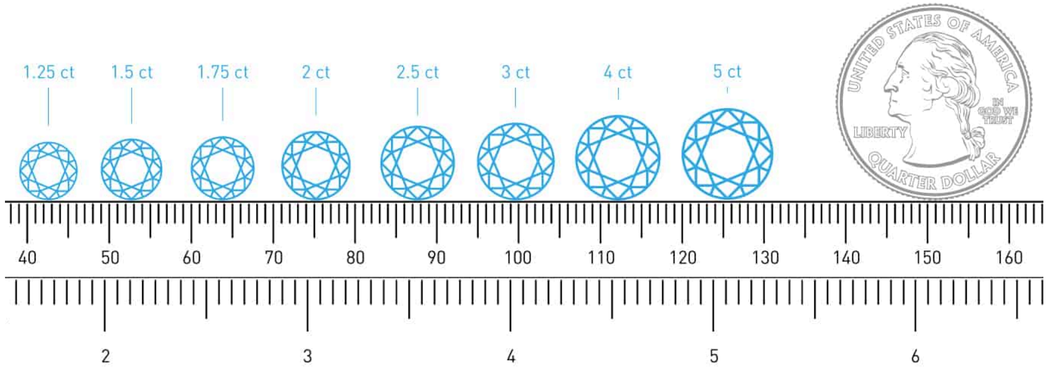
ROUND

GIA GRADED

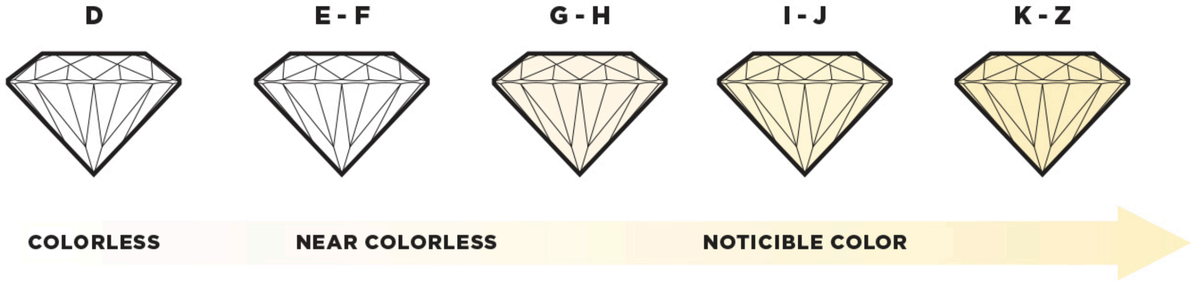
11 FEATURES

DATA

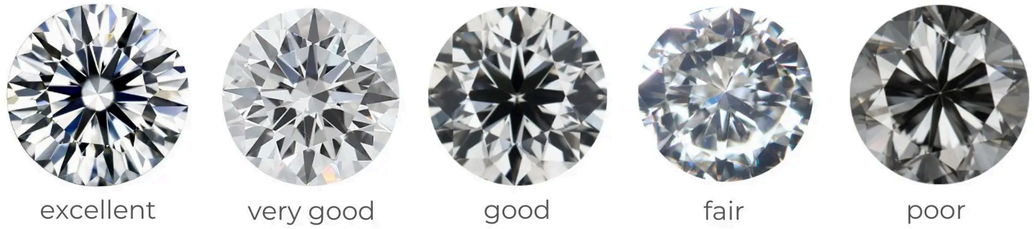
CARAT WEIGHT



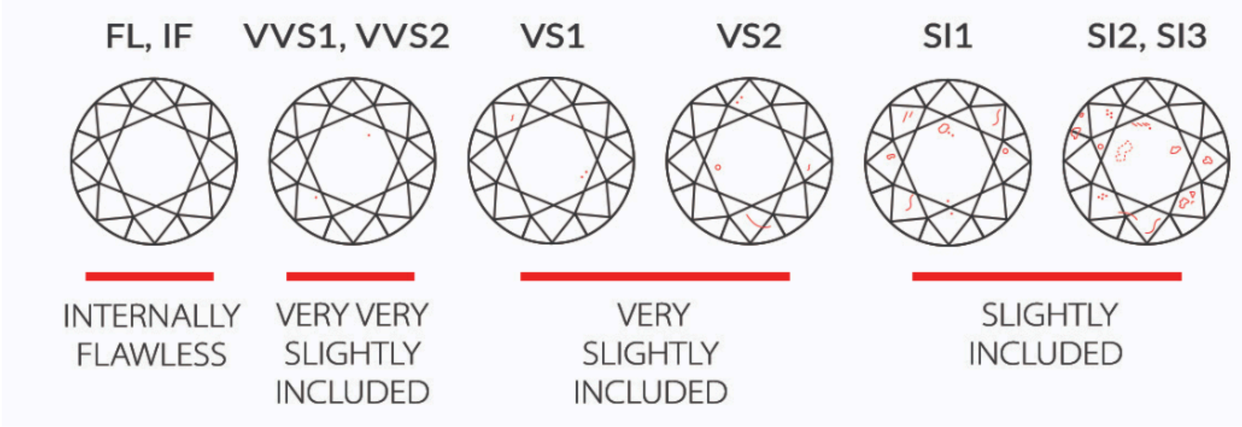
COLOR



CUT



CLARITY



HYPOTHESIS

blue nile®
THE SOURCE OF BRILLIANCE™

BLUENILE.COM

RETAILER

BRILLIANCE.COM

WHOLESALER

> ~~In-Store Price: $3,452~~
> Our Price: $2,301

> ~~In-Store Price: $12,000~~
> Our Price: $8,000

The Blue Nile model will consistently ‘over-guess’ the price for the Brilliance diamonds

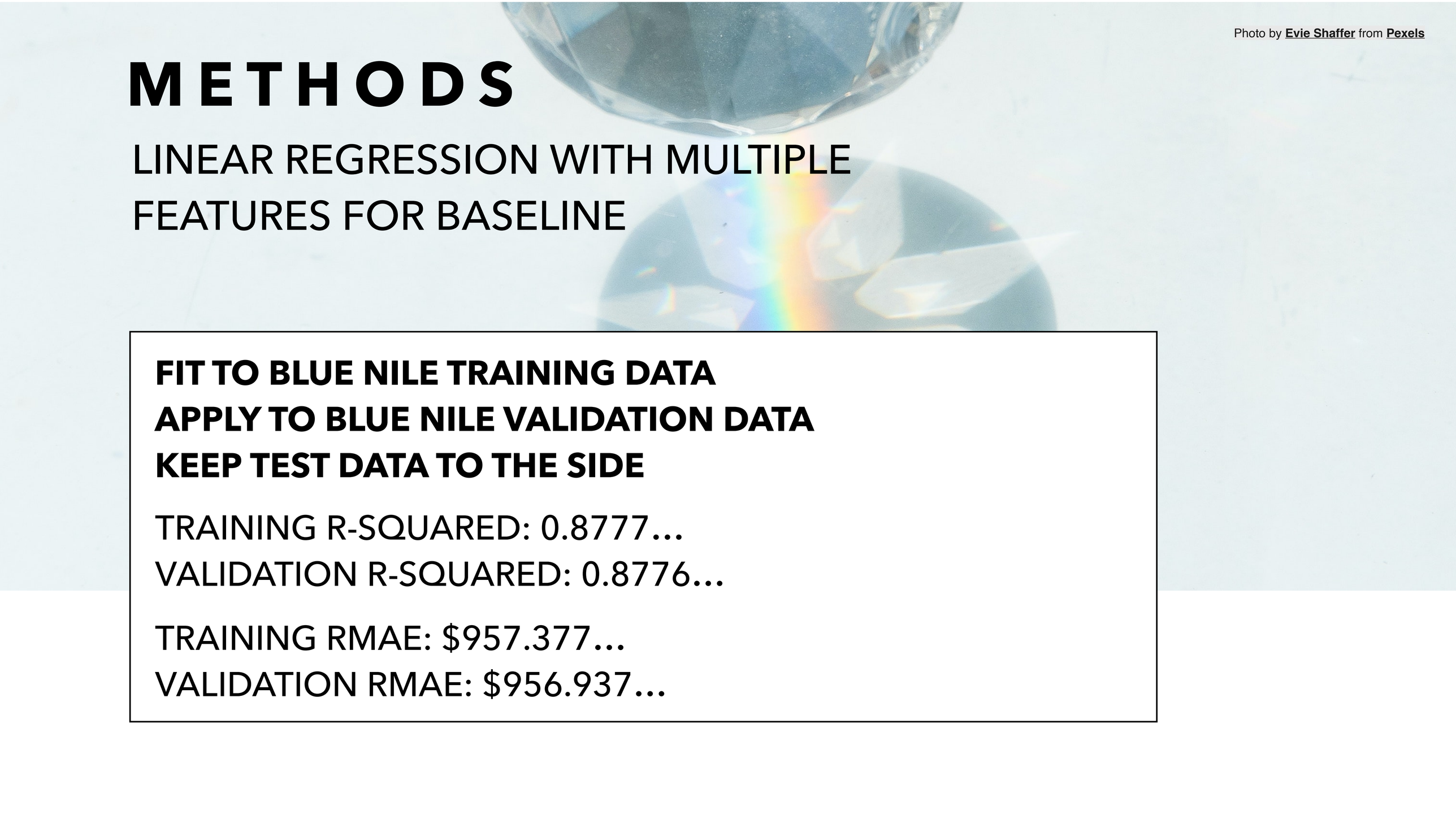


Photo by **Evie Shaffer** from **Pexels**

METHODS

LINEAR REGRESSION WITH MULTIPLE FEATURES FOR BASELINE

FIT TO BLUE NILE TRAINING DATA
APPLY TO BLUE NILE VALIDATION DATA
KEEP TEST DATA TO THE SIDE

TRAINING R-SQUARED: 0.8777…
VALIDATION R-SQUARED: 0.8776…

TRAINING RMAE: $957.377…
VALIDATION RMAE: $956.937…

METHODS

FINAL MODEL

CUSTOM FEATURE INTERACTIONS
SKLEARN.PREPROCESSING POLYNOMIALFEATURES
SKLEARN.PREPROCESSING STANDARDSCALER
LASSO REGRESSION

FIT ON BLUE NILE TRAIN + VALIDATION DATA

APPLY MODEL TO BLUE NILE TEST DATA
APPLY MODEL TO BRILLIANCE DATA

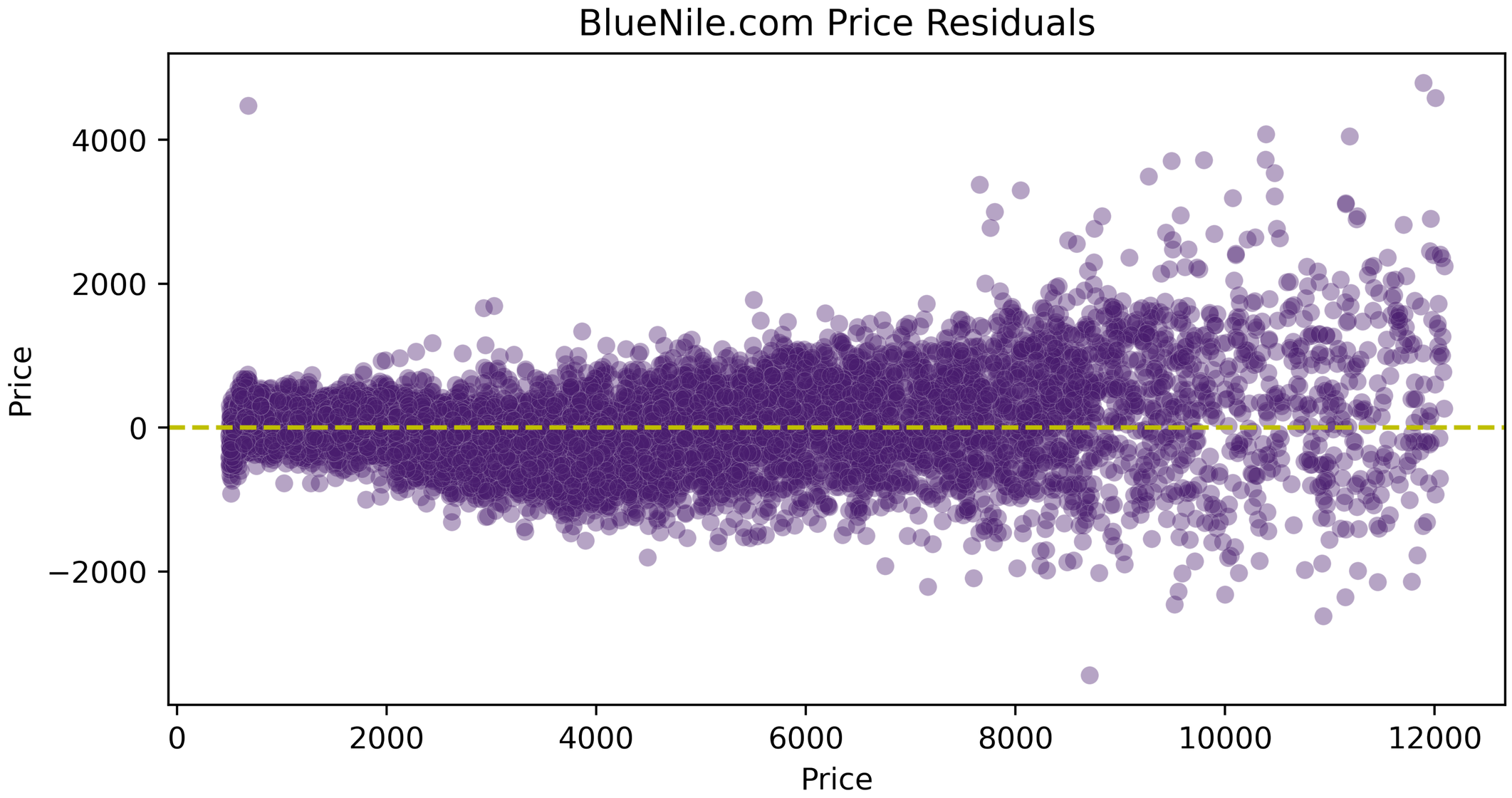
FINDINGS

BLUE NILE VALIDATION R-SQUARED: 0.8776...
BLUE NILE VALIDATION RMAE: $956.937...

BLUE NILE TEST R2: 0.956...

BLUE NILE TEST RMSE: $564.249...

FINDINGS


BlueNile.com Price Residuals
4000
2000
0
−2000
Price
0
2000
4000
6000
8000
10000
12000
Price

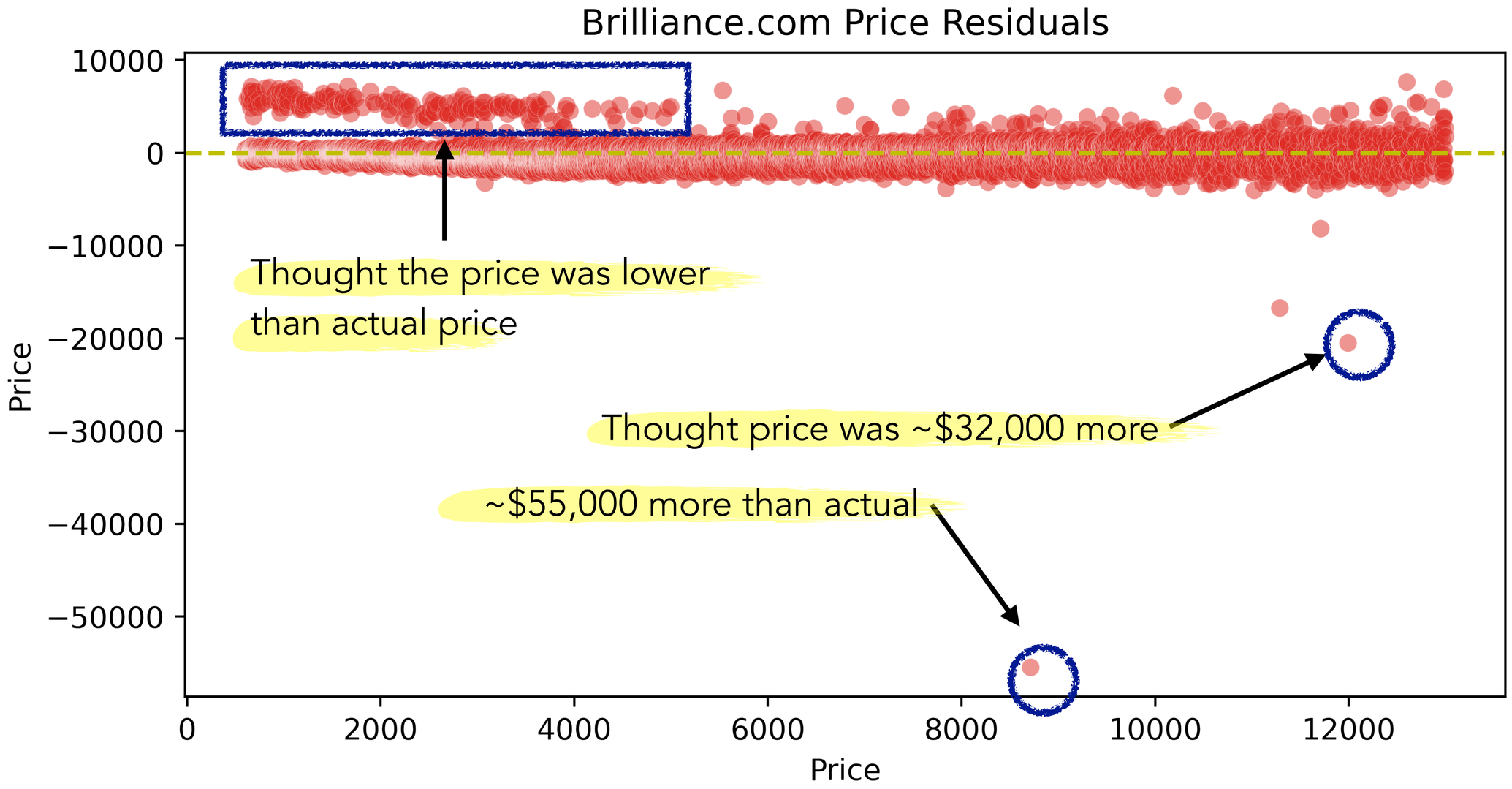
FINDINGS

BLUE NILE VALIDATION R-SQUARED: 0.8776...
BLUE NILE VALIDATION RMAE: $956.937...

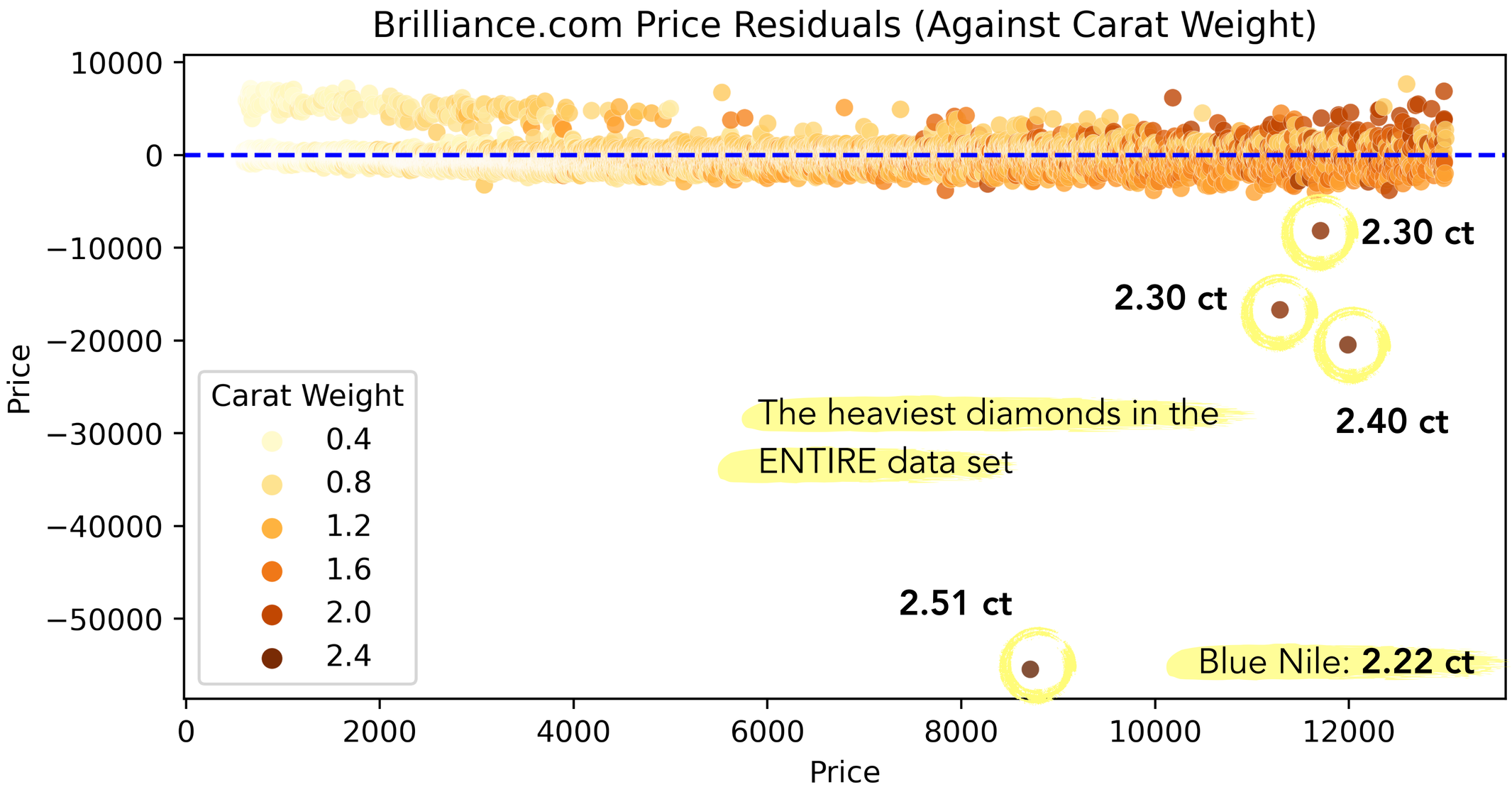
BRILLIANCE R2: 0.8711...

BRILLIANCE RMSE: $1,003.682...

FINDINGS


Brilliance.com Price Residuals
10000
0
−10000
−20000
−30000
−40000
−50000
Price
Thought the price was lower
than actual price
Thought price was ~$32,000 more
~$55,000 more than actual
0
2000
4000
6000
8000
10000
12000
Price

FINDINGS


Brilliance.com Price Residuals (Against Carat Weight)
10000
0
−10000
−20000
−30000
−40000
−50000
Price
0
2000
4000
6000
8000
10000
12000
Price
Carat Weight
0.4
0.8
1.2
1.6
2.0
2.4
2.30 ct
2.30 ct
2.40 ct
The heaviest diamonds in the ENTIRE data set
2.51 ct
Blue Nile: 2.22 ct

CONCLUSION

Yes, we can create a highly predictive linear regression model for loose diamonds.

Yes, our model can predict fairly consistently across a completely different data set.

No, Brilliance diamonds are not a better deal

FURTHER STUDIES...

Collect more data across a wider range of prices for Blue Nile and Brilliance

Use model on additional diamond distributers to continue to test hypothesis

Try out other models like XGBoost