

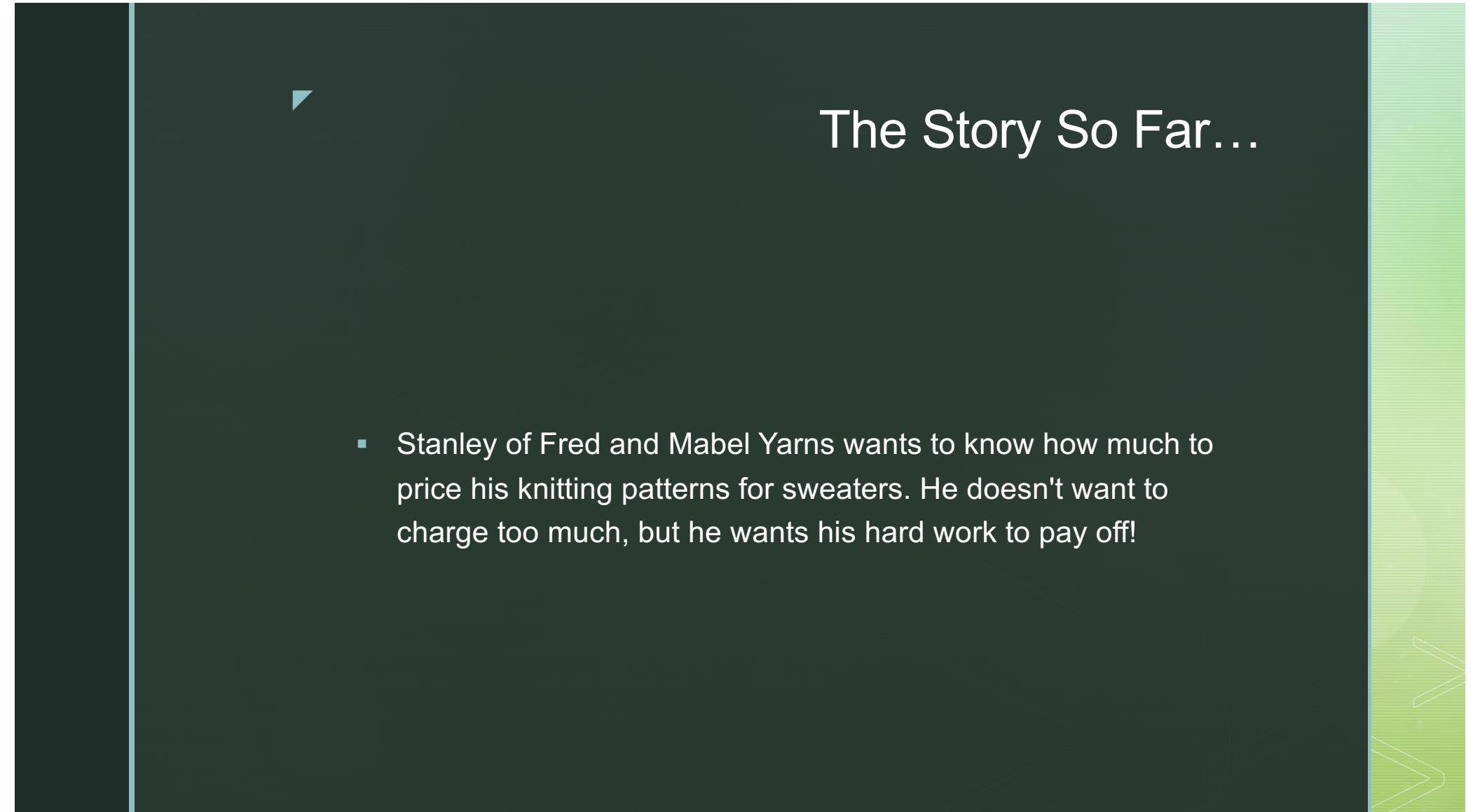
Pricing Sweater Patterns





Background





The Story So Far...

- Stanley of Fred and Mabel Yarns wants to know how much to price his knitting patterns for sweaters. He doesn't want to charge too much, but he wants his hard work to pay off!

Ravelry.com

The image shows the Ravelry website's landing page. On the left, there is a colorful illustration of three hot air balloons floating in a blue sky with white clouds. The balloons have yellow and teal patterns. In the basket of the largest balloon on the left, a black and white dog sits next to a rainbow-colored flag. Another dog is visible in the basket of a smaller teal balloon. A third balloon is partially visible in the background. At the bottom left of the illustration, there is a small "Play" button icon. To the right of the illustration is a white rectangular form for logging in or signing up. The form has "Log In" at the top, followed by fields for "Username" and "Password". Below the password field is a link "I forgot...". At the bottom of the form are two buttons: "Remember me" (with a checkbox) and a green "Log In" button. Below the form, the text "Sign Up" is displayed, followed by a bold statement: "Ravelry is a free website for knitters, crocheters, and fiber artists." At the bottom right of the form is a green "Join now" button.

ravelry

Play

Log In

Username

Password

I forgot

Remember me

Log In

Sign Up

**Ravelry is a free website
for knitters, crocheters,
and fiber artists.**

Join now

Ravelry.com

The screenshot shows the Ravelry search interface. At the top, there's a navigation bar with links for patterns, yarns, community, support, and advanced search. Below the navigation is a secondary row of links: Patterns (highlighted in blue), Projects, Designers, Sources, Yarns, Stash, Fiber, LYS, Brands, and Forums.

On the left, there's a sidebar titled "Filter your search:" with a dropdown menu "Select from all filters...". Below it is another dropdown for "My saved searches: Select a saved search".

The main search area has a search bar containing "sweater", a count of "152,666 matches (showing 100,000)", and a "category: sweater" indicator. It also includes "Sort by:" (Best match) and "View as:" (Small thumbnails) dropdowns, along with "Clear search", "Save search", and "Share search" buttons. A page navigation bar at the bottom shows pages 1 through 2084.

Ravelry.com

Love Note
by [tincanknits](#)

Published in [Tin Can Knits](#)
[Tin Can Knits on Ravelry](#)

Craft **Knitting**
Category [Sweater → Pullover](#)

Published **May 2019**

Suggested yarn
[Rainbow Heirloom Solo Light](#)
[La Bien Aimée Merino Singles](#)
[La Bien Aimée Mohair Silk](#)
[Rainbow Heirloom Kidsilk Cloud](#)

Yarn weight **yarn held together**
[Fingering \(14 wpi\) ?](#)

Gauge **16 stitches and 24 rows = 4 inches**
in stockinette on larger needles

Needle size
US 7 - 4.5 mm
US 10 - 6.0 mm

Yardage **200 - 1450 yards (183 - 1326 m)**

Sizes available **0-6mo (6-12mo, 1-2yr, 2-4yr, 4-6yr, 6-8yr, 8-10yr, Adult XS, S, M, L, XL-XXL, 3XL-4XL, 5XL)**

Languages [English](#)

[3-4-sleeve](#) [adult](#) [baby](#) [chart](#) [child](#) [circular-yoke](#)
[crew-neck](#) [cropped](#) [female](#) [in-the-round](#) [lace](#)

save in favorites [add to queue](#)
[cast on project](#) [add to library](#)
[share this](#)

\$8.00 USD [buy it now](#) [add to cart](#) [send as gift](#)

About this pattern

Love Note
by [tincanknits](#)
 [7643 projects](#), in 54,0 queues

overall rating of 4.9 from [2275 votes](#)
 clarity rating of 4.9 from [2242 votes](#)
 average difficulty from [2130 ratings](#)

About this yarn

Solo Light
by [Rainbow Heirloom](#)
Fingering

▪ Tags

- Chart
- Crewneck
- One-piece
- Seamless
- Top-down
- Unisex
- Written-pattern

Ravelry.com

- Data retrieved using Selenium and Beautiful Soup
- 2448 patterns pulled

Exploratory Analysis



Data Funneling

- Many patterns are free
- A fair number are not priced in US\$
- Outliers
- 833 patterns remained

Continuous Features

- None of the continuous features are visually highly correlated with price



Feature Manipulation

- After creating dummy variables, 28 features per pattern
- Various combinations
- Feature regularization

Model Choice



Linear Regression

- Tested four linear regression models
- Used RidgeRegression to fit 20 features

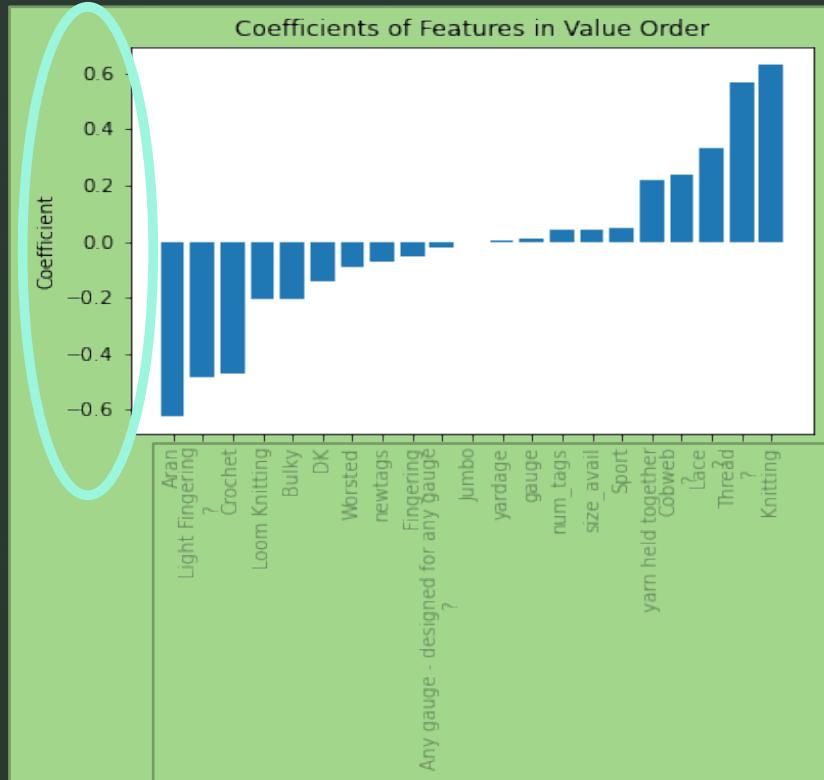
Results



Statistics

- R^2 on training data: 0.17
- R^2 on test data: 0.23

Coefficients



Coefficients II

- Four most influential features are
 - “Knitting”
 - “Thread”
 - ”Light Fingering”
 - “Aran”

Predicted vs. Actual





Summary and Future Work

Summary

- Used 833 patterns to predict pricing for sweater patterns.
- RidgeRegression gave best results
- Four most influential features are
 - “Knitting”
 - “Thread”
 - “Light Fingering”
 - “Aran”
- Prices are not well-predicted by the data

Future Work

- Try grouping yarn weights
- Group prediction using more specific tags
 - E.g.: prices of “crewneck” sweater patterns
- Convert currencies to include non-USD-priced patterns

Any questions?

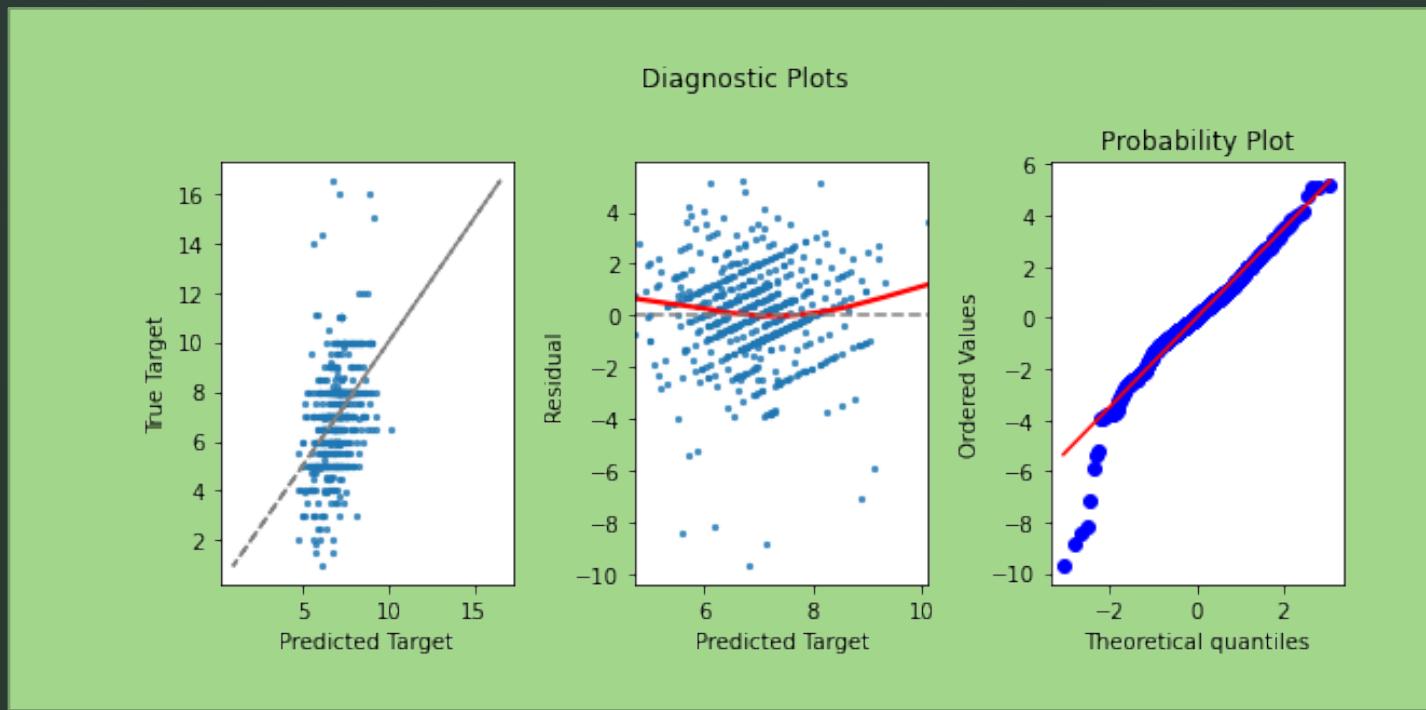
Thank you!

Credits

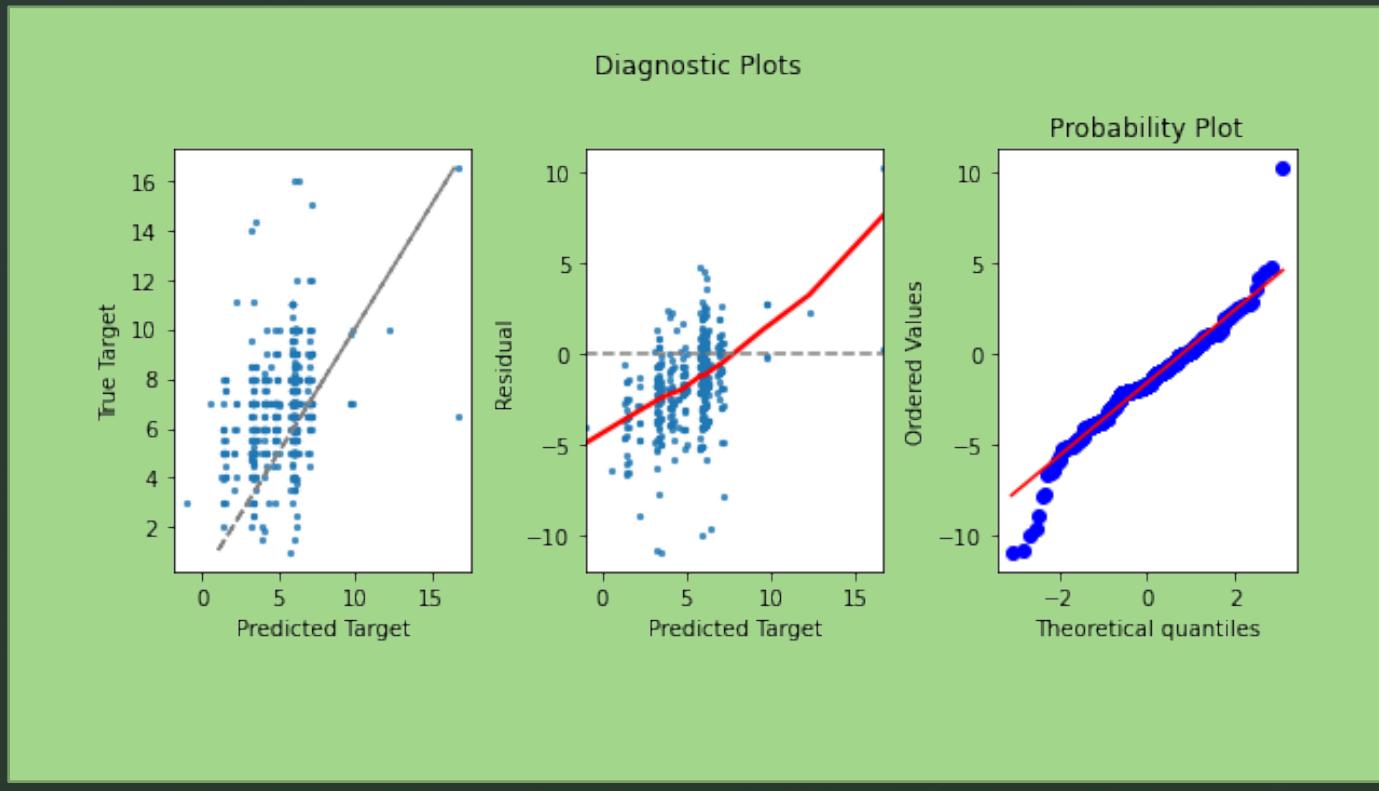
- Ravelry.com
- freeimages.com
- Unsplash.com

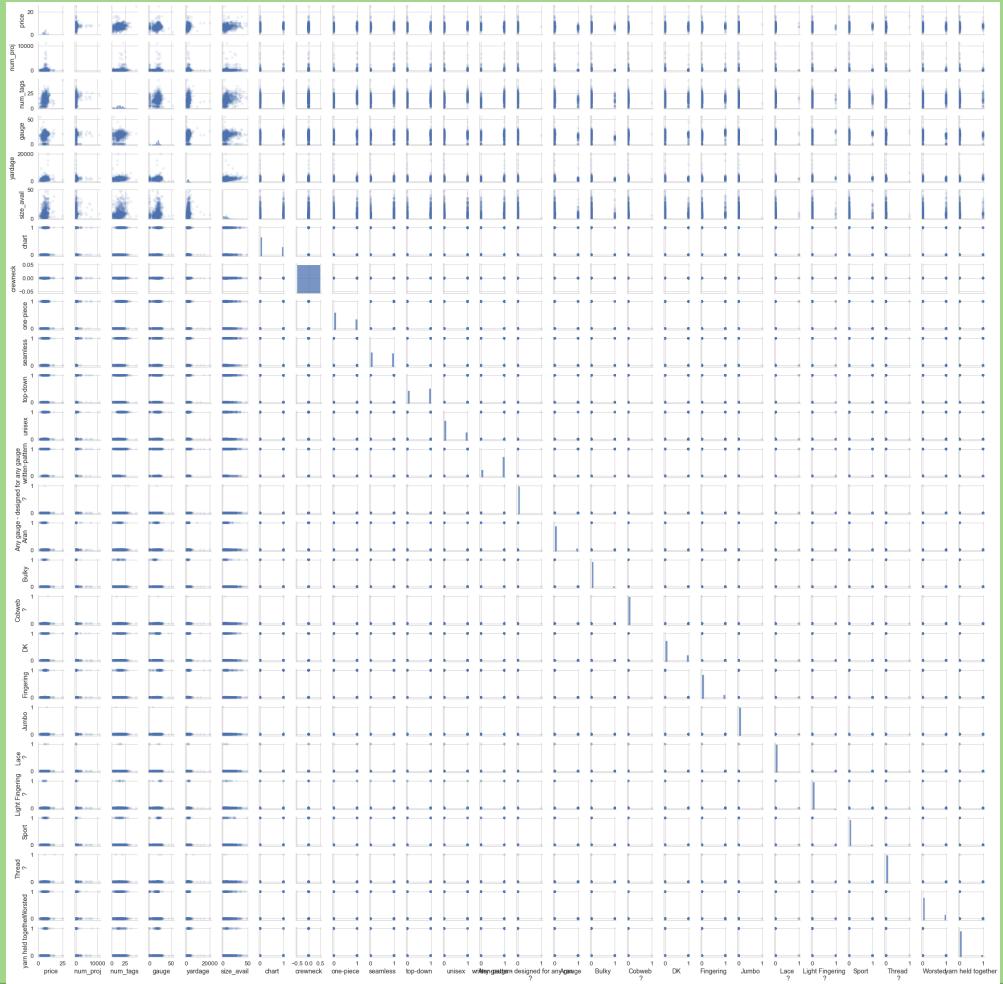
Appendix

Residuals from Model

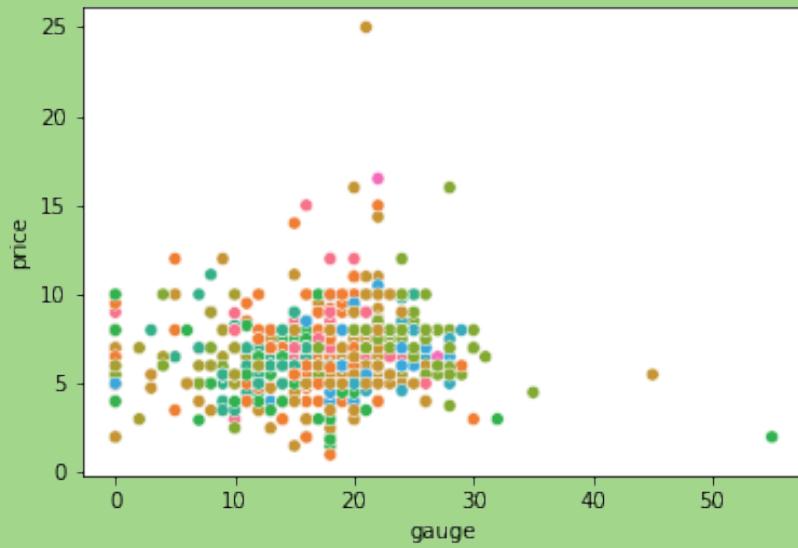


Residuals from Regularized Model

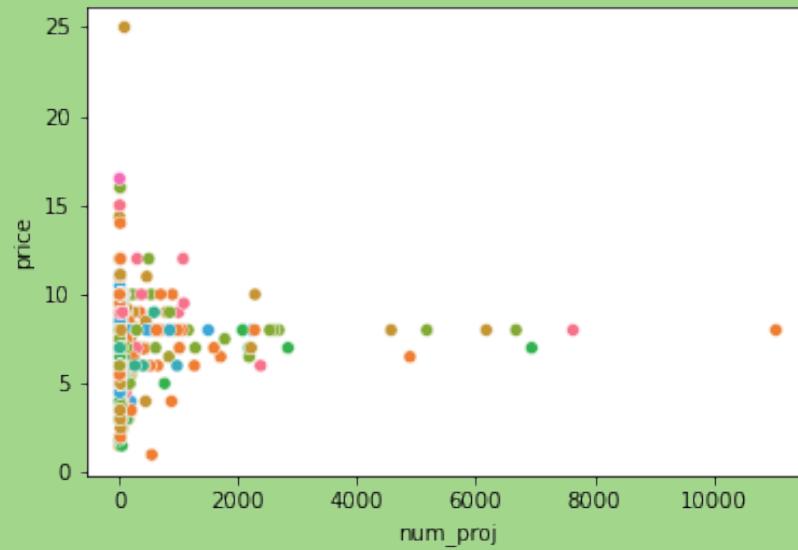




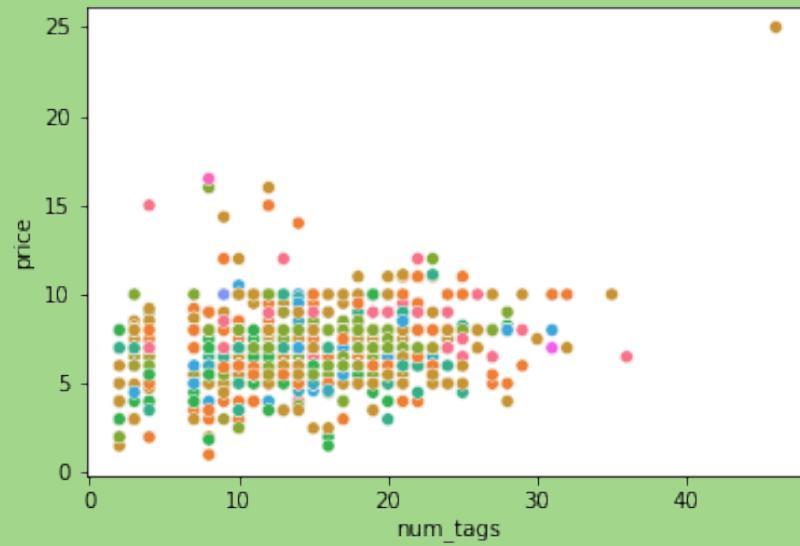
Gauge Colored by Yarn Weight



Number of Projects Colored by Yarn Weight



Number of Tags Colored by Yarn Weight



R² Comparison

- One-fold validation
- Linear Regression: 0.16998030147087628
- Lasso Regression: 0.1771005935528016
- Ridge Regression: 0.17748506850368562
- ElasticNet Regression: 0.17778667472506737

5-Fold Validation

- OLS
 - Scores: 0.154, 0.052, 0.164, 0.222, 0.174
 - Linear Reg Mean R Squared Score: 0.153
 - variance in scores: 0.00311
- RidgeRegression
 - Scores: 0.161, 0.047, 0.182, 0.220, 0.170
 - Linear Reg Mean R Squared Score: 0.156
 - variance in scores: 0.00340