

E-Commerce Price Prophet

Capstone Final Presentation

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Our Team



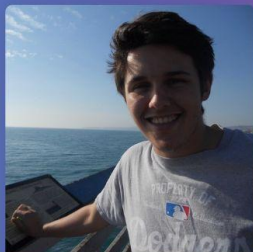
Austin

Subject Matter Expert



Daniel

Data Engineer



Kevin

Project Manager



Rithvik

Infrastructure Engineer



Saurabh

Dashboard Developer

Shouldn't e-commerce be easier?

WHY?

Pricing products is time-consuming

Platforms prioritize profits over fairness

WHAT?

Buyers face confusion due to price variations

An unbiased tool could improve fairness



\$3 trillion

Estimated revenue from all global e-commerce transactions in 2023



E-Commerce

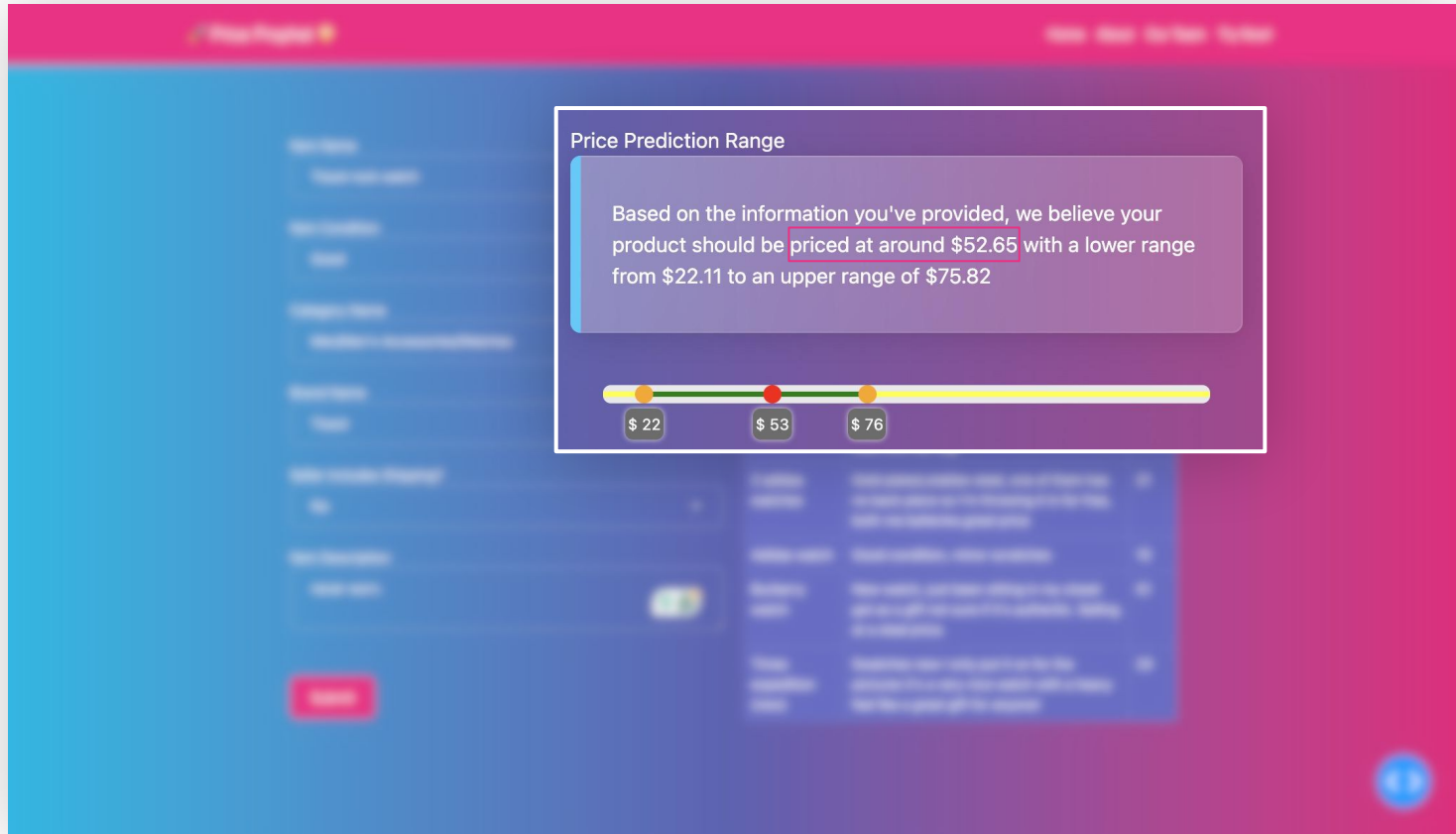
From a Domain Expert

“Mercari often recommends a price range for a different product than what I intended to sell”

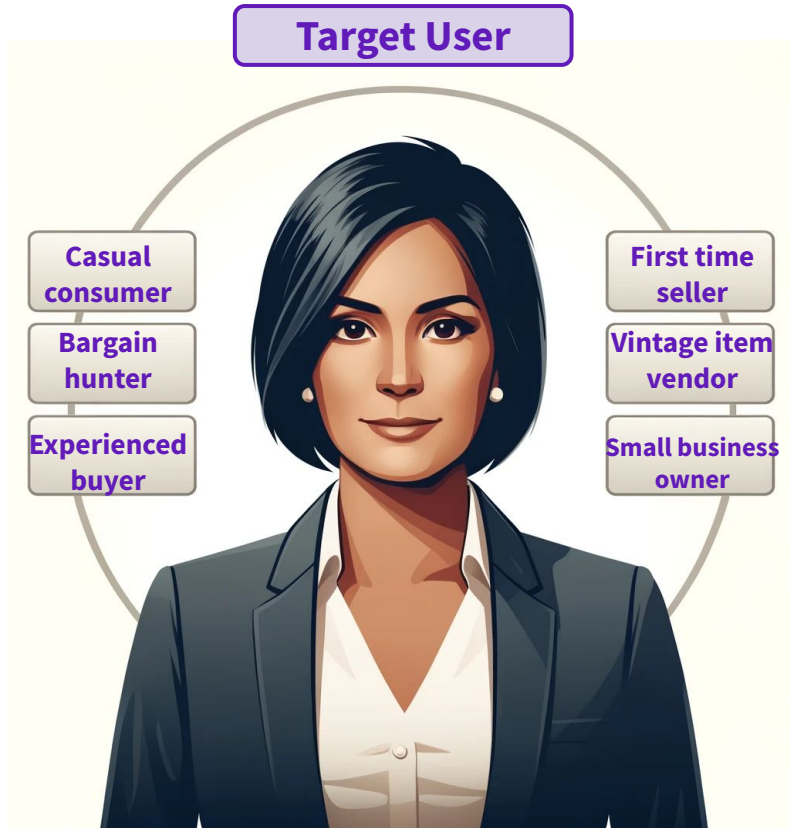
“The Mercari pricing tool provides lower than expected price ranges”

The screenshot shows the 'Sell an item' form on the Mercari mobile app. At the top, the status bar shows the time 5:51, a battery icon, and a 100% battery level. The app header includes a close button (X), the title 'Sell an item', and a 'List' button. Below the header is a photo upload section with a camera icon and the text 'Add up to 12 photos'. The 'Description' section contains a text input field with the placeholder 'Tissot rock watch' and a character count of '18/80'. Below this is a larger text input field with the placeholder 'Describe your item (5+ words)' and a character count of '0/1000'. Underneath is a hashtag input field with the placeholder 'Add up to 5 hashtags (Optional)' and a character count of '0/5'. The 'Details' section includes several rows with labels and values: 'Category' is 'Men > Men's accessories > Watches', 'Brand' is 'Tissot', 'Condition' is 'Good', and 'Color' is 'Select color (optional)'. Each row has a right-pointing chevron icon. The bottom of the screen shows the start of a 'Delivery' section.

What does the ideal experience look like for users?



Buyers and sellers benefit from transparent pricing



Trust: Transparent pricing builds trust, fostering confidence in transactions and e-commerce platforms

Market Efficiency: Clear and consistent pricing reduces confusion, streamlining the market for everyone

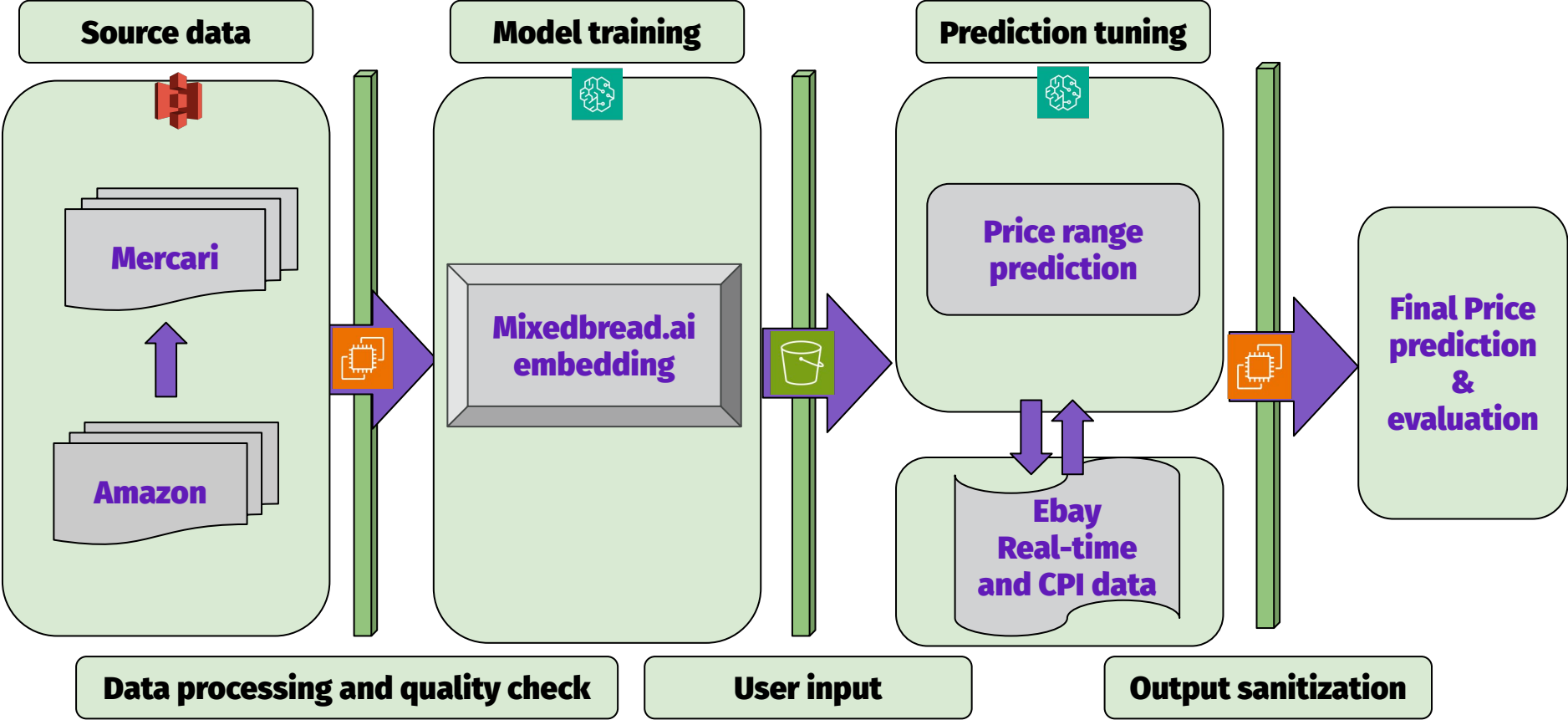
Fair Competition: Sellers at all experience levels can compete more fairly, offering better prices and quality, benefiting consumers

Our data

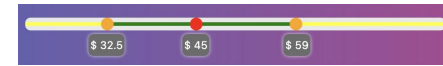
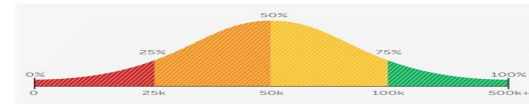
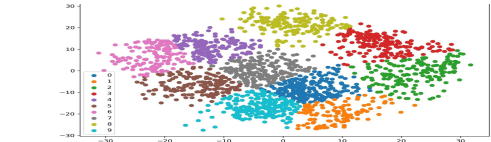
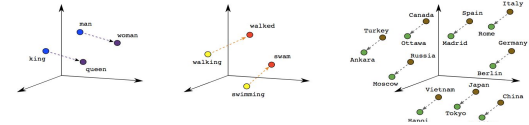
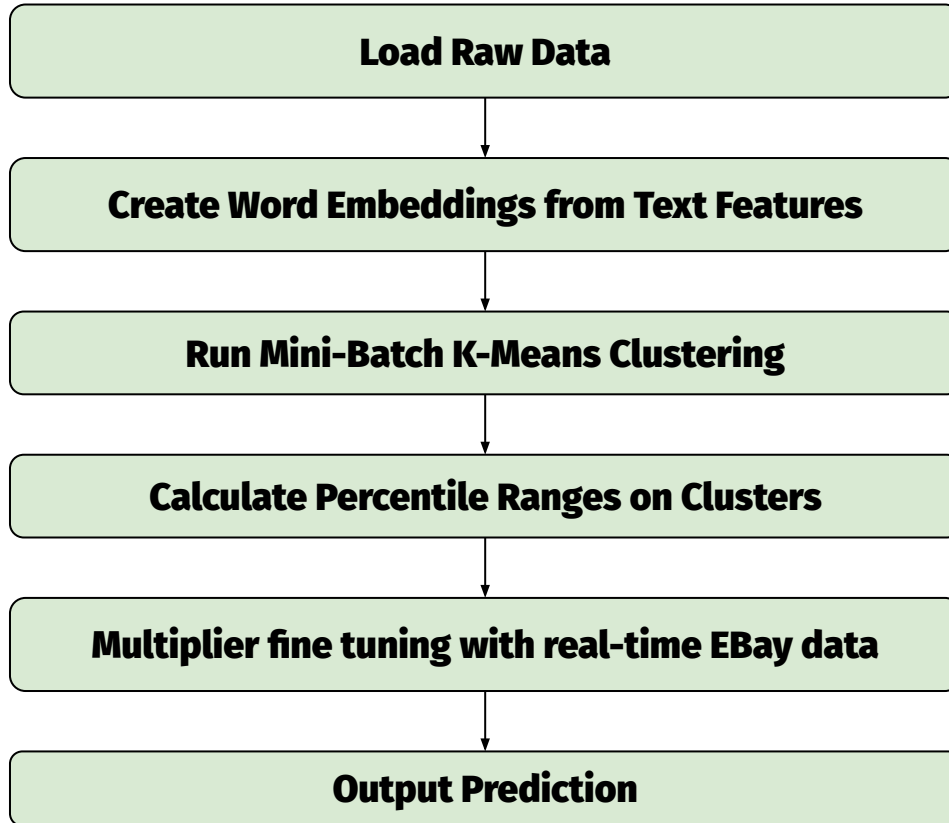


Dataset	Mercari Price Prediction (Primary)	Amazon Review (Supplementary)	eBay current listings (Secondary)
Observations	More than 700k	240 million in original dataset (100k most recent listings utilized)	120k+ observations recorded based on trained cluster characteristics
Fields	Item title, brand, category, condition, final sales price	Item title, brand, category, condition, final sales price	Item title, brand, category, condition, current listing price
Source	Kaggle	UCSD data repository	eBay Finding API
Limitations:	Historical listings collected from 2018-2019	Most recent listings recorded in 2018	Current listings; no final sales price

Data Architecture Diagram



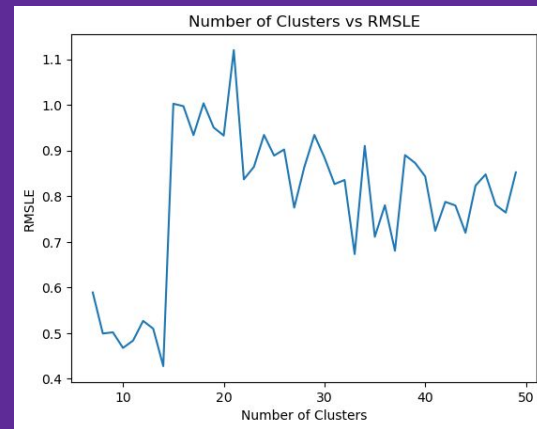
Model Pipeline Overview



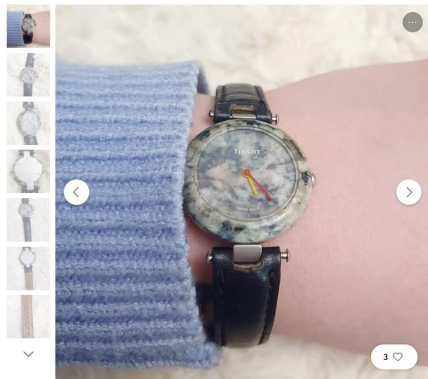
K-Means Clustering

Minibatch KMeans algorithm on training data, use cluster assignment to have 30% - 70% quantile ranges for each cluster

Convert item name and description into vectors using MixedBread AI



Mercari / Tissot / Women / Women's accessories / Watches / Vintage Tissot Rock Watch R150 Marbled Stone Swiss



New! Updated 1d ago
**Vintage Tissot Rock Watch R150
Marbled Stone Swiss**

Item Name

\$60.00

[PayPal](#) Pay in 4 interest-free payments of \$21.25.
[Learn more](#)

Add to cart

Make offer

Buy now

or

[PayPal](#) Checkout

*By continuing to checkout, you agree to the
[Mercari Privacy Policy](#) and [Terms of Service](#).

[Get CPS 2-Year Protection Plan for ONLY \\$14.99](#)
Sold separately. Purchase after checkout. [Learn more](#)

Meet the seller



Lexi's Menagerie

★★★★★ 769 reviews | 1031 listed 753 sales
Profile verified

[View profile](#)

Comments



No comments...yet

Be the first to comment

Add your comment

Details

Condition Good

Brand [Tissot](#)

Category [Women](#) [Women's accessories](#) [Watches](#)
[Tissot](#) [Watches For Women](#)

Posted 04/14/24

Tags

[#tissot](#) (463) [#rockwatch](#) [#womenswatch](#) (4K)

[#vintagewatch](#) (2K)

Description

Beautiful Tissot Rock Watch from the 1980s!
Needs a new battery! Currently unable to tell time.
The watch band was also changed prior to me acquiring it, it's still functional but you may want to get a nice band as this one is a little beat up.
The timepiece itself is in great condition, no scratches on the face, and all the screws in the back are in tact. Total length is 7 1/2 in.

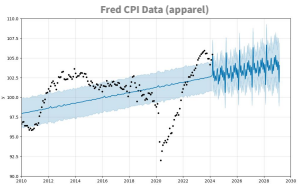
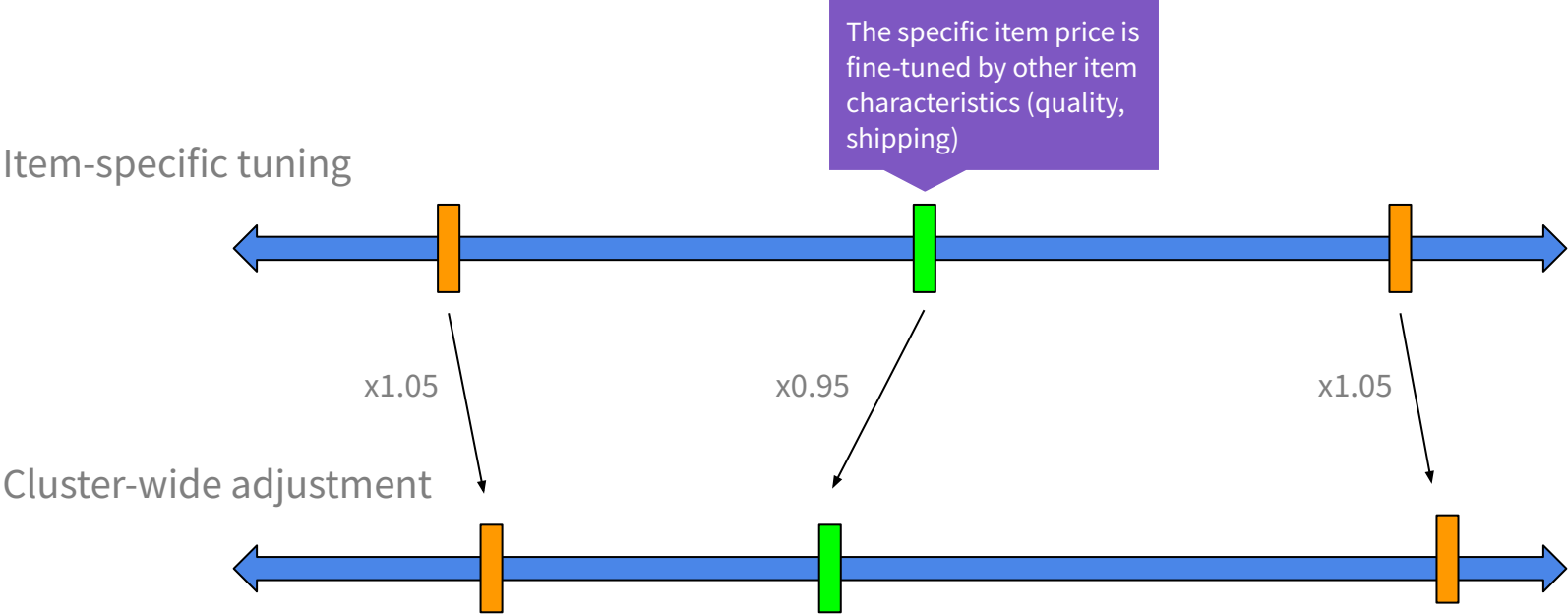
Description

Shipping & Payments

\$3.99 | 3+ days | from New York

Shipping

Multiplier Model for Fine-tuning Price Ranges



CPI and Ebay data move the lower and upper ranges



This method allows us to create a unique pricing analysis per item

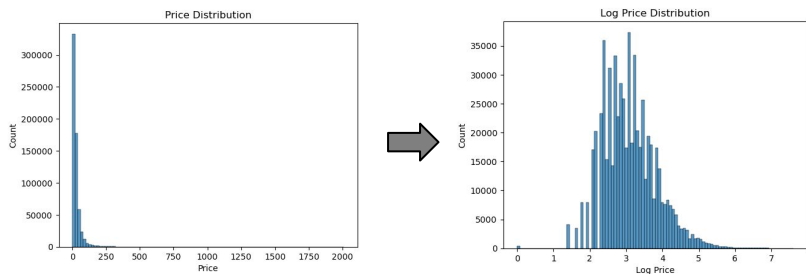
MVP Live Demo

A Mercari-based pricing dashboard that compares similar postings and recommends a price range for sellers

Results and Evaluation

We used root mean square logarithmic error (RMSLE) as our error metric in evaluating model performance and improvement

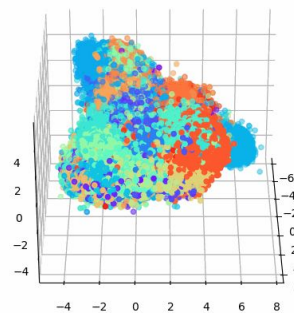
In the end, we achieved an RMSLE of 0.42 (cross-validated)



Transforming Our Data to Account for Heavy Right Skew

$$RMSLE = \sqrt{\frac{1}{N} \sum_{i=1}^N (\log(y_i + 1) - \log(\hat{y}_i + 1))^2}$$

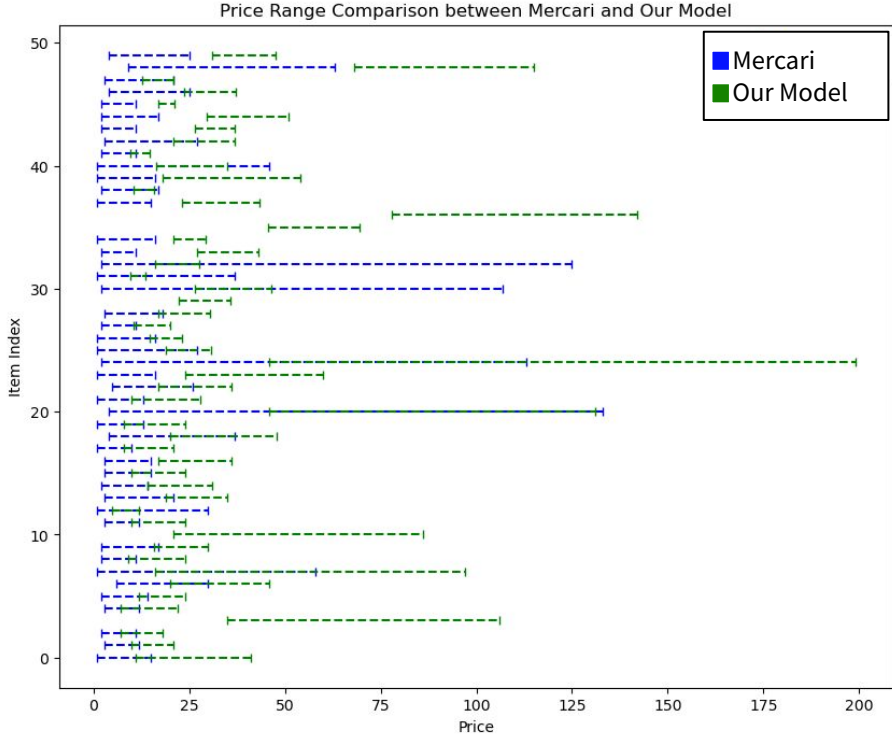
New Error Function to Account for Skewed Distribution



Ebay Data Vectorized by Our Model Projected in 3D Space

Benchmarking Against Mercari's Suggested Prices

To further validate and compare our model, we took an unseen sample from our data and used Mercari's suggested pricing tool and our tool.



More user-friendly yet
detailed interface

Item Name
Air Force Ones

Item Condition
Good

Category Name
Men/Shoes/Athletic

Brand Name
Nike

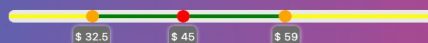
Seller Includes Shipping?
Yes

Item Description
worn once or twice.

Submit

Price Prediction Range

Based on the information you've provided, we believe your product should be priced at around \$44.77 with a lower range from \$32.64 to an upper range of \$58.97



Similar Items

Name	Description	Price
Nike Airforces	The shoes have only been worn twice. Not really my style Size 9 in women's I'm willing to negotiate	70
Nike Air Force 1s	It is in good condition. No box	36
Air Force 1s	Good condition Weren't worn that much Sz 5Y 6.5 in woman's	21
NIKE SUEDE AIR FORCE ONE	Worn only once. Selling bc i got the wrong size. lmk if u need more detail	108
Nike Air	Nike Air Force 1 shoes brand new with tag but these had some stains on the inside on the one shoe when I got them so I decided I didn't want them. Shown in last two pics the stain.	80

Unbiased and tighter
price ranges

Greater transparency
for users displaying
similar and current
listings

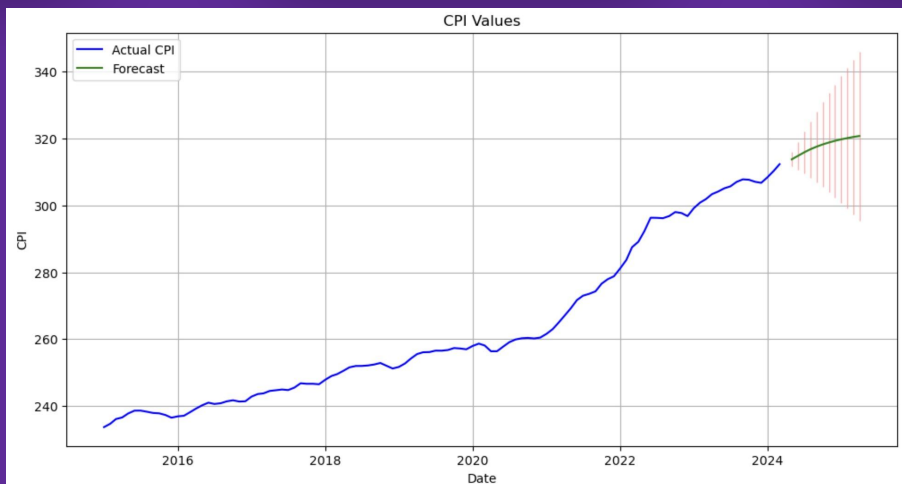


Future Developments

**Expanding into
additional
item
categories**

**Collecting live
data to adjust
to changes in
the market**

**More
modalities
(e.g. images,
videos)**



Mission Statement

**To optimize e-commerce
efficiency and promote price
transparency for all.**

