Enhance Amazon's Product Recommendation, Search, and Reviews

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BUSINESS & PROJECT OVERVIEW

Business Overview

- **Product managers** are looking to improve user experience

- User experience consists of the following:
  - Customized **recommendations**
  - Accurate **item search**
  - **Reviews** useful for decision-making

Enhance Amazon Product Recommendation, Search, and Reviews

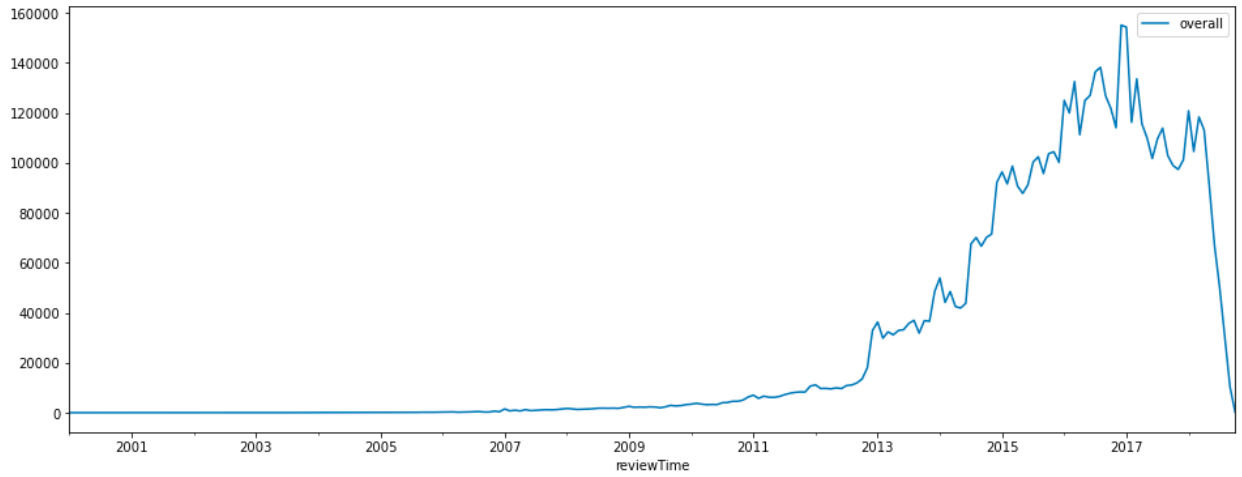
- **Product Recommendation**
  - Model-based algorithms
- **Product Search**
  - Expand search results by identifying similar groups of products
- **Product Reviews**
  - Identify key sentences in positive/negative reviews which would be useful to customers

DATA

Amazon Product Reviews from UCSD

- Category "**Pet Supplies**" for years 2013 – 2018
  - 200K items, 3M users, and 6M reviews & ratings (average is 4 stars)
  - Subset down to 8K items, 3K users, and 90K reviews & ratings for demonstration purpose

Number of Reviews by Month



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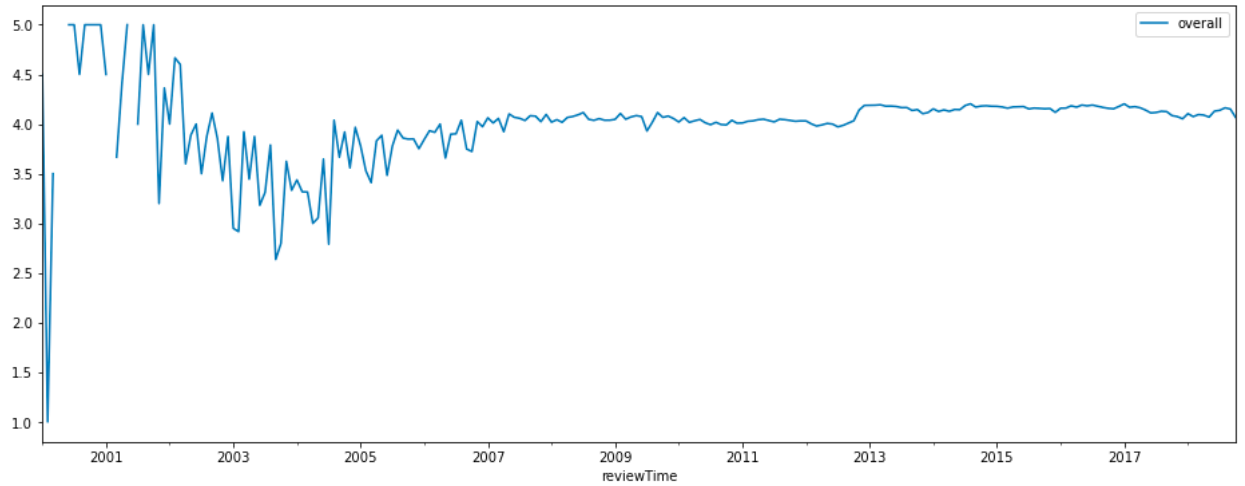
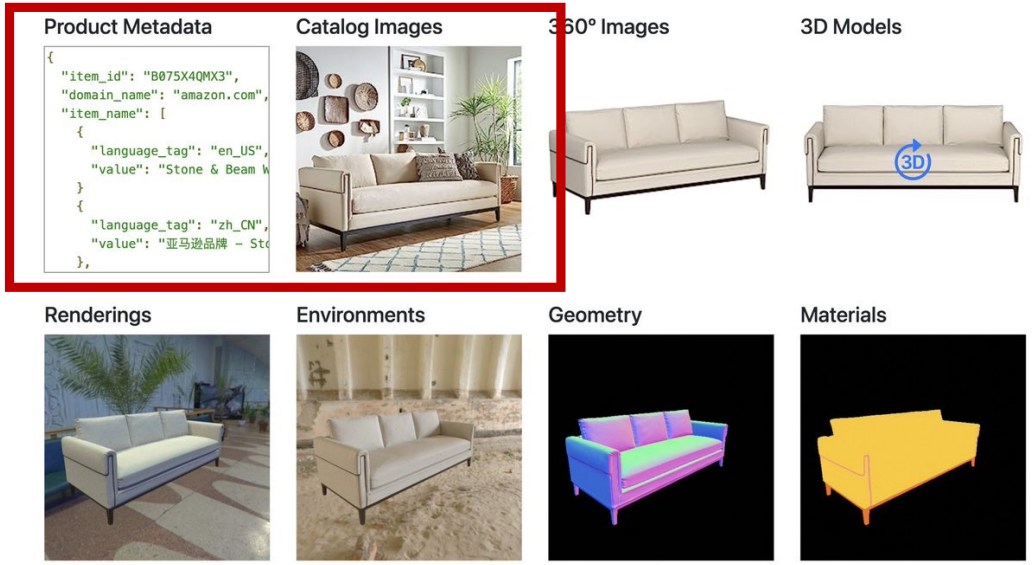


Amazon Berkeley Objects ("ABO") data

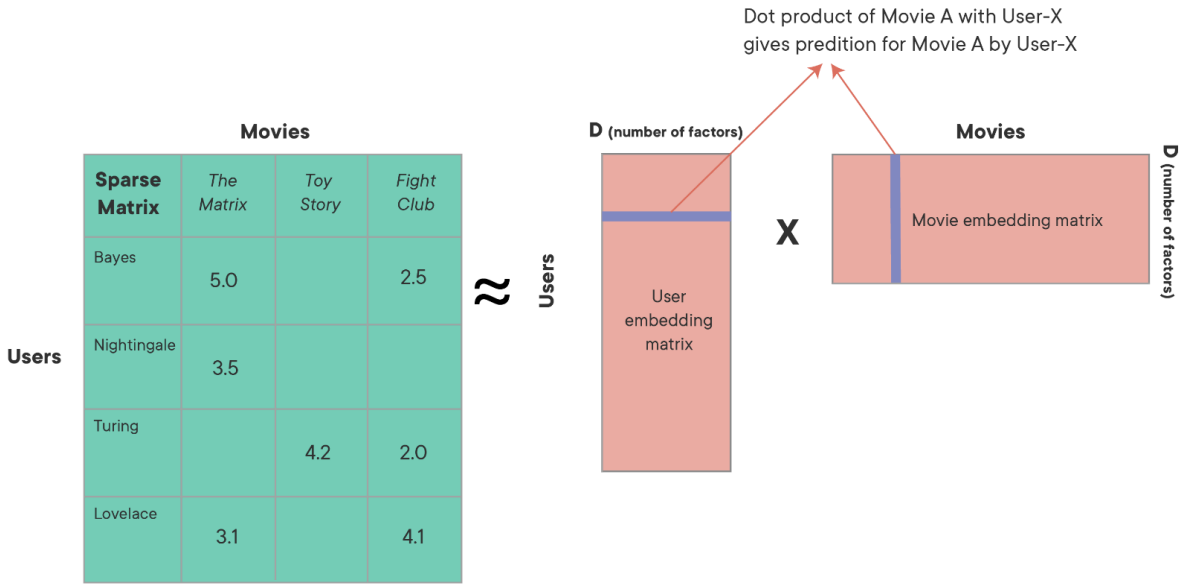
- The data contains **images**, **tags**, and other information for 50K products of various categories
- This project focuses on the category "**Shoes**" with 2.5K products



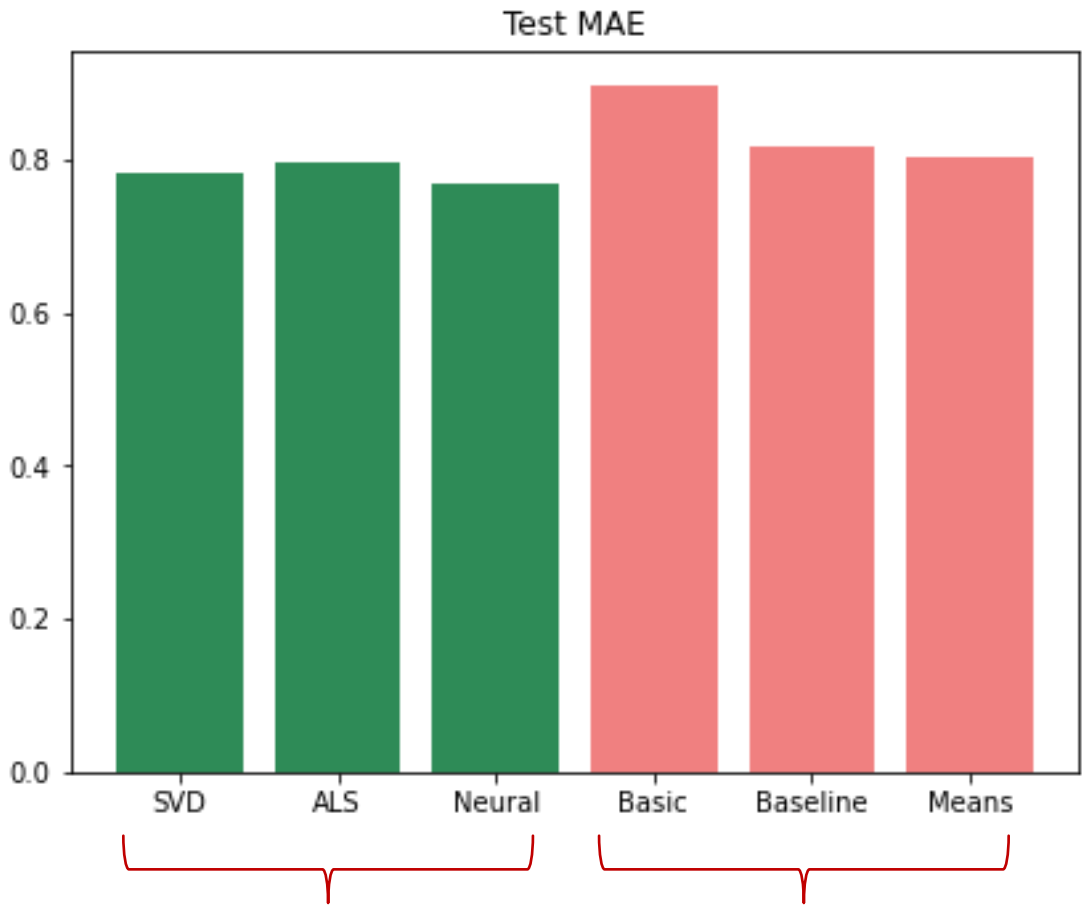
I. PRODUCT RECOMMENDATION

Enhance Product Recommendation

- **Model-based** approaches
- Compared to memory-based:
  - Scales better
  - Mitigates cold-start problems



Comparison of Prediction Accuracy



II. PRODUCT SEARCH

Enhance Product Search

- Expand search results by identify similar groups of products based on their categories
- Method: **Multi-label classification** neural network
  - Step 1) Generate categories using keywords sellers post

Categories
- Modern sofa
- Ivory sofa

  - Step 2) Use **product images** to predict **categories**

Example: Keyword “Formal Shoes”

- 4 categories containing **formal**
  - **formal** shoes for men black
  - **formal** shoes for mens leather
  - leather shoes for men **formal** branded
  - shoes for men **formal**

III. PRODUCT REVIEWS

Product Reviews

- Identify **key sentences** from **most popular reviews**

- Method: Term Frequency-Inverse Document Frequency (TF-IDF)
  - Step 1) Identify keywords from **positive/negative** reviews
  - Step 2) **Extract sentences** containing such keywords from most popular reviews

Example: “Nylabone Dura Chew Textured Dog Chew, X-Large”

Example: Top 5 Positive Reviews

- “(2560+ lbs)\nIt's really cute to walk along the aisle and see contented dogs happily holding their chew bones in their paws and gnawing away.”
- “I am so glad I got it and I suspect they are even happier!”
- “My 60 pound boxer pit mix is a fan.”
- “**Yummy & Healthy & Fun …**”
- “**Wears slowly.**”

Example: Top 5 Negative Reviews

- “Like I handed her a brick.”
- “I was told that if we got her something like this, she would not tear up anything, like my Bible, anymore.”
- “**Price is very high than local store**, you may able to buy it from Marshall or other local store with better price, and my dog evening blooding after play a while with this product, after one time use, I just through it away.”
- “so this is a big fat nope is our book of chew toys.”
- “I bought this when I had 4 dogs in the house (our two, and two puppies we were fostering), **out of 4 dogs NONE of them wanted this!**”

CONCLUSION & FUTURE WORK

Enhance Amazon Product Recommendation, Search, and Reviews

- **Product Recommendation**
  - Model-based algorithms
- **Product Search**
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- **Product Reviews**
  - Identify key sentences in positive/negative reviews which would be useful to customers

And in the Future…

- **Product Recommendation**
  - Potentially explore hybrid approaches for best performance
- **Product Search**
  - Further validate the accuracy of expanded item search
- **Product Reviews**
  - Try different formulas for pulling keywords to see which extract most useful sentences
  - Produce an evaluation tool to measure the success