Amazon Magazine Subscription Recommendation System

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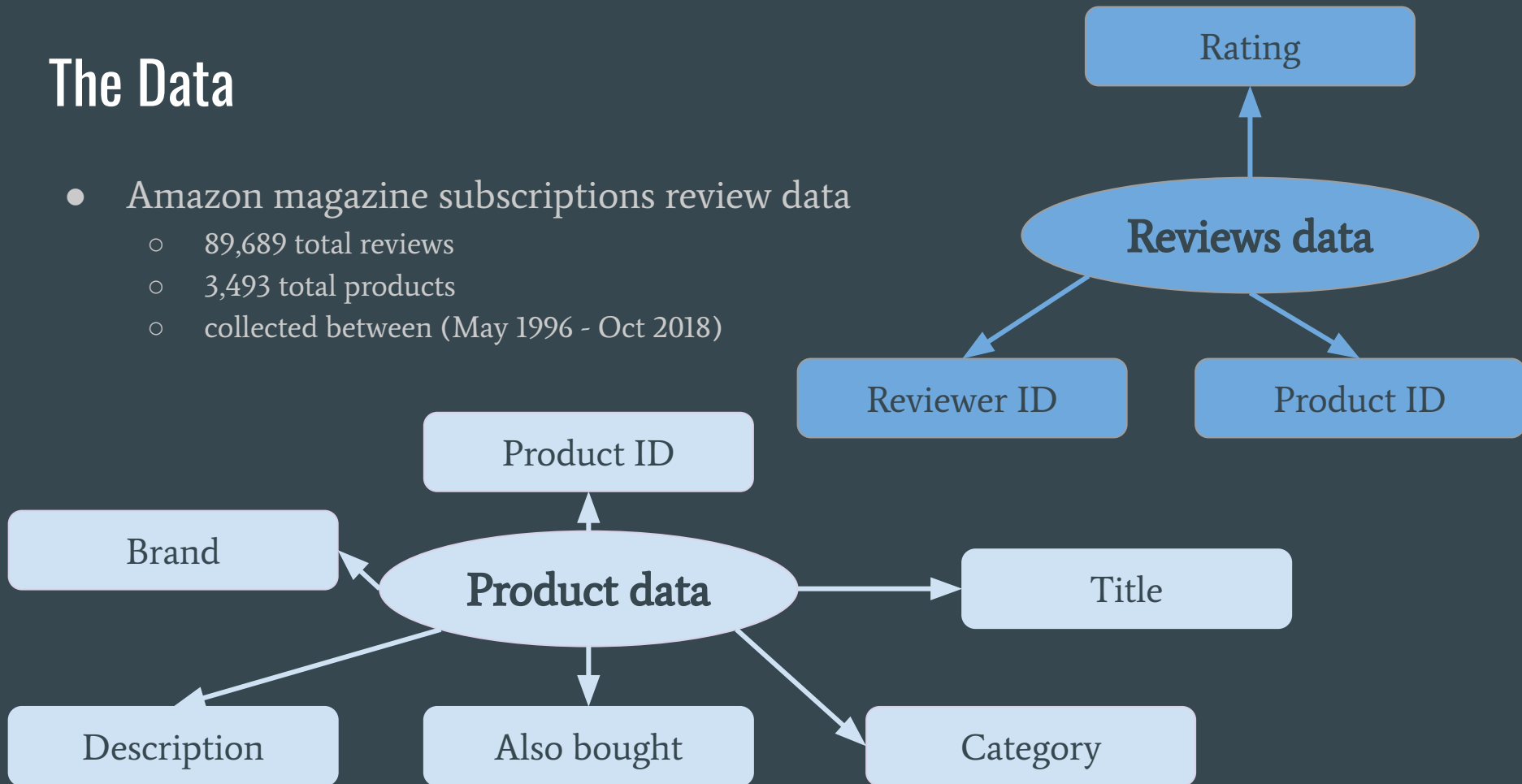By: Simona Tso

The problem

- Information overload makes it difficult for customers to find the right product
- There is an opportunity to increase sales by putting the most relevant products in front of the right customers
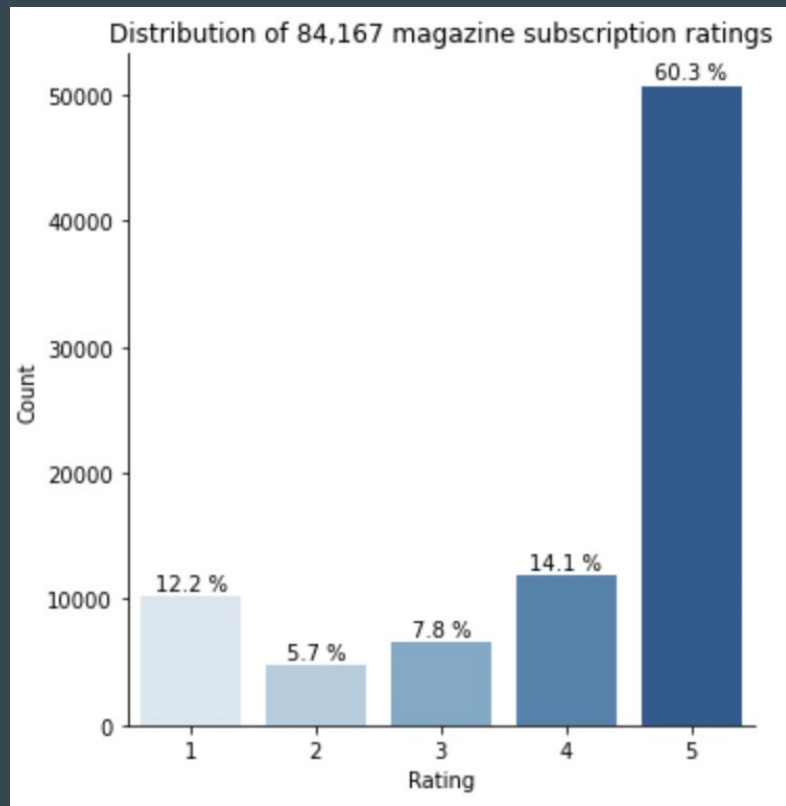
Our solution

- Personalize recommendations based on:
  - Similar users
  - Similar products
  - Most popular products
- Adopt a data-driven method to increase sales and reduce churn

The Data

- Amazon magazine subscriptions review data
  - 89,689 total reviews
  - 3,493 total products
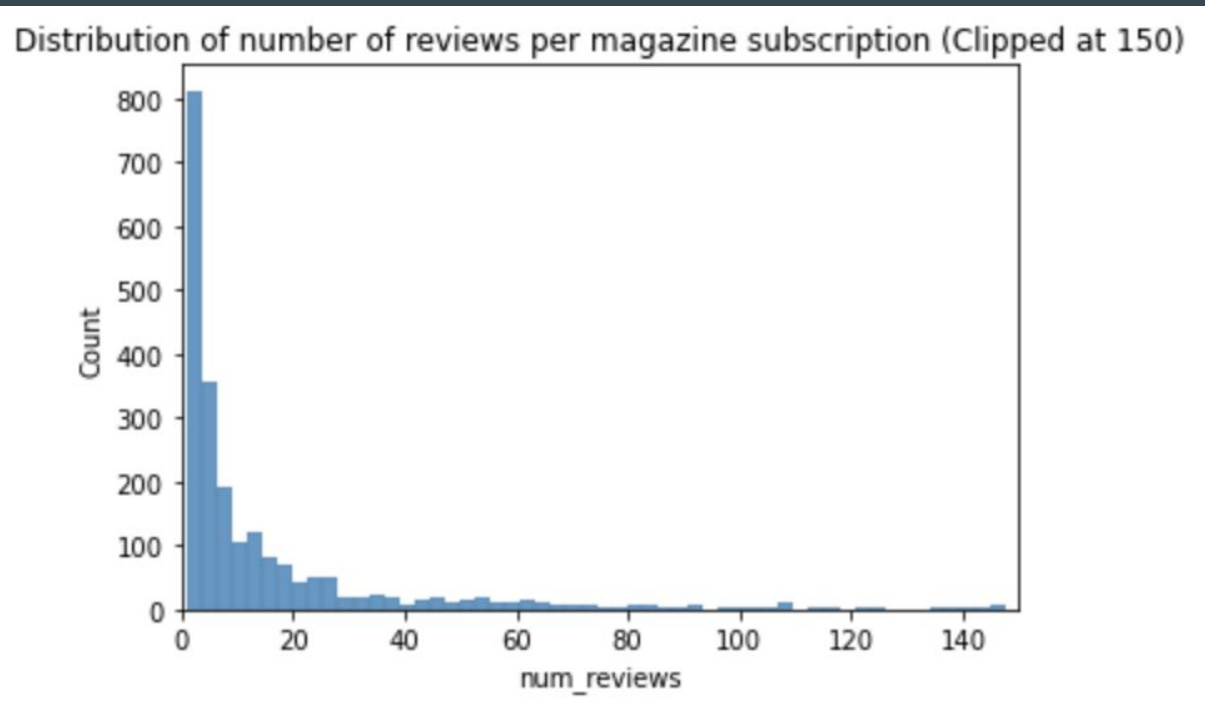 - collected between (May 1996 - Oct 2018)

Data Exploration - Distribution of Ratings

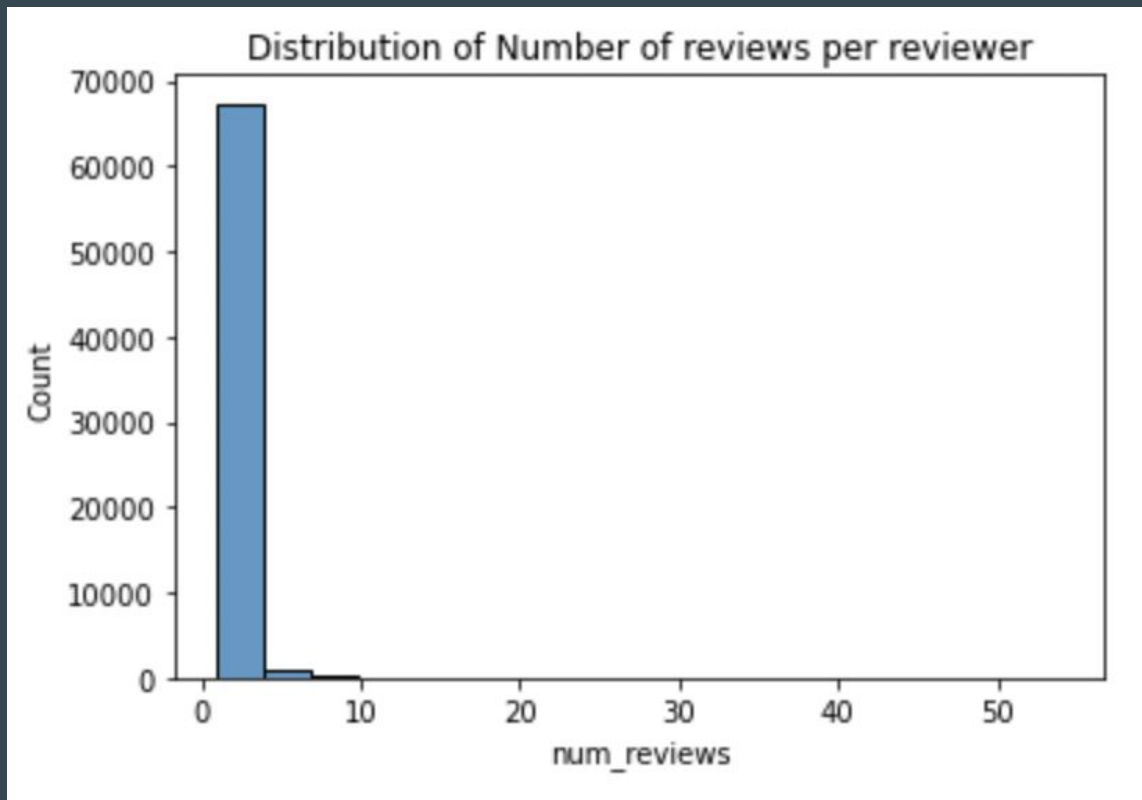Distribution of 84,167 magazine subscription ratings

- 60.3% of magazine subscriptions received 5 star ratings

- Very few magazine subscriptions received 2 & 3 star ratings

Data Exploration - Distribution of Reviews

Distribution of number of reviews per magazine subscription (Clipped at 150)

- Most magazine subscriptions received only 1 rating

- The most rated magazine received 1718 reviews

Data Exploration - Distribution of Reviewers

Distribution of Number of reviews per reviewer
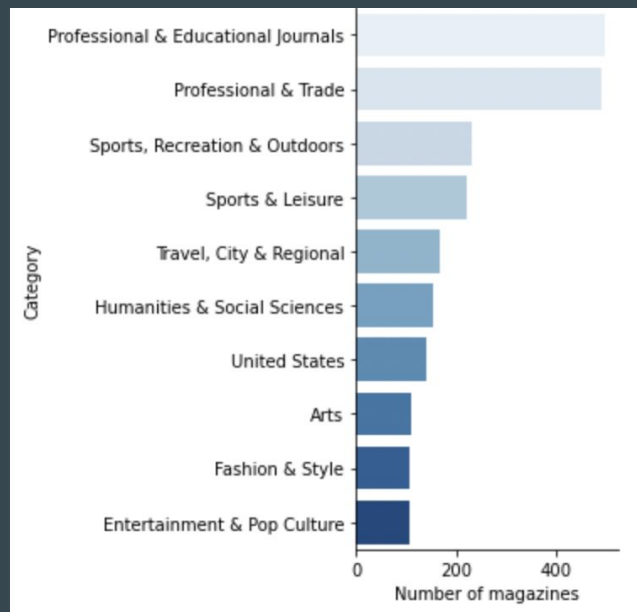
- Most reviewers only gave 1 review

- The most productive reviewer gave 54 reviews

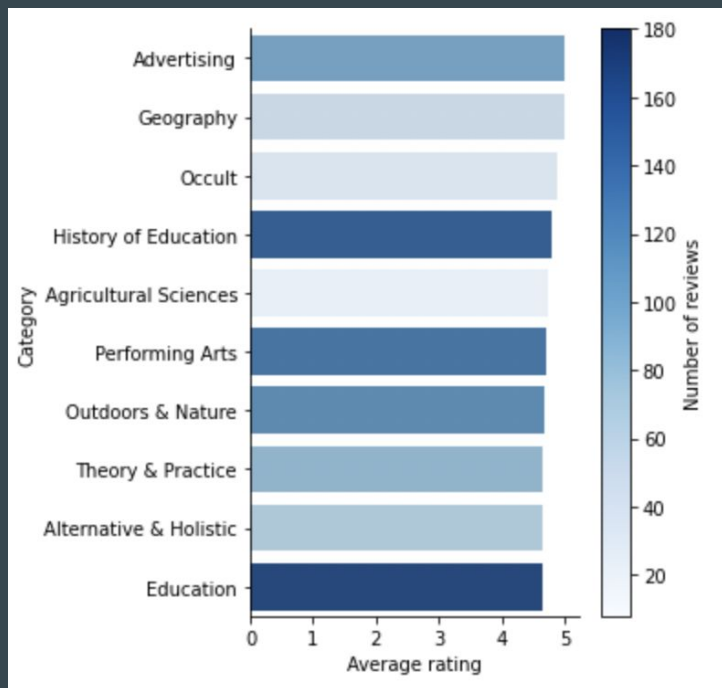# Data Exploration - Magazine Categories

Top categories by number of magazines

- Most magazines are categorized as Professional & Education journals (497 in total)

Data Exploration - Magazine Categories

Top categories by average rating

- Magazines categorized as Advertising has the highest average rating (5-stars)

- 'Education' and 'History of Education' magazines received the most reviews

Data Exploration - Most loved magazine subscriptions

1. Mystery Scene

MURDOCH MYSTERIES • BART PAUL • ELAINE VIETS

Mystery Scene
YOUR GUIDE TO THE BEST IN MYSTERY, CRIME & SUSPENSE

MARCIA CLARK
LITIGATING LITERATURE

DAVID McCALLUM
FROM NCIS TO NOVELIST

NAOMI HIRAHARA
EAST-WEST DIVIDE

GRANTCHESTER
SOCIAL CHANGE & SEXY VICARS IN POST-WWII BRITAIN

2. House & Home

Canadian
HOUSE & HOME
THE MAGAZINE OF HOME & STYLE

BEST DECORATING IDEAS FOR SPRING | AT HOME IN NASHVILLE WITH JOHNNY REID | PLANT YOUR OWN CUTTING GARDEN

Indoors & OUT

SARAH RICHARDSON'S ULTIMATE OFF-THE-GRID RETREAT

PLUS
INDIA HICKS INVITES US TO HER FARMHOUSE IN THE ENGLISH COUNTRYSIDE | TOUR THE IDYLLIC VANCOUVER GARDEN OF THOMAS HOBBS

3. Gray's Sporting Journal

Gray's Sporting Journal

The Big Game Edition

VOLUME FORTY-FOUR   ISSUE 5   OCTOBER 2019

4. B.O.S.S

THE #1 EDUCATIONAL & ENTREPRENEURIAL RESOURCE MAGAZINE FOR MINORITY YOUNG ADULTS

B.O.S.S.
Be your Own Success Story
Magazine of Today's Young Minority Leaders

CAN THESE MILLENNIALS INSPIRE A GENERATION TO...

SPEND DIFFERENT?

5. Dirt Bike

450 SHOOTOUT: OFF-ROAD & MX

DIRT BIKE
dirtbikemagazine.com
JANUARY 2009

REVIVAL!
HOW A USED BIKE WON THE TOUGHEST RACE IN THE WEST

SAVE BIG BUCKS:
TOP TEN USED BIKES YOU CAN WIN WITH

PRO RIDING SECRETS
• LEARN HOW TO TACKLE UGLY OBSTACLES
• WOODS TIPS & TRICKS

RACE TEST
• MODIFIED KTM 400XCW
• OFF-ROAD RMZ-450: FIERCE & FRIENDLY

$4.99

Data Exploration - Most disliked magazine subscriptions

1. American Baby

2. Elle Decor - Italian ed

3. Variety

4. Elle - French ed

5. V Magazine

Recommendation Systems

1. **Collaborative Filtering** using Alternating Least Squares (PySpark)
   - Test RMSE: 1.215
2. **Collaborative Filtering** using various prediction algorithms (Python)

Algorithm	KNN Baseline	SVD	Baseline Only	SVD pp	Co-Clustering	KNN With Means	Slope One	KNN With ZScore	KNN Basic	NMF	Normal Predictor
Test RMSE	1.349341	1.351881	1.362914	1.368660	1.382874	1.384150	1.387706	1.388441	1.399252	1.403964	1.800689

3. **Content-based Filtering** using cosine similarity

Recommendation Systems - Best Models

1. Collaborative filtering using Alternating Least Squares (PySpark)
   - Test RMSE: 1.215
   - Params:
     - Rank = 1, MaxIter = 1, RegParam = 1
2. Content-based filtering using cosine similarity

Case study: Amazon Customer

Maximum PC
★☆☆☆☆
- Technology Computers & Internet

Vanity Fair
★★☆☆☆
- Professional & Educational Journals Professional & Trade
- Entertainment & Media

PC World
★★★★☆
- Technology Computers & Internet

Details
★★★★★
- Fashion & Style Men

Wired
★★★★★
- Science History & Nature Technology

GQ
★★★★★
- Fashion & Style Men

Bon Appétit
★★★★★
- Cooking Food & Wine Recipes & Techniques

Xbox
★★★★★
- Literary Sci-Fi & Mystery Science fiction & fantasy Fantasy

Case study: Amazon Customer - Summary

- Male
- Interests:
    - Men's fashion
    - Cooking
    - Technology
    - Sci-fi
    - History & nature
    - Science
    - Literary
- Reviewed 5 Conde Nast magazines, 4 of which received 5-stars
- Reviewed 2 Future US, Inc. magazines, one received 1-star whilst the other received 5-stars

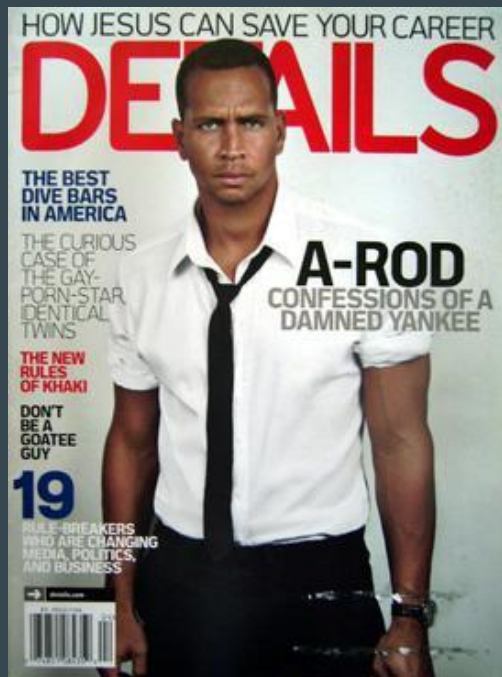# Recommendations - based on similar reviewers (ALS)

	Title	Brand	Category	Summary
1	Gourmet News	Oser Communications Group Inc	• Cooking • Food & Wine • Reference	• Gourmet industry • New products • Trade news
2	Diapason	Scranton Gillette Commun Inc	• Professional & Educational Journals • Professional & Trade • Entertainment & Media • Music	• Organ, harpsichord & church music
3	Architectural Digest	Conde Nast	• Arts • Music & Photography	• Features work of top architects & interior decorators
4	Allure	Conde Nast	• Fashion & Style	• Beauty expert advice & tips
5	Professional Artist	Turnstile Publ	• Music & Photography, • Art & Art History	• Guide artists on their journey toward making a living with their art

Do these recommendations make sense?

	Title	Matching criterias	Possible reasoning

1	Gourmet News	• Categories:
		  ○ Cooking
		  ○ Food & Wine	

2	Diapason		• A high proportion of the user's demographic may be interested in this magazine
3	Architectural Digest	• Brand: Conde Nast	
4	Allure	• Brand: Conde Nast	• Fashion & Style Men is a subset of Fashion & Style
5	Professional Artist		• Art & Art History is similar to History & Nature

Recommendations - based on similar magazines

Which magazines are most similar to 'Details' ?

- Fashion & Style, Men

- Conde Nast Publications

- "Hottest fashion, celebrities, movies, music, ideas, technology & issues of the day"

Recommendations - based on similar magazines (Details magazine)

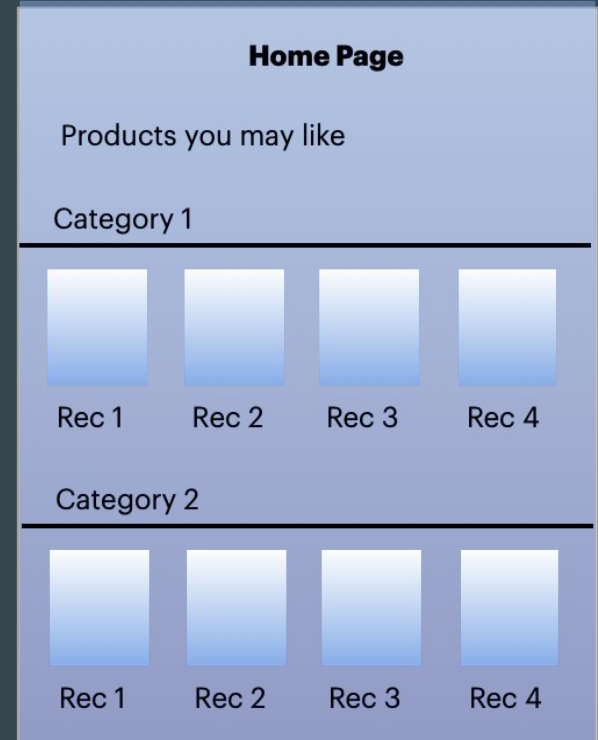|	Title	Brand	Category	Summary
1	Vanity Fair	Conde Nast Publications	- Professional & Educational Journals - Professional & Trade - Entertainment & Media	People, personalities & power
2	Cowboys & Indians	Cowboys & Indians	- Travel - City & Regional - United States - South	- Luxury western lifestyle - Western & American Indian art, interiors, fashion and jewelry
3	Esquire	Reader's Digest Association	Fashion & Style Men	- Men's lifestyle - Style & clothes, cars, culture & entertainment and advice on money
4	Coastal Living	Meredith Corporation	- Home & Garden - Design & Decoration	- Homes & destinations on coastlines of US, Canada & Carribean - Recipes, coastal news, products & events
5	Glamour	Conde Nast Publications	Fashion & Style Women	- Hair & Beauty - Relationship & sex questions - Monthly horoscopes - Health & diet

Do these recommendations make sense?

	Title	Matching criterias	Possible reasoning
1	Vanity Fair	• Brand: Conde Nast	• Celebrities
2	Cowboys & Indians		• A type of Men's Lifestyle
3	Esquire	• Categories: ○ Fashion & Style Men	
4	Coastal Living		• A type of Men's lifestyle
5	Glamour	• Brand: Conde Nast	• Lifestyle content

Conclusion

- Best models:
  - Collaborative filtering using Alternating Least Squares (PySpark)
    - Test RMSE: 1.215
  - Content-based filtering using cosine similarity
- Recommendation systems can help increase sales & reduce churn by:
  - Displaying the most relevant items that users are interested in
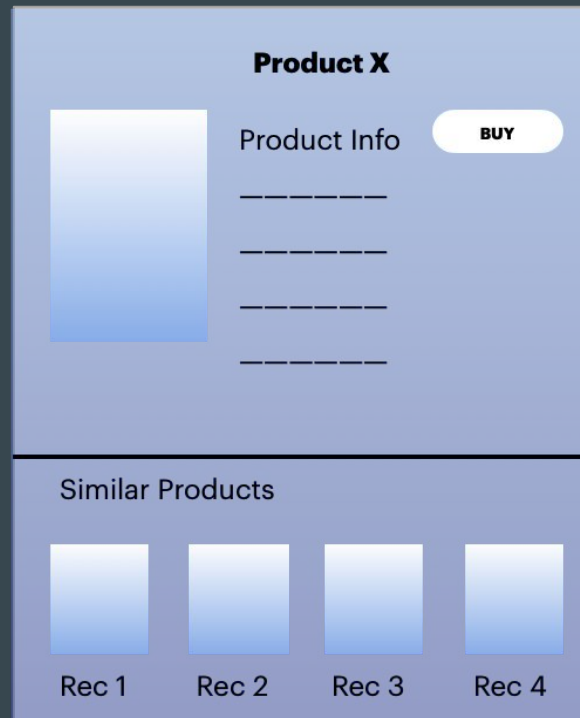 - Helping users discover new items

Recommendations - Collaborative Filtering Recommendation System

- Display collaborative filtering recommendations on a customer's home page

Home Page

Products you may like

Category 1

Rec 1   Rec 2   Rec 3   Rec 4

Category 2

Rec 1   Rec 2   Rec 3   Rec 4

Recommendations - Content-Based Filtering Recommendation System

- Display content-based filtering recommendations on product pages

Recommendations - Cold Start Problem

- Cold Start Problem:
  - New users don't have any ratings
  - Recommendation systems will not work
- Solution:
  - Show new users the most popular items (generated from exploratory data analysis)

Future Scope

- Use image recognition to include magazine covers
- Sentiment analysis on review text
- Use A/B testing to determine which recommendation system works best/ the best places to display recommendations
- Additional dataset:
  - User demographic
  - Entire Amazon Reviews dataset (all categories)