

# Amazon Magazine Subscription Recommendation System

...

By: Simona Tso

# The problem

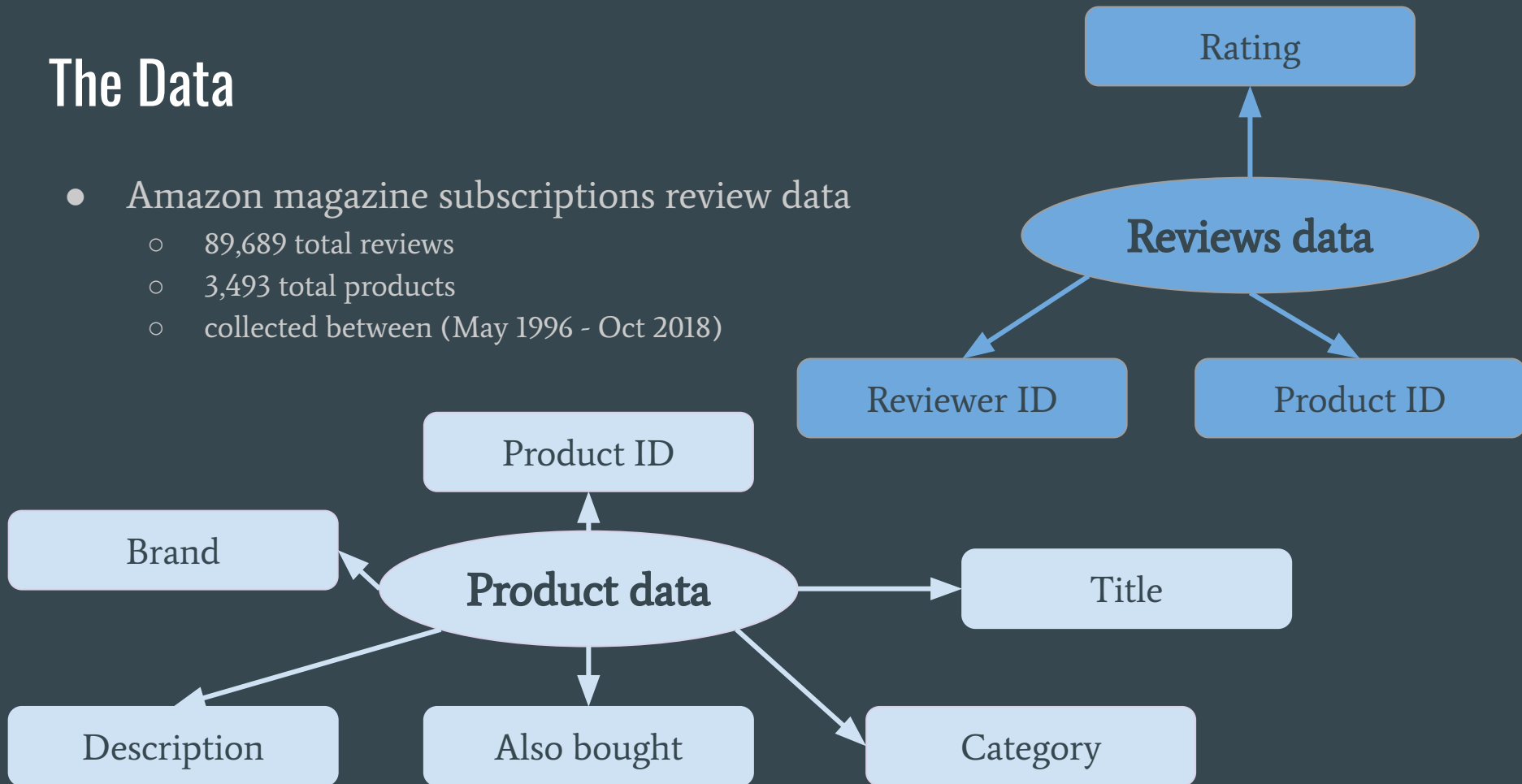
- Information overload makes it difficult for customers to find the right product
- There is an opportunity to increase sales by putting the most relevant products in front of the right customers

# Our solution

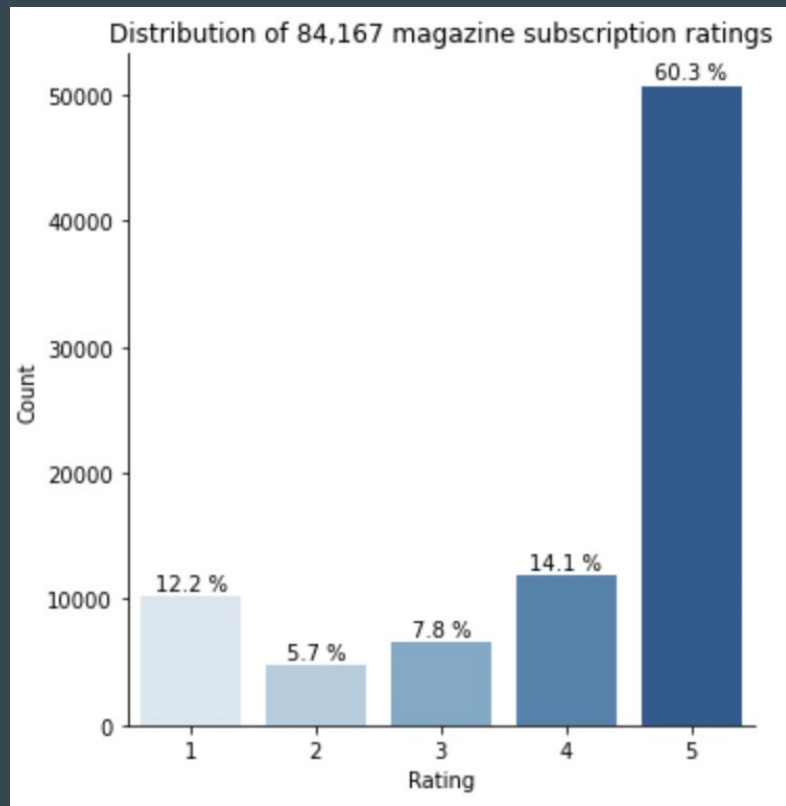
- Personalize recommendations based on:
  - Similar users
  - Similar products
  - Most popular products
- Adopt a data-driven method to increase sales and reduce churn

# The Data

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

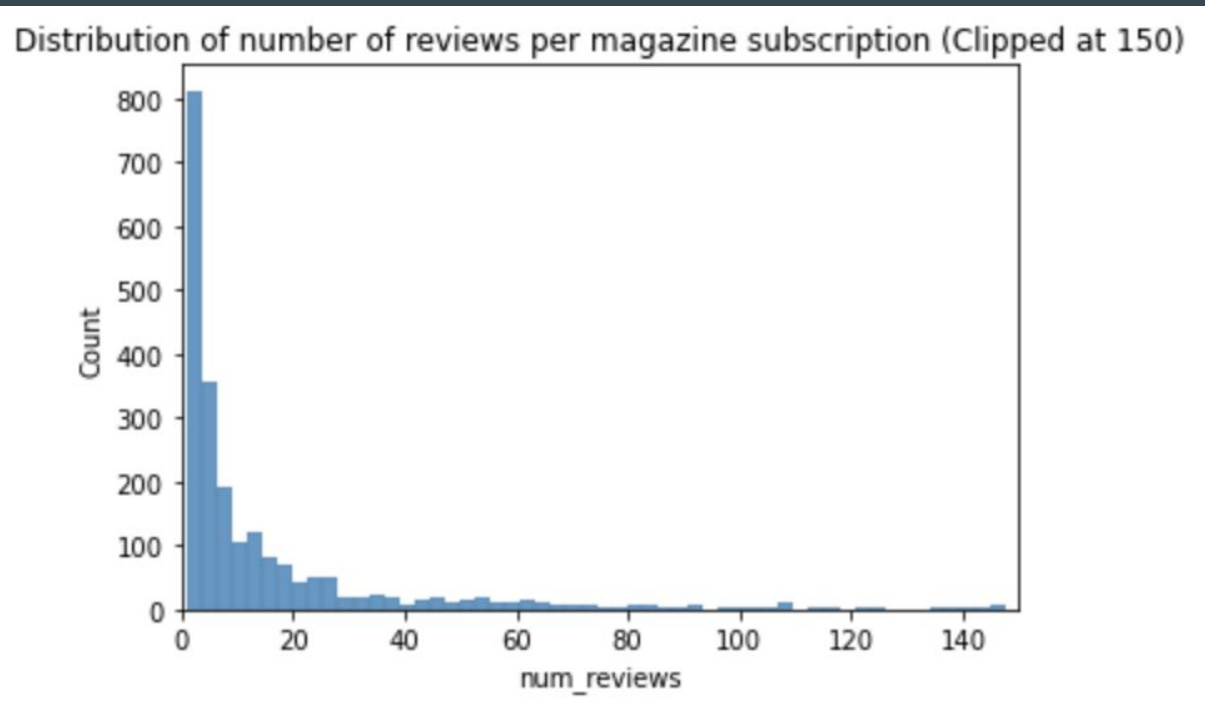


# Data Exploration - Distribution of Ratings



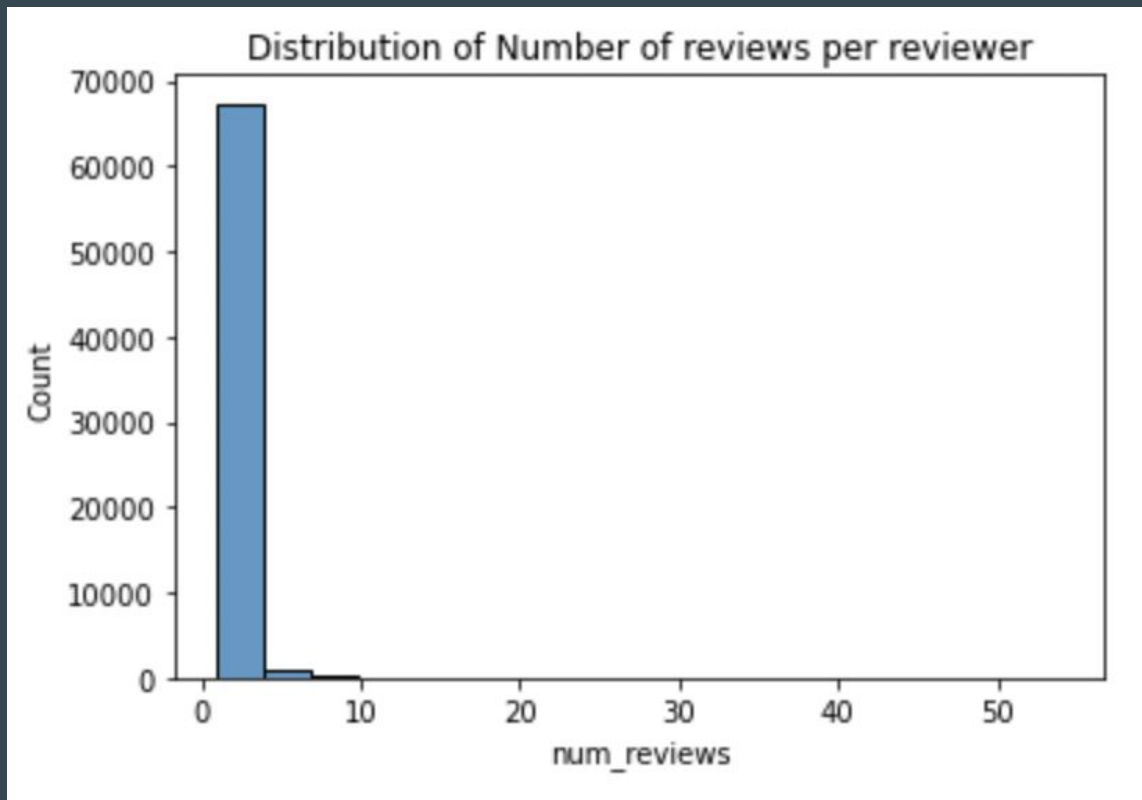
- 60.3% of magazine subscriptions received 5 star ratings
- Very few magazine subscriptions received 2 & 3 star ratings

# Data Exploration - Distribution of Reviews



- Most magazine subscriptions received only 1 rating
- The most rated magazine received 1718 reviews

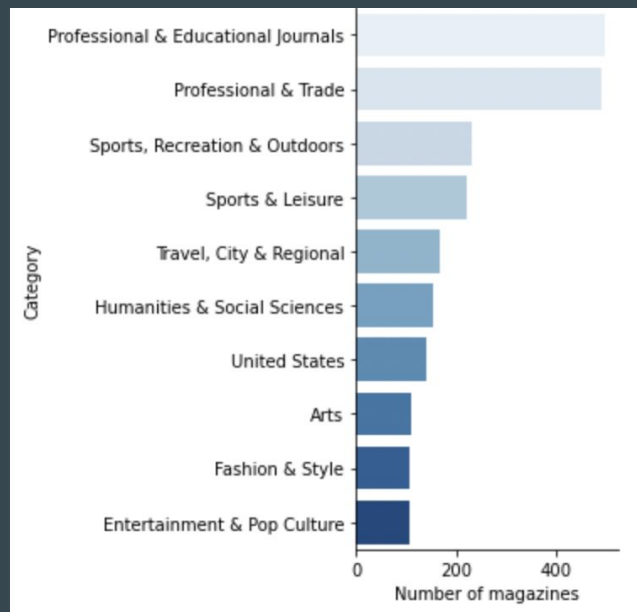
# Data Exploration - Distribution of Reviewers



- Most reviewers only gave 1 review
- The most productive reviewer gave 54 reviews

# Data Exploration - Magazine Categories

Top categories by number of magazines

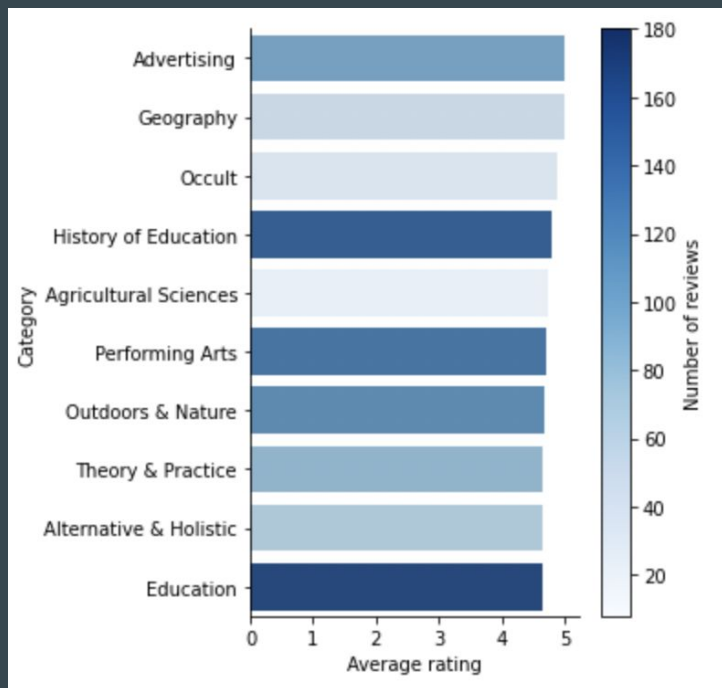


- Most magazines are categorized as Professional & Education journals (497 in total)



# 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



2. House & Home



3. Gray's Sporting Journal



4. B.O.S.S



5. Dirt Bike



# 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	KNN With ZScore	Slope One	KNN Basic	NMF	Normal Predictor
Test RMSE	1.349	1.351	1.363	1.369	1.379	1.382	1.383	1.388	1.398	1.404	1.803

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



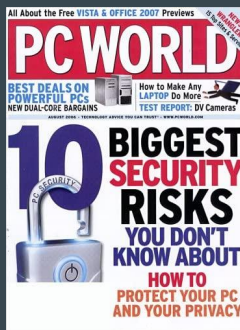
- Technology
- Computers & Internet

## 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

# Do these recommendations make sense?

	Title	Matching criterias	Possible reasoning
1	Vanity Fair	<ul style="list-style-type: none"><li>• Brand: Conde Nast</li></ul>	<ul style="list-style-type: none"><li>• Celebrities</li></ul>
2	Cowboys & Indians		<ul style="list-style-type: none"><li>• A type of Men's Lifestyle</li></ul>
3	Esquire	<ul style="list-style-type: none"><li>• Categories:<ul style="list-style-type: none"><li>○ Fashion &amp; Style Men</li></ul></li></ul>	
4	Coastal Living		<ul style="list-style-type: none"><li>• A type of Men's lifestyle</li></ul>
5	Glamour	<ul style="list-style-type: none"><li>• Brand: Conde Nast</li></ul>	<ul style="list-style-type: none"><li>• Lifestyle content</li></ul>

# 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	<ul style="list-style-type: none"><li>• Cooking</li><li>• Food &amp; Wine</li><li>• Reference</li></ul>	<ul style="list-style-type: none"><li>• Gourmet industry</li><li>• New products</li><li>• Trade news</li></ul>
2	Diapason	Scranton Gillette Commun Inc	<ul style="list-style-type: none"><li>• Professional &amp; Educational Journals</li><li>• Professional &amp; Trade</li><li>• Entertainment &amp; Media</li><li>• Music</li></ul>	<ul style="list-style-type: none"><li>• Organ, harpsichord &amp; church music</li></ul>
3	Architectural Digest	Conde Nast	<ul style="list-style-type: none"><li>• Arts</li><li>• Music &amp; Photography</li></ul>	<ul style="list-style-type: none"><li>• Features work of top architects &amp; interior decorators</li></ul>
4	Allure	Conde Nast	<ul style="list-style-type: none"><li>• Fashion &amp; Style</li></ul>	<ul style="list-style-type: none"><li>• Beauty expert advice &amp; tips</li></ul>
5	Professional Artist	Turnstile Publ	<ul style="list-style-type: none"><li>• Music &amp; Photography,</li><li>• Art &amp; Art History</li></ul>	<ul style="list-style-type: none"><li>• Guide artists on their journey toward making a living with their art</li></ul>

# Do these recommendations make sense?

	Title	Matching criterias	Possible reasoning
1	Gourmet News	<ul style="list-style-type: none"><li>• Categories:<ul style="list-style-type: none"><li>◦ Cooking</li><li>◦ Food &amp; Wine</li></ul></li></ul>	
2	Diapason		<ul style="list-style-type: none"><li>• A high proportion of the user's demographic may be interested in this magazine</li></ul>
3	Architectural Digest	<ul style="list-style-type: none"><li>• Brand: Conde Nast</li></ul>	
4	Allure	<ul style="list-style-type: none"><li>• Brand: Conde Nast</li></ul>	<ul style="list-style-type: none"><li>• Fashion &amp; Style Men is a subset of Fashion &amp; Style</li></ul>
5	Professional Artist		<ul style="list-style-type: none"><li>• Art &amp; Art History is similar to History &amp; Nature</li></ul>

# 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)

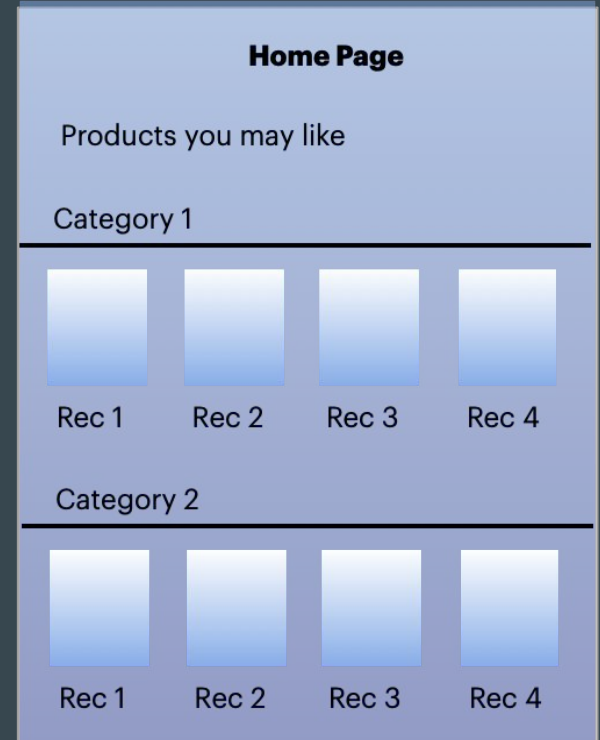
	Title	Brand	Category	Summary
1	Vanity Fair	Conde Nast Publications	<ul style="list-style-type: none"><li>• Professional &amp; Educational Journals</li><li>• Professional &amp; Trade</li><li>• Entertainment &amp; Media</li></ul>	<ul style="list-style-type: none"><li>• People, personalities &amp; power</li></ul>
2	Cowboys & Indians	Cowboys & Indians	<ul style="list-style-type: none"><li>• Travel</li><li>• City &amp; Regional</li><li>• United States</li><li>• South</li></ul>	<ul style="list-style-type: none"><li>• Luxury western lifestyle</li><li>• Western &amp; American Indian art, interiors, fashion and jewelry</li></ul>
3	Esquire	Reader's Digest Association	<ul style="list-style-type: none"><li>• Fashion &amp; Style Men</li></ul>	<ul style="list-style-type: none"><li>• Men's lifestyle</li><li>• Style &amp; clothes, cars, culture &amp; entertainment and advice on money</li></ul>
4	Coastal Living	Meredith Corporation	<ul style="list-style-type: none"><li>• Home &amp; Garden</li><li>• Design &amp; Decoration</li></ul>	<ul style="list-style-type: none"><li>• Homes &amp; destinations on coastlines of US, Canada &amp; Carribean</li><li>• Recipes, coastal news, products &amp; events</li></ul>
5	Glamour	Conde Nast Publications	<ul style="list-style-type: none"><li>• Fashion &amp; Style Women</li></ul>	<ul style="list-style-type: none"><li>• Hair &amp; Beauty</li><li>• Relationship &amp; sex questions</li><li>• Monthly horoscopes</li><li>• Health &amp; diet</li></ul>

# 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

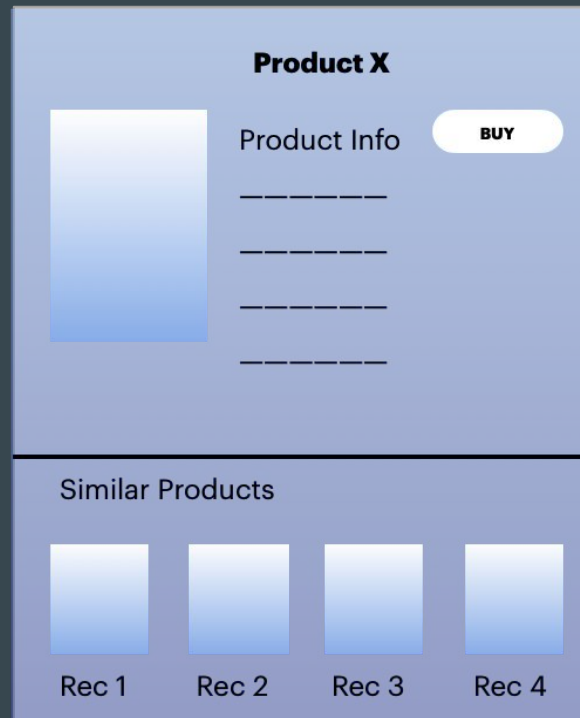
# Recommendations - Collaborative Filtering Recommendation System

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



# 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)