SOCIAL NETWORK FINAL PROJECT
Recommendation System

Team Sixth Sense

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AGENDA

Our Objective

Data Description

Analytical Approach

Predictions of Model

Implication & insights

Q & A

comSCORE

Build a recommendation system using the Comscore E-commerce database based on different algorithms such as Jaccard similarity, Cosine similarity, and R recommenderlab package.

Data Description

Comscore dataset US customers online shopping behavior

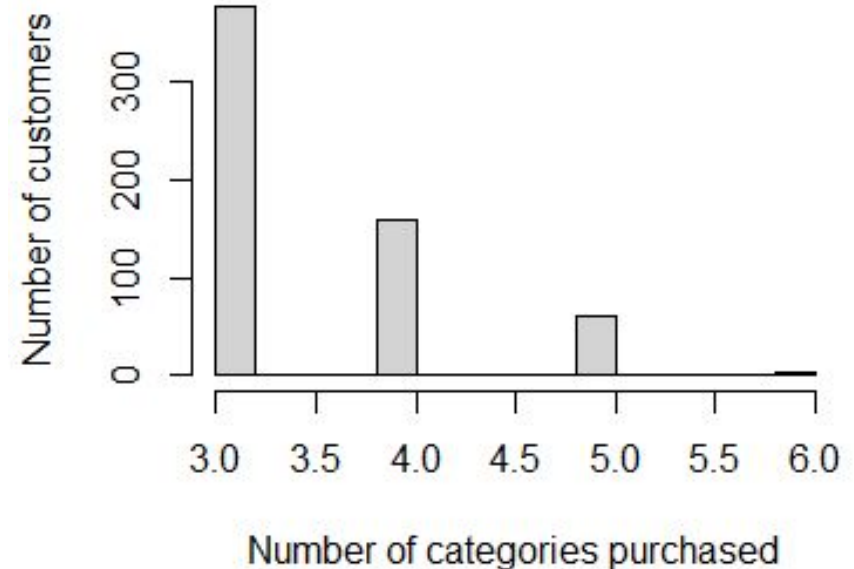- Unique machine ID

- Product category

Transform the data to create the affiliation matrix

- Row: User ID

- Column: Book category
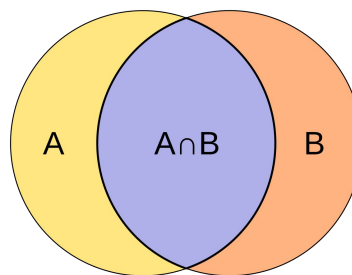

Histogram of customer's purchases

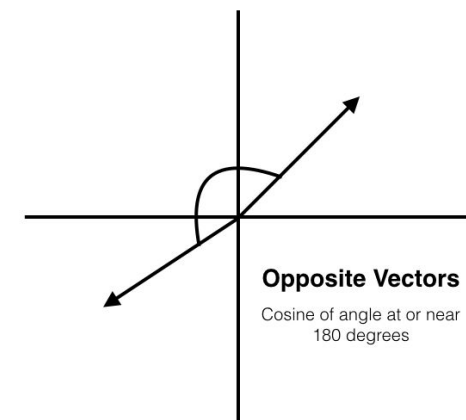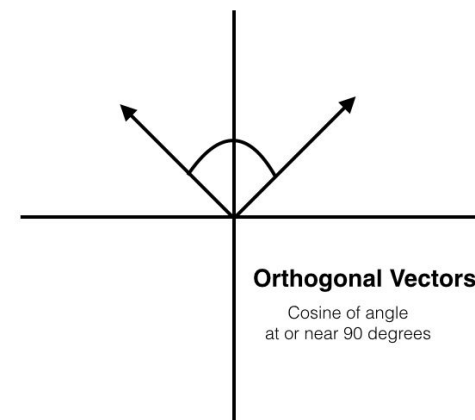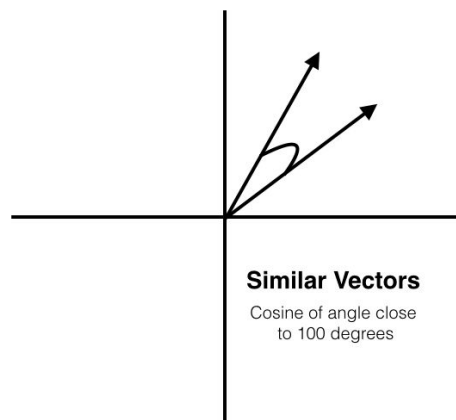|	Book Category 1	Book Category 2	Book Category 3	Book Category 4	Book Category 5	Book Category 6	Book Category 7	Book Category 8	Book Category 9	Book Category 10	Book Category 11	Book Category 12	Book Category 13	Book Category 14	Book Category 15
User 1	0	1	0	0	0	1	1	0	1	1	1	1	0	0	1
User 2	1	0	0	0	1	0	0	0	1	0	0	1	0	0	1
User 3	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1
User 4	0	1	1	0	0	1	1	0	1	1	1	1	0	0	1
User 5	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
User 6	0	1	0	0	0	0	1	0	1	0	0	1	0	0	1
User 7	1	1	1	1	0	1	1	1	1	0	0	1	0	0	1
User 8	1	0	0	0	0	1	1	0	1	0	0	1	0	1	1
User 9	0	1	1	1	0	1	0	0	1	0	0	1	0	0	1
User 10	1	0	0	0	0	1	0	0	1	0	0	1	1	1	1
User 11	1	0	0	0	0	1	0	0	1	0	0	1	1	1	1
User 12	1	0	1	0	1	1	0	0	1	0	0	1	0	0	1
User 13	1	0	0	0	0	1	0	0	1	0	0	1	1	1	1
User 14	1	1	0	0	0	1	1	1	1	0	1	1	0	0	1
User 15	1	0	0	0	0	1	0	0	1	0	0	1	0	1	1
User 16	1	0	0	0	0	1	0	0	1	0	0	1	0	1	1
User 17	0	1	0	0	0	0	1	0	1	1	0	1	0	0	1
User 18	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1
User 19	1	0	0	0	0	0	0	0	1	0	0	1	0	0	1
User 20	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0
User 21	0	1	1	0	0	1	1	0	1	1	0	1	0	0	1
User 22	1	1	1	1	0	1	1	1	1	0	0	1	0	0	1

Analytical Approach

Jaccard Similarity vs. Cosine Similarity

$$J(A, B) = \frac{|A \cap B|}{|A \cup B|}$$

$$\cos(\theta) = \frac{\sum_{i=1}^{n} A_i B_i}{\sqrt{\sum_{i=1}^{n} A_i^2} \sqrt{\sum_{i=1}^{n} B_i^2}}$$

A   A∩B   B

Similar Vectors

Cosine of angle close
to 100 degrees

Orthogonal Vectors

Cosine of angle
at or near 90 degrees

Opposite Vectors

Cosine of angle at or near
180 degrees

Jaccard Similarity Method

Jaccard Similarity Matrix								
	User 1	User 2	User 3	User 4	User 5	User 6	User 7	User 8
User 1		0.7143	0.8333	0.8333	0.667	0.6667	0.5	0.5
User 2	0.7143		0.8333	0.8333	0.667	0.6667	0.5	0.5
User 3	0.8333	0.8333		1	0.8	0.8	0.6	0.6
User 4	0.8333	0.8333	1		0.8	0.8	0.6	0.6
User 5	0.6667	0.6667	0.8	0.8		0.6	0.75	0.4
User 6	0.6667	0.6667	0.8	0.8	0.6		0.4	0.75
User 7	0.5	0.5	0.6	0.6	0.75	0.4		0.5
User 8	0.5	0.5	0.6	0.6	0.4	0.75	0.5	

Recommendations Based on Jaccard Similarity

Recommendations			
	User 3	User 4	User 2
User 1			COOKING, FOOD & WINE
	User 3	User 4	User 1
User 2			ROMANCE
	User 1	User 2	
User 3	ROMANCE		
	User 1	User 2	
User 4	ROMANCE	COOKING, FOOD & WINE	
	User 3	User 4	
User 5	LITERATURE & FICTION	LITERATURE & FICTION	
	User 3	User 4	
User 6	ART, MUSIC & PHOTOGRAPHY	ART, MUSIC & PHOTOGRAPHY	
	User 5		
User 7	TEXTBOOKS		
	User 6		
User 8	TEXTBOOKS		

Recommenderlab in R

Package used in R: Recommenderlab

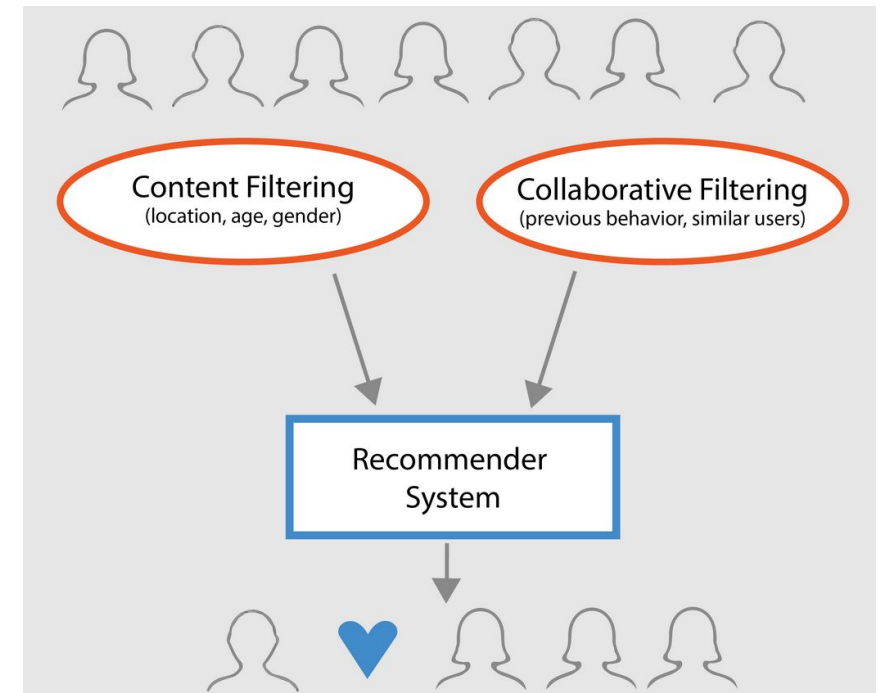Recommendation algorithm: collaborative filtering algorithm

Method: Cosine similarity & Jaccard similarity

Output

User ID	Recommendation
user 1	Calendar
user 2	ART, MUSIC & PHOTOGRAPHY

Evaluation

```
              RMSE      MSE      MAE
cosine   22.01791  484.7885  9.490743
jaccard  21.64685  468.5862  9.041618
```


Content Filtering
(location, age, gender)

Collaborative Filtering
(previous behavior, similar users)

Recommender System

Implication & Insights

- Amazon and other e-commerce platforms can utilize this methodology in order to make better recommendations for their customers

- Use cases for Cosine similarity and Jaccard similarity are different

- Both methods can be implemented to increase sales and improve customer satisfaction