The background features a complex network of thin grey lines and dots, forming a web-like structure. Scattered throughout are various triangles of different sizes and orientations, some with solid dots at their vertices. The overall aesthetic is technical and modern.

# Unipartite vs Bipartite Recommender Systems

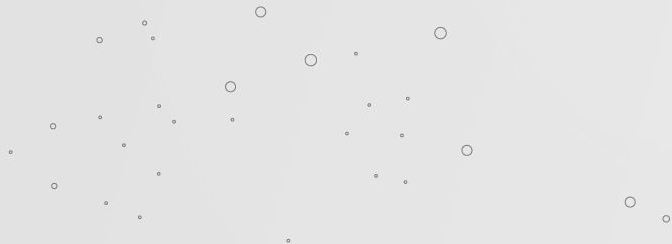
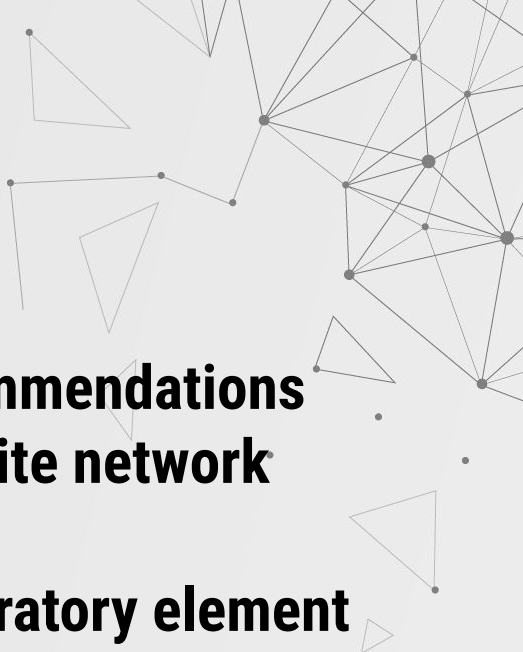
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Rachel Meade  
Rocco Lange  
Sebastian Osorio  
Pedro Ivo Rivas  
Robbie Geoghegan

## Project objective

**Explore the information gain associated with recommendations from a bipartite network compared with a unipartite network**

**Our hypothesis was a bipartite network has an exploratory element that allows users to see recommendations outside their immediate clusters**



The initial network contained  
over 982,619 bipartite edges

---

## KINDLE BOOK REVIEWS

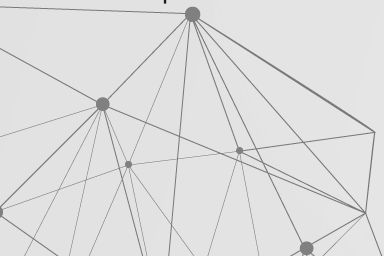
Source: Kaggle

61,934 Books

68,223 Reviewers

Each book reviewed at least 5 times

Each person reviewed at least 5 books



kindle



The background of the slide features a silhouette of a person sitting on a hill under a large, leafy tree, reading a book. The sky is dark blue with some clouds and a few stars. The word 'kindle' is written in white lowercase letters.

# kindle

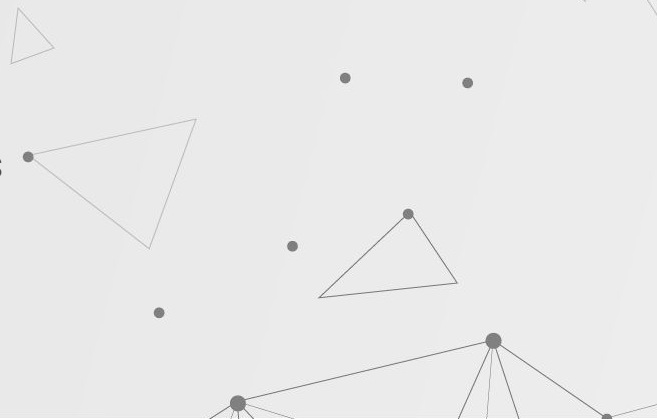
The data was filtered to get a more manageable network

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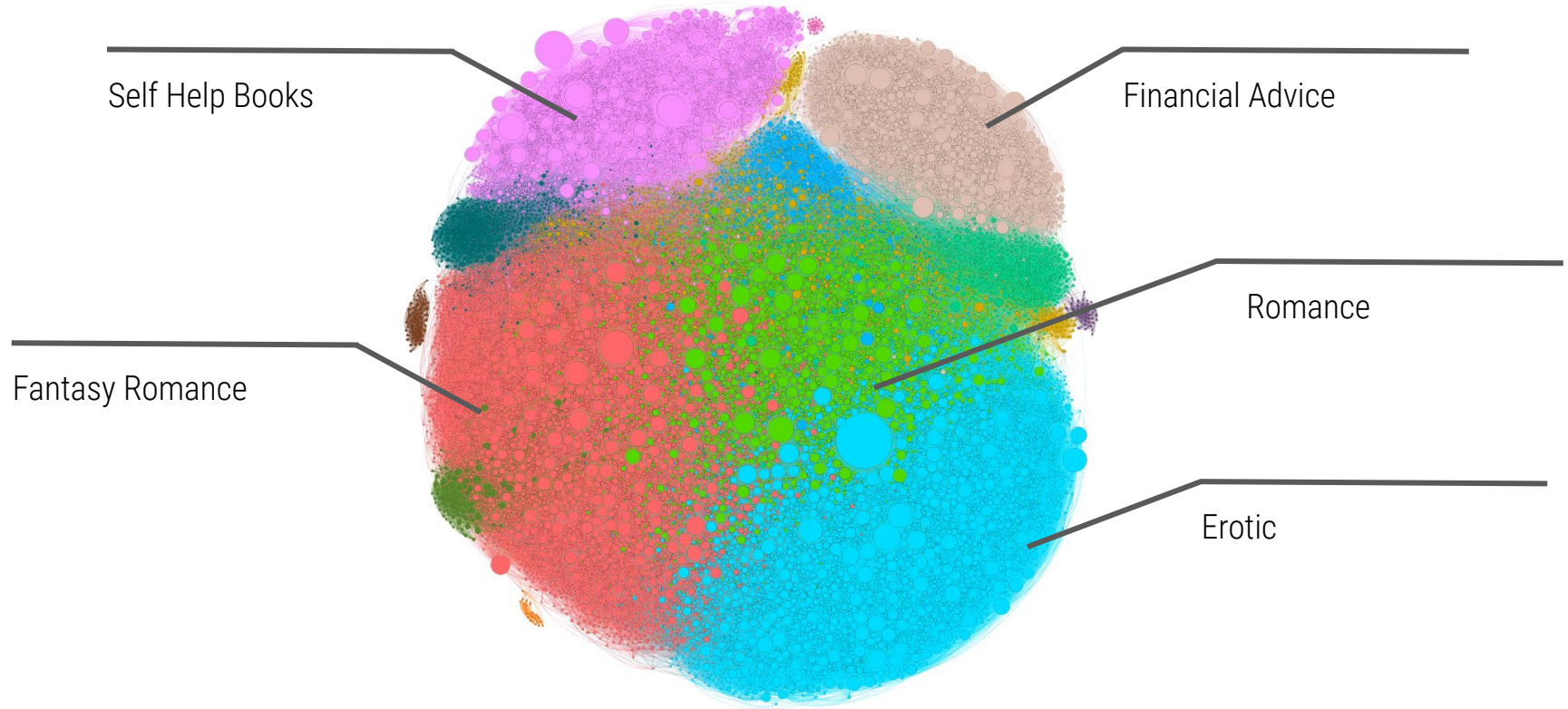
## KINDLE BOOK REVIEWS

Reviews with over 4.0 in rating were kept  
At least 10 reviews per book and 10 reviews per users

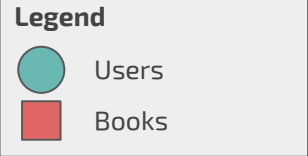
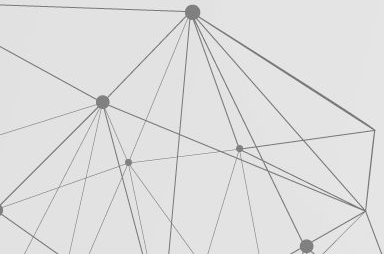
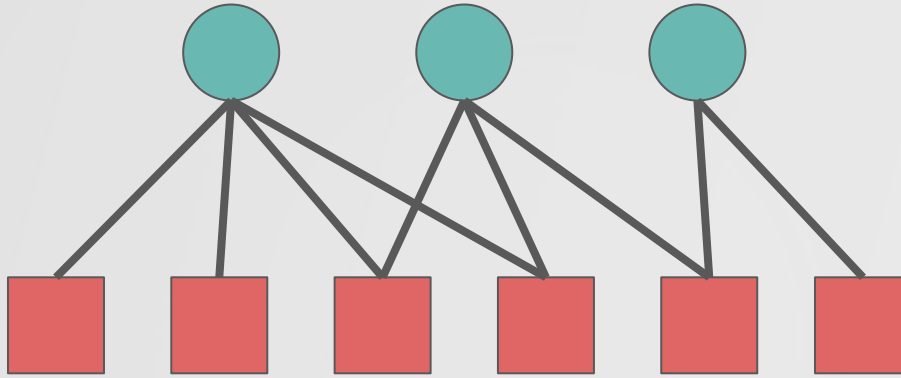
Final data:  
9,724 users  
11,182 books  
242,968 edges



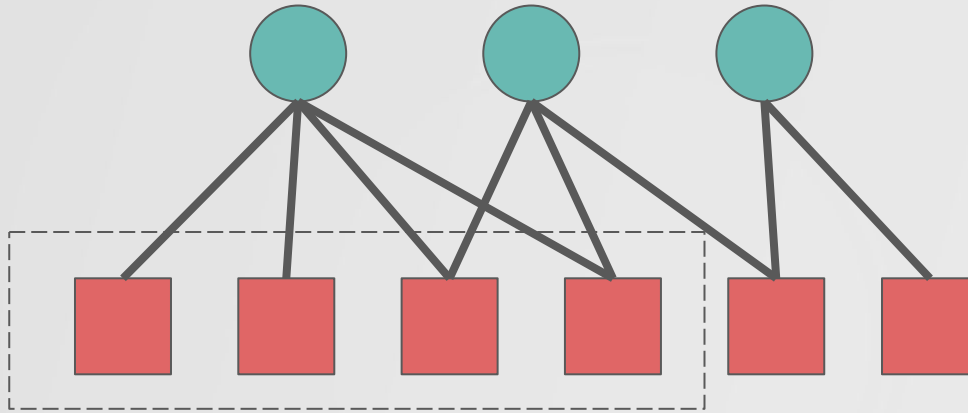
# Bipartite Network Visualization



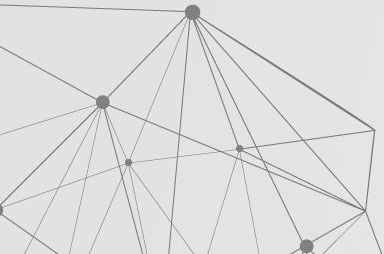
To recommend a book to a user on the bipartite network we look at the person with the most similar reading habits



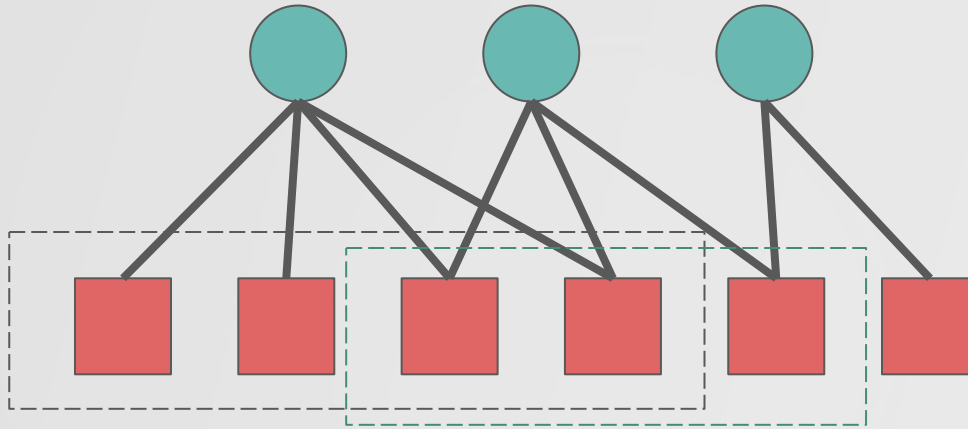
To recommend a book to a user on the bipartite network we look at the person with the most similar reading habits



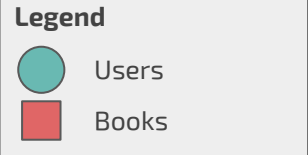
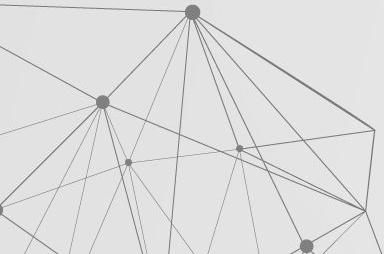
1. Identify a person's set



To recommend a book to a user on the bipartite network we look at the person with the most similar reading habits

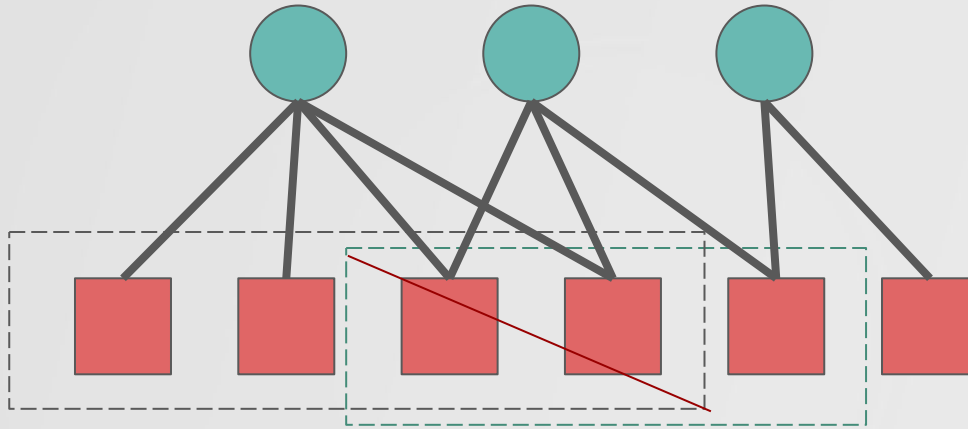


1. Identify a person's set
2. Find the person with the closest reading pattern

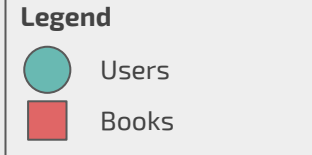
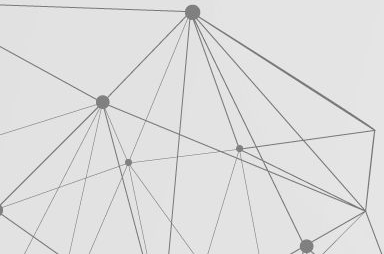




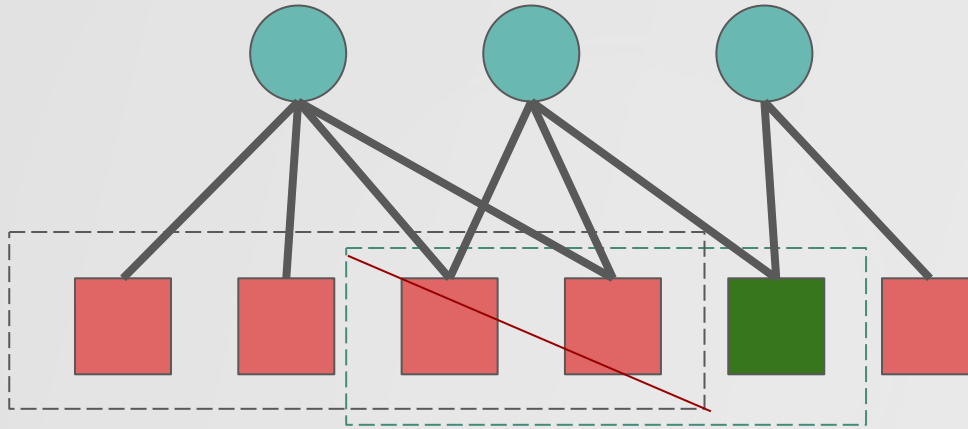
To recommend a book to a user on the bipartite network we look at the person with the most similar reading habits



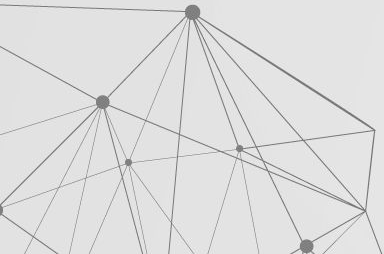
1. Identify a person's set
2. Find the person with the closest reading pattern
3. Find the difference in their sets



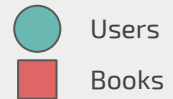
To recommend a book to a user on the bipartite network we look at the person with the most similar reading habits



1. Identify a person's set
2. Find the person with the closest reading pattern
3. Find the difference in their sets
4. Recommend something from there

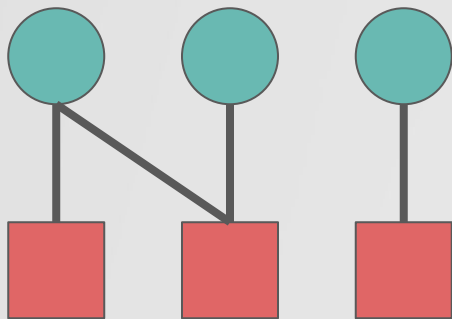


**Legend**

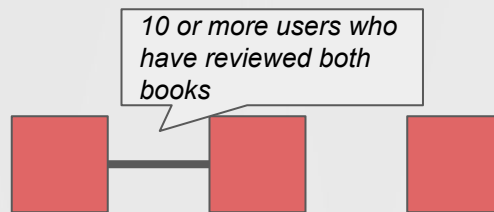


To create a unipartite network we connected books that had 10+ users who had reviewed both books

**Bipartite Network**



**One-mode projection  
(Unipartite Network)**

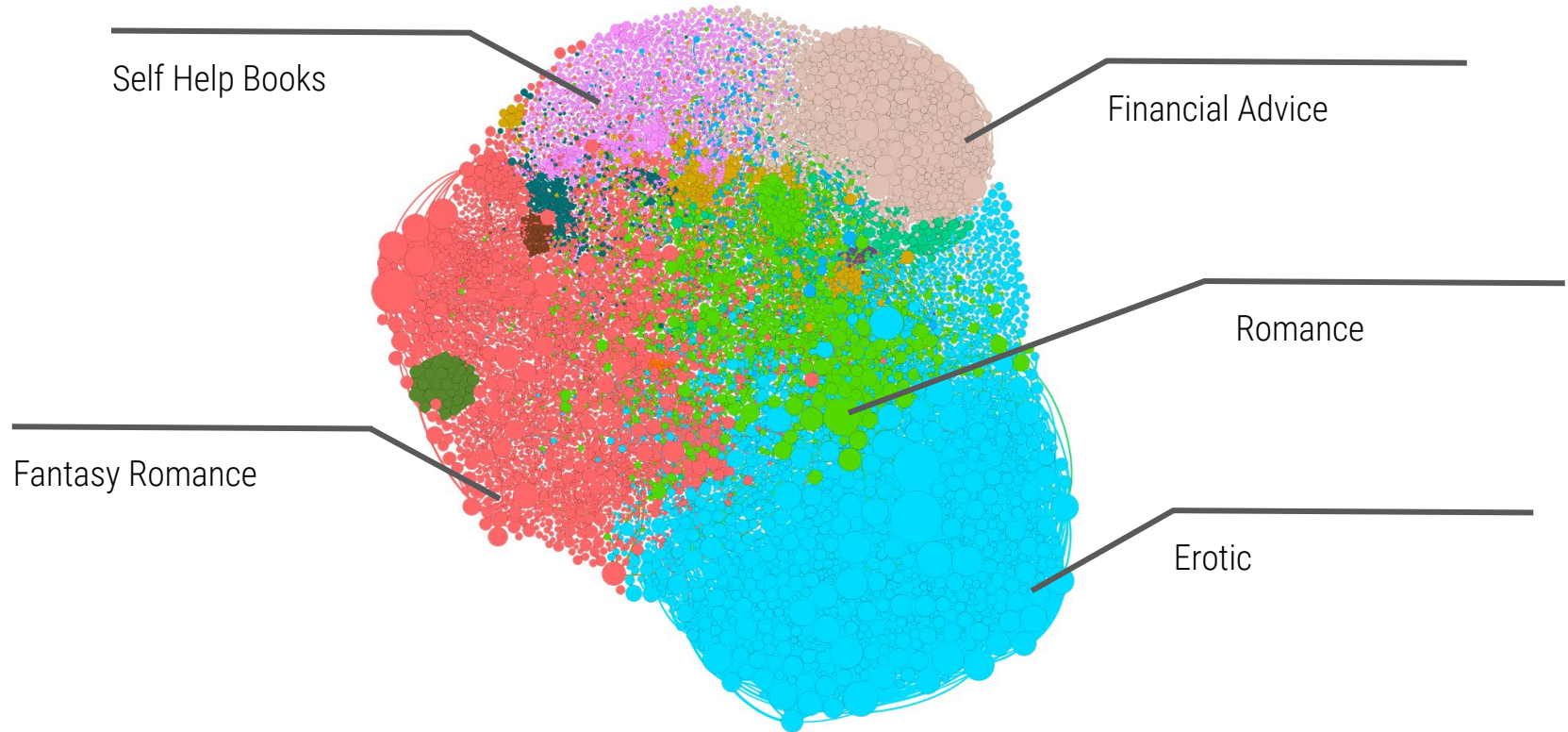


- Dropped books with fewer than 10 connections
- 11,182 books remained in the network

**Legend**



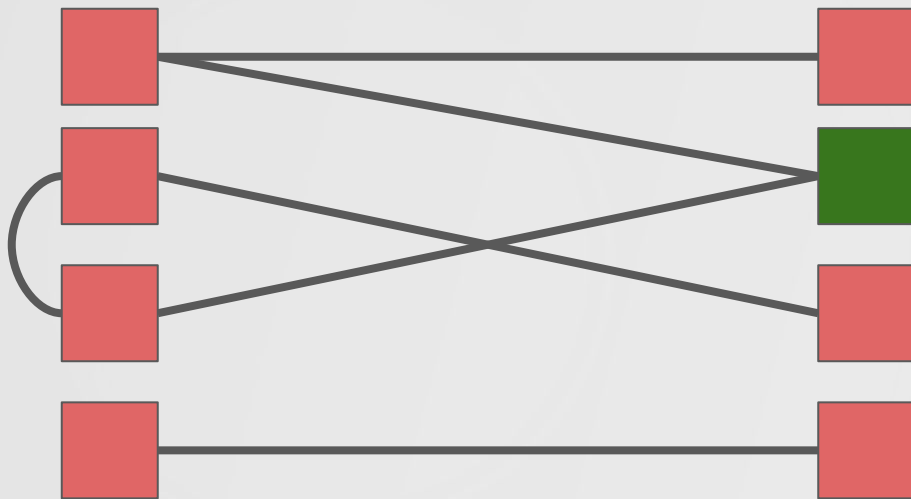
# One-mode projection - Unipartite Network (Books)



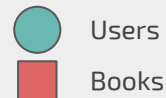
# The unipartite recommender system suggested a book based on connections to a reader's review history

**A Reader's History**

**Connected Books**



**Legend**





# 18.9%

## More Out-of-Cluster Recommendations

From bipartite recommendation system when the unipartite recommendation system suggests a book in the same cluster as the user

# Example results of recommender systems



## MARY RUIZ

Book history:

**Nonfiction > Health, Fitness & Dieting > Diets & Weight Loss**

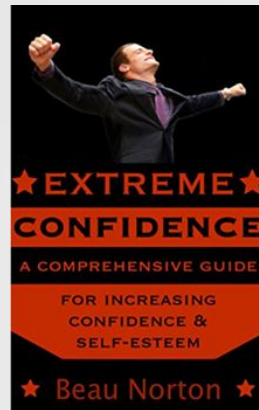
Bipartite recommendation:

**Nonfiction > Self-Help > Personal Transformation**

Unipartite recommendation:

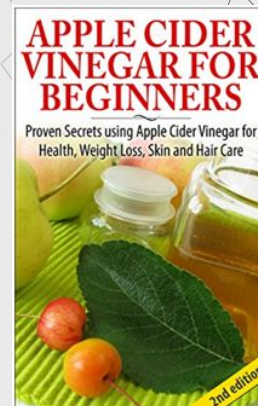
**Nonfiction > Health, Fitness & Dieting > Diets & Weight Loss**

## Bipartite Rec.

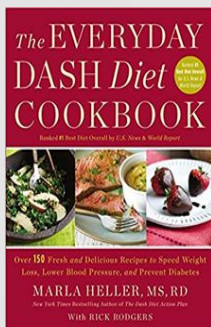
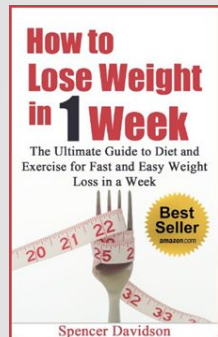


**Nonfiction > Self-Help > Personal Transformation**

## Unipartite Rec.



**Nonfiction > Health, Fitness & Dieting > Diets & Weight Loss**





# Example results of recommender systems



**JONATHAN DOE**

Book history:

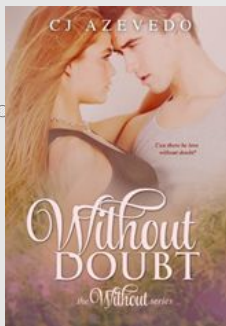
**Fiction > Romance**

Bipartite recommendation:

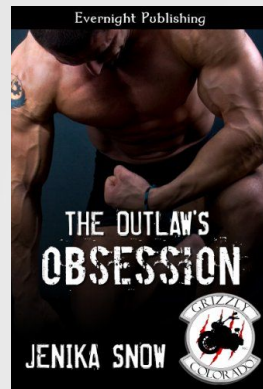
**Fiction > Erotic**

Unipartite recommendation:

**Fiction > Romance**

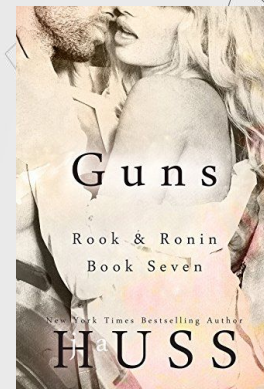


**Bipartite Rec.**



**Fiction > Erotic**

**Unipartite Rec.**



**Fiction > Romance**





# Bipartite recommendation systems encourage exploration outside current cluster

**Bipartite network recommendation systems are computationally expensive.**

They're worth the extra cost when exploration of new material is desired.



Spotify "I'm feeling lucky" button



Try a new type of cuisine



New feature for online shopping (like Amazon)

- "You might also like to try..."

The background of the slide features a complex network diagram. It consists of numerous dark grey circular nodes of varying sizes, interconnected by thin, light grey lines. These lines form a web-like structure that fills the entire slide, with some areas being denser than others. The overall aesthetic is modern and technical, typical of data science or computer science presentations.

# Unipartite vs Bipartite Recommender Systems

Rachel Meade - Rocco Lange - Sebastian Osorio  
Pedro Ivo Rivas - Robbie Geoghegan

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