Recommender Systems:

In this module, you will learn about recommender systems. You will be introduced to the main idea behind recommendation engines, then you will gain an understanding of two main types of recommendation engines, namely, content-based and collaborative filtering.

Intro to Recommender Systems

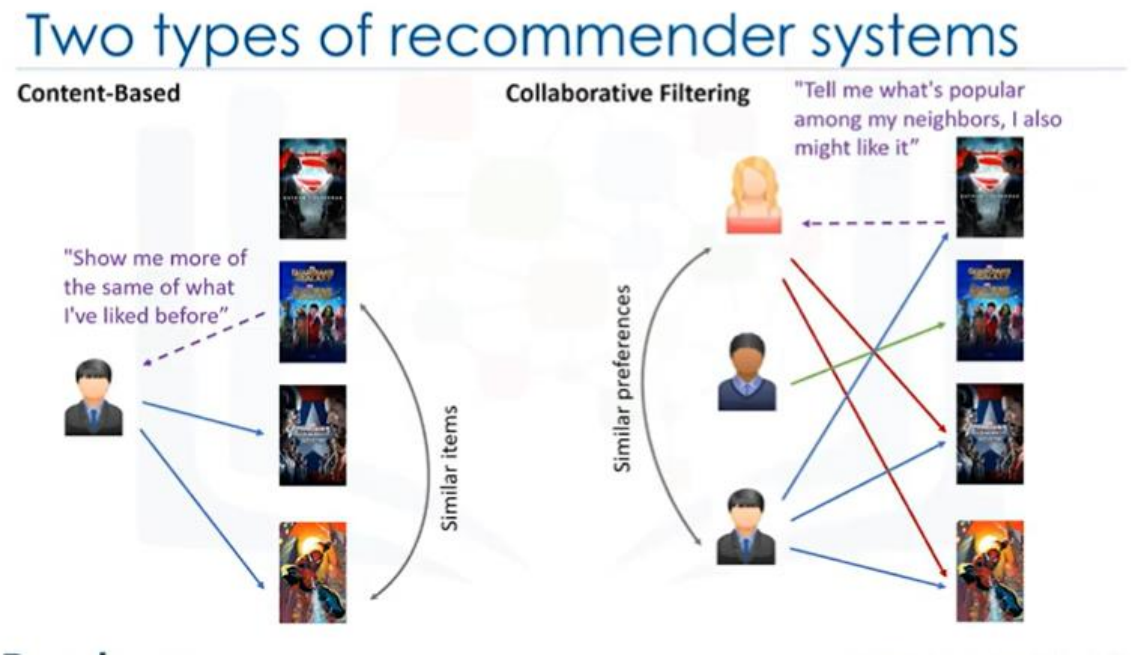
Recommender systems capture the pattern of peoples' behavior and use it **to predict what else they might want or like.**

Applications

- What to buy?
    - E-commerce, books, movies, beer, shoes
- Where to eat?
- Which job to apply to?
- Who you should be friends with?
    - LinkedIn, Facebook...
- Personalize your experience on the web
    - News platforms, news personalization

Advantages of recommender systems

- Broader exposure
- Possibility of continual usage or purchase of products
- Provides better experience



Implementing recommender systems

- Memory-based
  - Uses the entire user-item dataset to generate a recommendation
  - Uses statistical techniques to approximate users or items
    e.g., Pearson Correlation, Cosine Similarity, Euclidean Distance, etc.
- Model-based
  - Develops a model of users in an attempt to learn their preferences
  - Models can be created using Machine Learning techniques like regression, clustering, classification, etc.

Content-based Recommender Systems

Content-based recommender systems

Weighing the genres

2
10
8

ut User Ratings

X

	Comedy	Adventure	Super Hero	Sci-Fi
	0	1	1	0
	1	1	1	1
	1	0	1	0

Movies Matrix

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Weighted Genre Matrix

	Comedy	Adventure	Super Hero	Sci-Fi
	0	2	2	0
	10	10	10	10
	8	0	8	0

User Profile

	Comedy	Adventure	Super Hero	Sci-Fi
	18	12	20	10

Weighing the genres

2
10
8

ut User Ratings

X

	Comedy	Adventure	Super Hero	Sci-Fi
	0	1	1	0
	1	1	1	1
	1	0	1	0

Movies Matrix

=

Weighted Genre Matrix

	Comedy	Adventure	Super Hero	Sci-Fi
	0	2	2	0
	10	10	10	10
	8	0	8	0

User Profile

	Comedy	Adventure	Super Hero	Sci-Fi
	0.3	0.2	0.33	0.16

Candidate movies for recommendation

Finding the recommendation

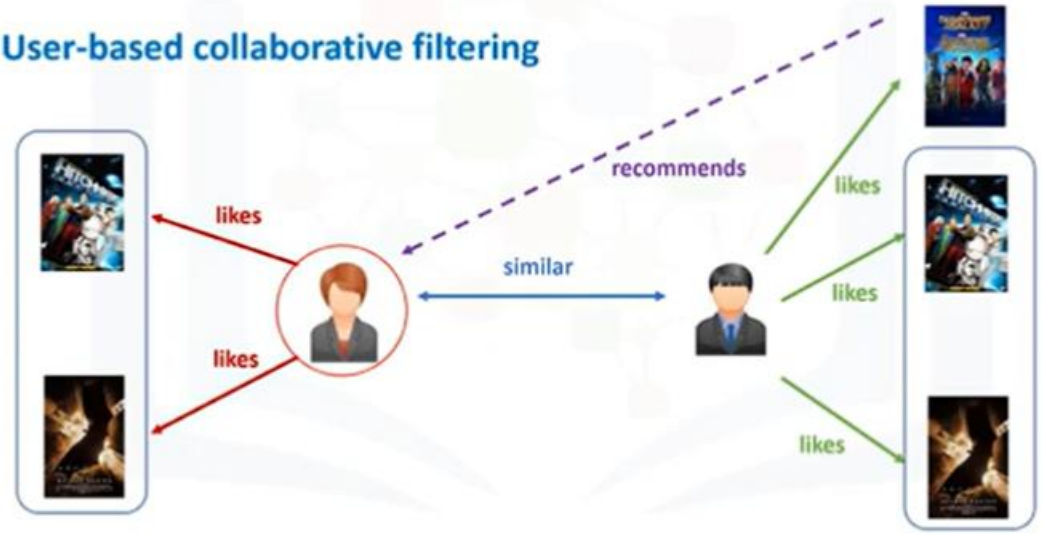
Content-based recommender systems

Problem: This can be solved with collaborative-filtering

Collaborative-filtering

Collaborative filtering

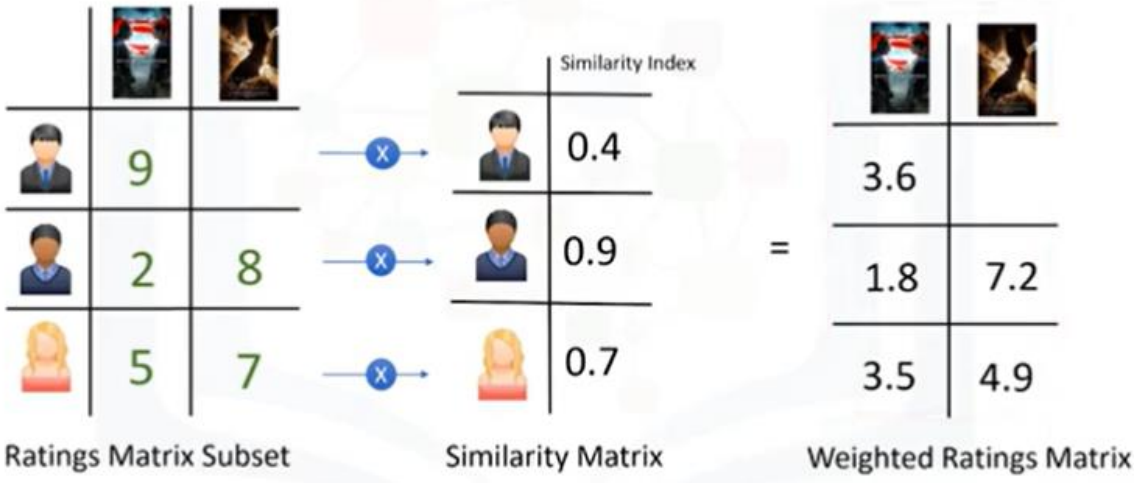
- **User-based collaborative filtering**

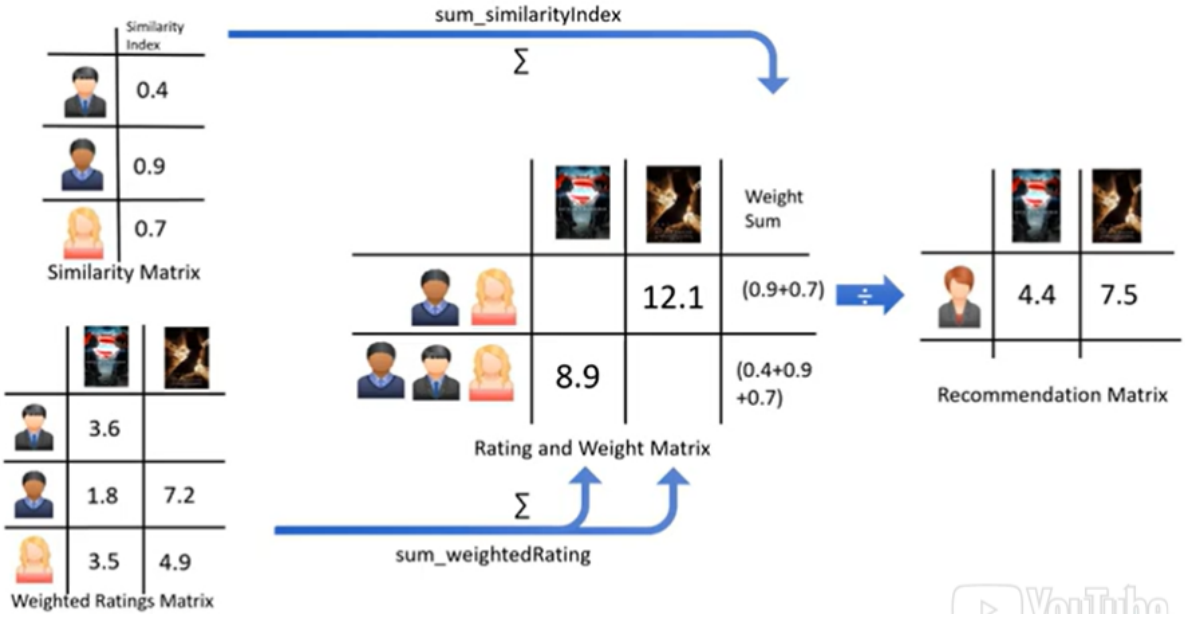


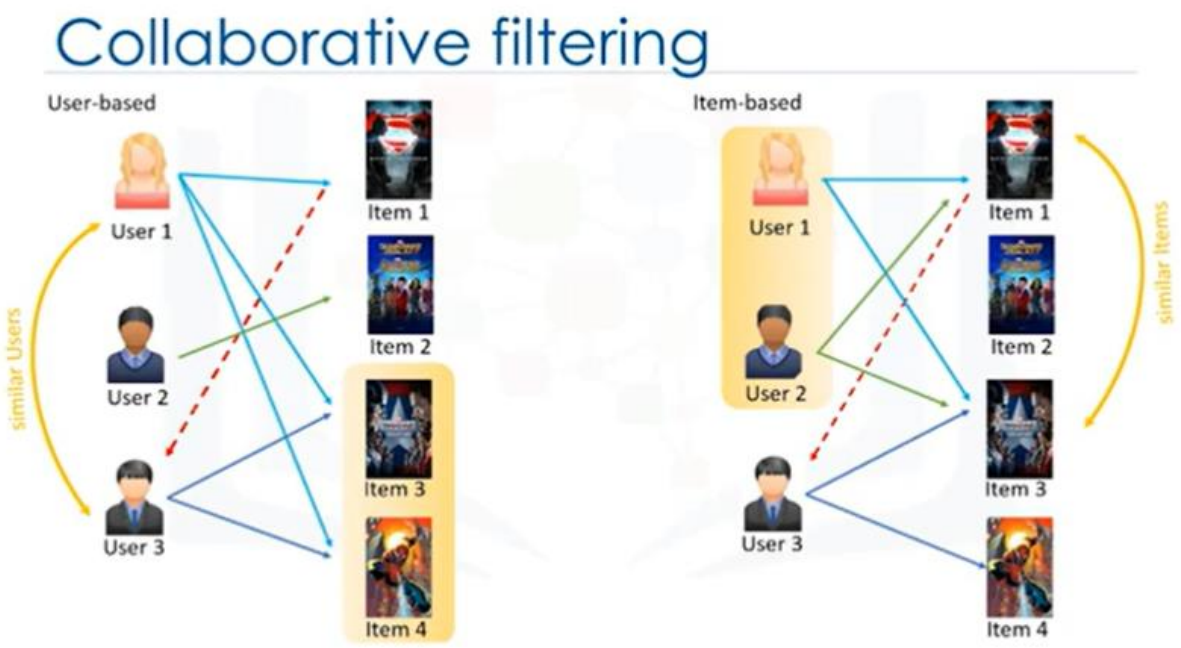
Learning the similarity weights

Ratings Matrix

Creating the weighted ratings matrix







Challenges of collaborative filtering

- Data sparsity
    - Users in general rate only a limited number of items
- Cold start
    - Difficult in recommendation to new users or new items
- Scalability
    - Increase in number of users or items