

RECOMMENDATION SYSTEMS

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RECOMMENDATION SYSTEMS

LEARNING OBJECTIVES

- Build your own recommendation engine using Python
- Understand the different models behind recommendation systems, including content-based recommendations and collaborative filtering

OPENING

RECOMMENDATION SYSTEMS

WHAT ARE RECOMMENDATION SYSTEMS?

- A recommendation system aims to match users to products / items that they likely haven't experienced yet and / or predict a users preference based on past observations.
- A **ranking** or **prediction** is produced by analyzing other user/item ratings (and sometimes item characteristics) to provide personalized recommendations to users.

WHAT ARE RECOMMENDATION SYSTEMS?

- There are many approaches to the design, but these are commonly modeled techniques:
- In **content-based filtering**, items are mapped into a feature space and recommendations depend on item characteristics.
- In contrast, an important assumption underlying all of **collaborative filtering** is that users who have similar preferences in the past are likely to have similar preferences in the future.

EXAMPLE - AMAZON

Recommendations for You in Books



Cracking the Coding Interview: 150...

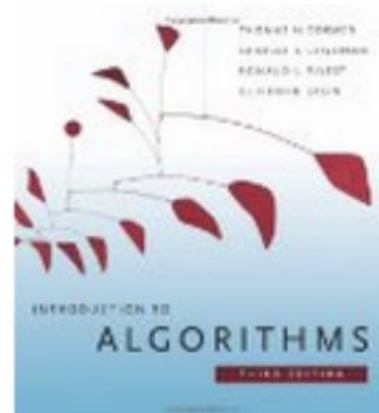
➤ Gayle Laakmann McDowell

Paperback

★★★★★ (166)

~~\$39.95~~ **\$23.22**

Why recommended?



Introduction to Algorithms

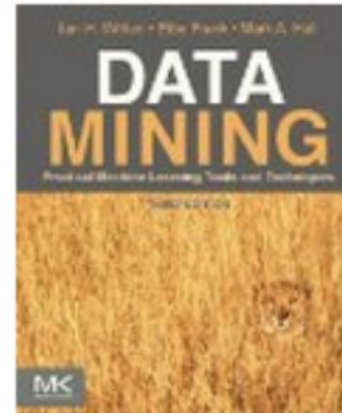
Thomas H. Cormen, Charles E...

Hardcover

★★★★★ (85)

~~\$92.00~~ **\$80.00**

Why recommended?



Data Mining: Practical Machine...

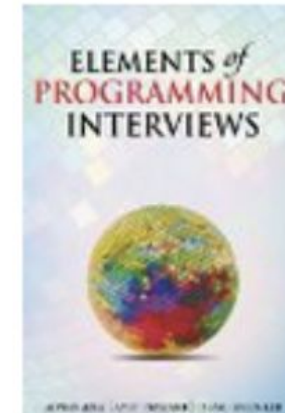
➤ Ian H. Witten, Eibe Frank, Mark A. Hall

Paperback

★★★★★ (27)

~~\$69.95~~ **\$42.09**

Why recommended?



Elements of Programming Interviews...

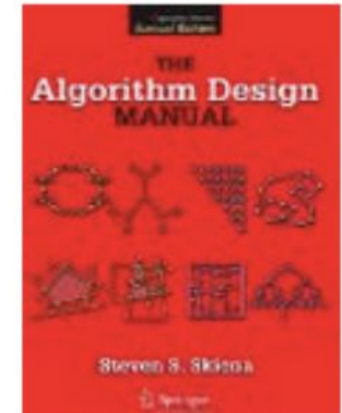
➤ Amit Prakash, Adnan Aziz, Tsung-Hsien Lee

Paperback

★★★★★ (25)

~~\$29.99~~ **\$26.18**

Why recommended?



The Algorithm Design Manual

➤ Steve Skiena

Paperback

★★★★★ (47)

~~\$89.95~~ **\$71.84**

Why recommended?

EXAMPLE - NETFLIX

Because you watched Fuller House



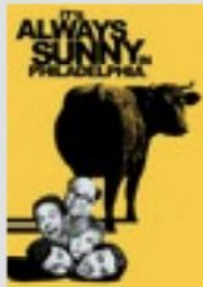
EXAMPLE - NETFLIX

TV Shows

Your taste preferences
created this row.

TV Shows.

As well as your interest in...



INTRODUCTION

CONTENT-BASED FILTERING

CONTENT-BASED FILTERING

- Content-based filtering begins by mapping each item into a feature space. Both users and items are represented by vectors in this space.
- **Item vectors** measure the degree to which the item is described by each feature, and **user vectors** measure a user's preferences for each feature.
- Ratings are generated by taking **dot products** of user & item vectors.

CONTENT-BASED FILTERING

- One notable example of content-based filtering is Pandora, which maps songs into a feature space using features (or “genes”) designed by the Music Genome Project.
- Using song vectors that depend on these features, Pandora can create a station with music having similar properties to a song the user selects.

CONTENT-BASED FILTERING

- Content-based filtering has some difficulties:
 - Must map items into a feature space
 - Recommendations are limited in scope (items must be similar to each other)
 - Hard to create cross-content recommendations (e.g. books/music films...this would require comparing elements from different feature spaces!)

INTRODUCTION

COLLABORATIVE FILTERING

COLLABORATIVE FILTERING

- Collaborative filtering refers to a family of methods for predicting ratings where instead of thinking about users and items in terms of a feature space, we are only interested in the existing user-item ratings themselves.
- Main difference between content and collaborative filtering:
 - Content Based: maps items and users into a feature space
 - Collaborative: relies on previous user-item ratings