Carnegie Mellon University
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46-886: Machine Learning Fundamentals

Amr Farahat

Recommender Systems:
Introduction

Much of this slide deck is derived/borrowed from course material I've co-taught at MIT

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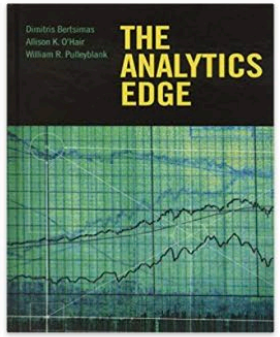

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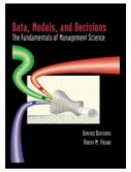

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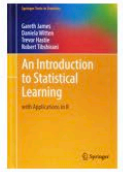

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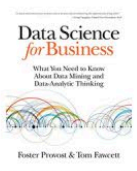

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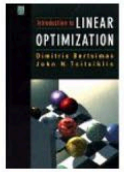

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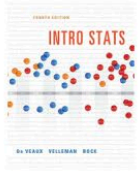

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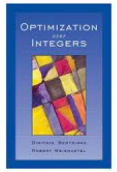

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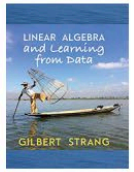

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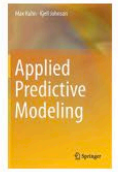

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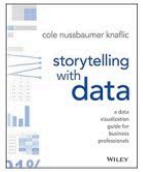

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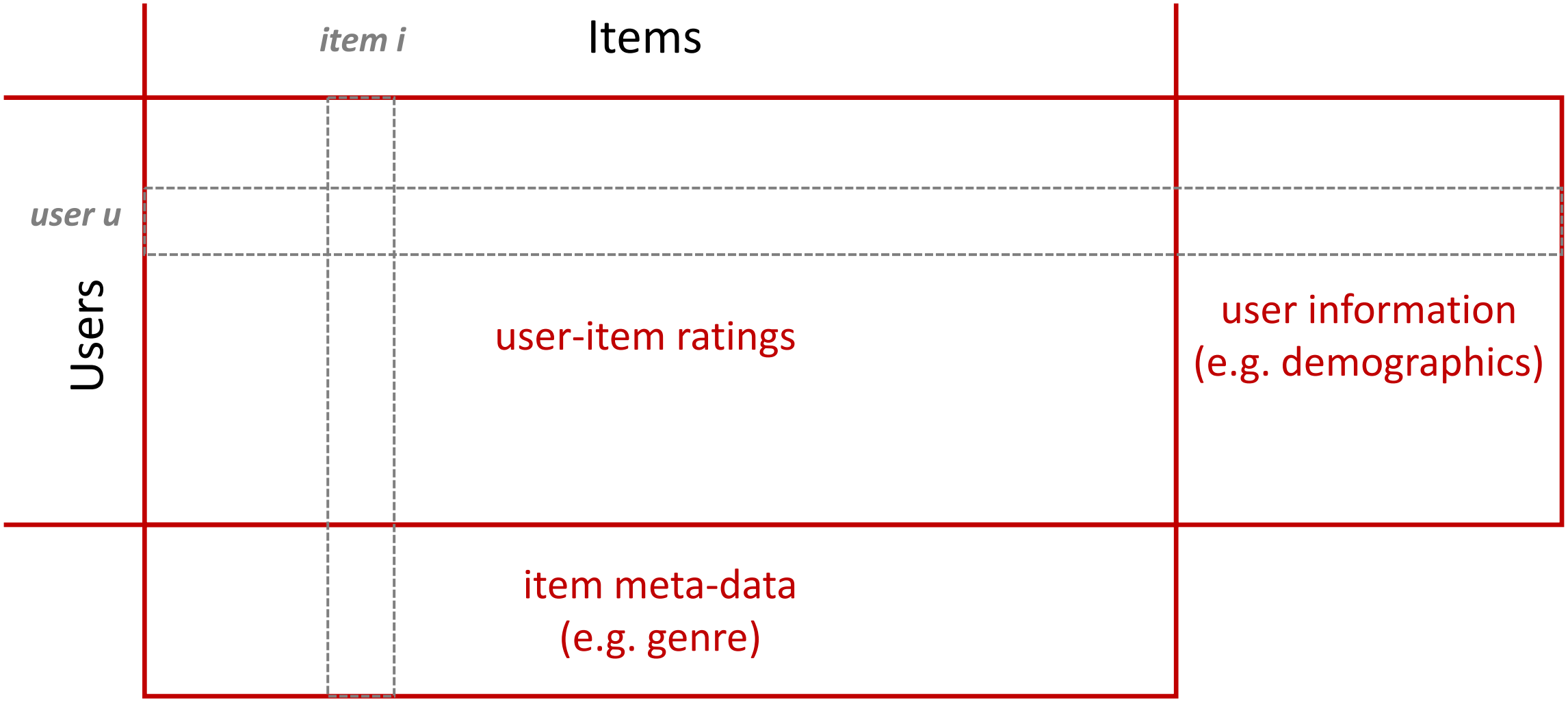
Types of Recommendation Systems

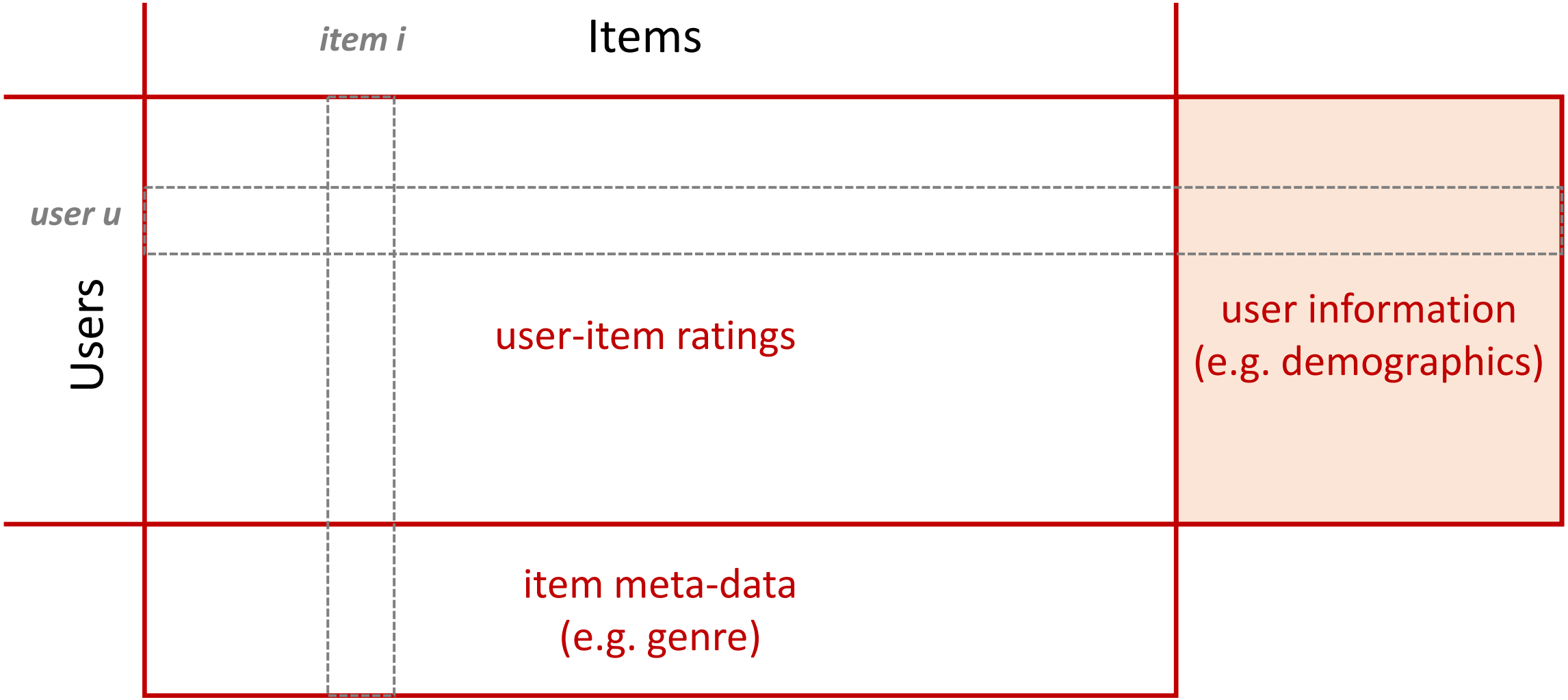
Demographic filtering	• Based on user demographics	facebook
Content-based filtering	• Based on item features and characteristics	PANDORA internet radio
Collaborative filtering	• Based on user-item interaction data from all users and items	NETFLIX
Matching	• Based on compatibility: recommend matches that will “work” both ways	eharmony

But there are lots of hybrid and bespoke approaches our there.

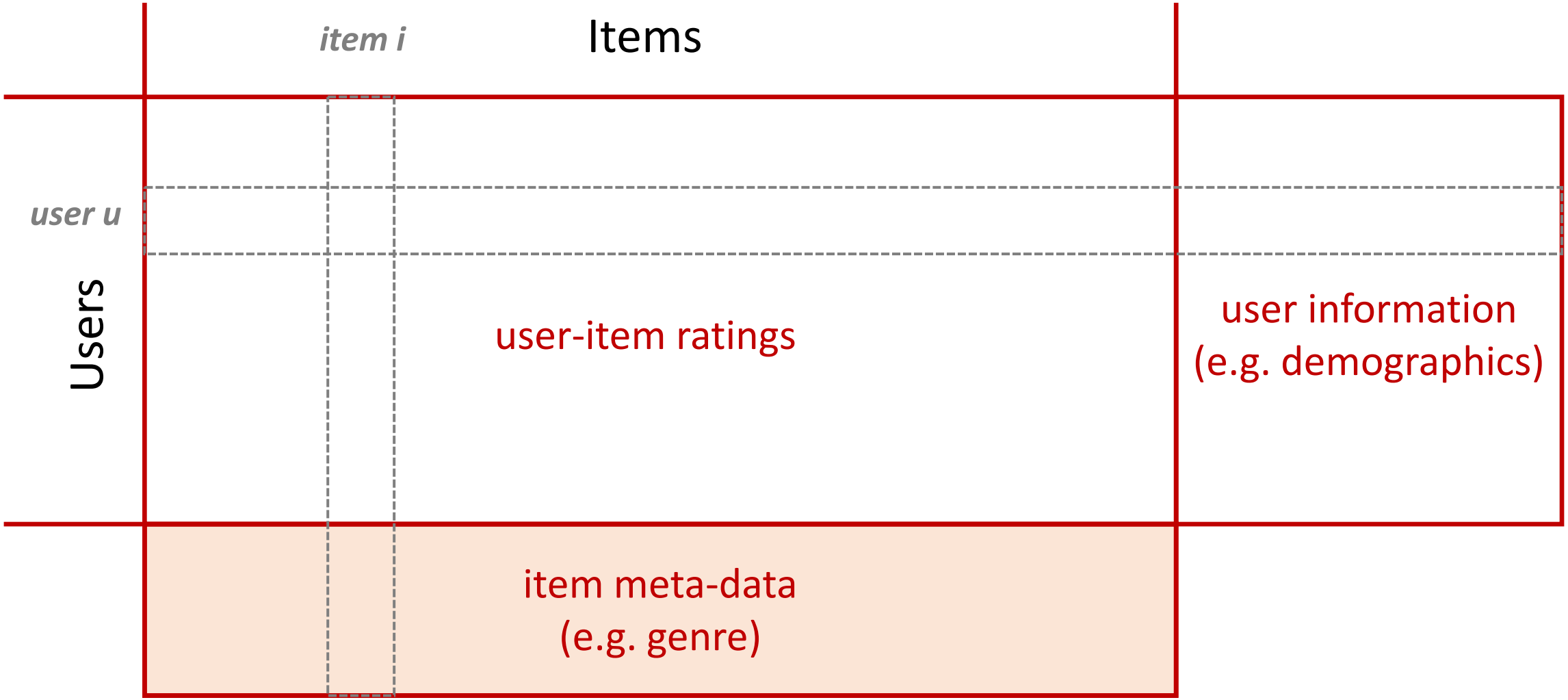
A Broad View of Data Underlying Recommender Systems



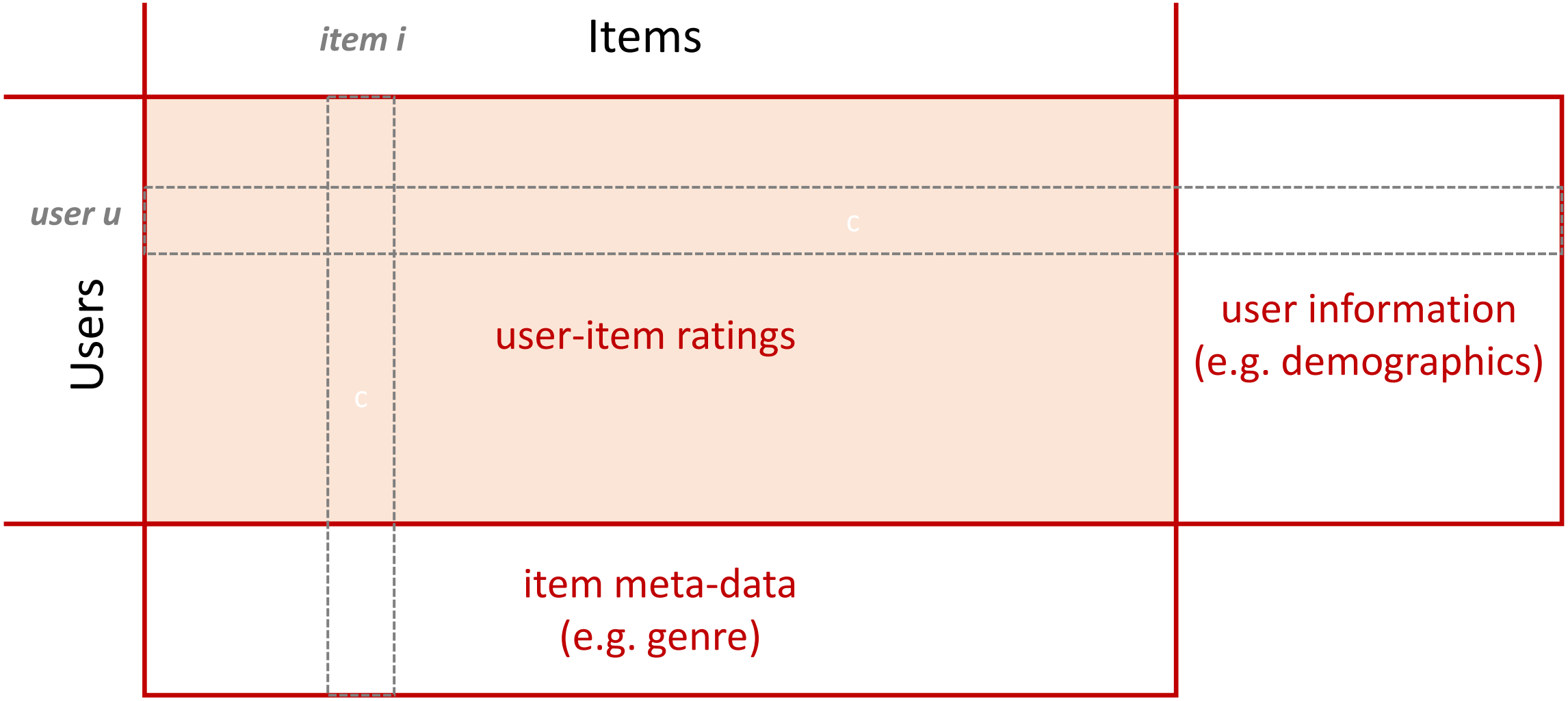
Demographic Filtering



Content-Based Filtering



Collaborative Filtering



An Important Practical Consideration – The Cold Start Problem

- For a new user, what do we recommend?
  - If you have user metadata (e.g., demographics, device, location) data, you can make recommendations that are popular for the average user in that 'metadata bucket'
  - You can recommend items popular across the entire user base and rapidly adapt based on how the user reacts to those recommendations
- For a new item, what do we do?
  - If you have item metadata (e.g, genre, director, lead actor for movies), you can assign the average rating of the 'metadata bucket'
  - Identify 'sibling items' and 'borrow' the sibling's ratings as a starting point