

CS-4053 Recommender System

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Lecture 1: Introduction

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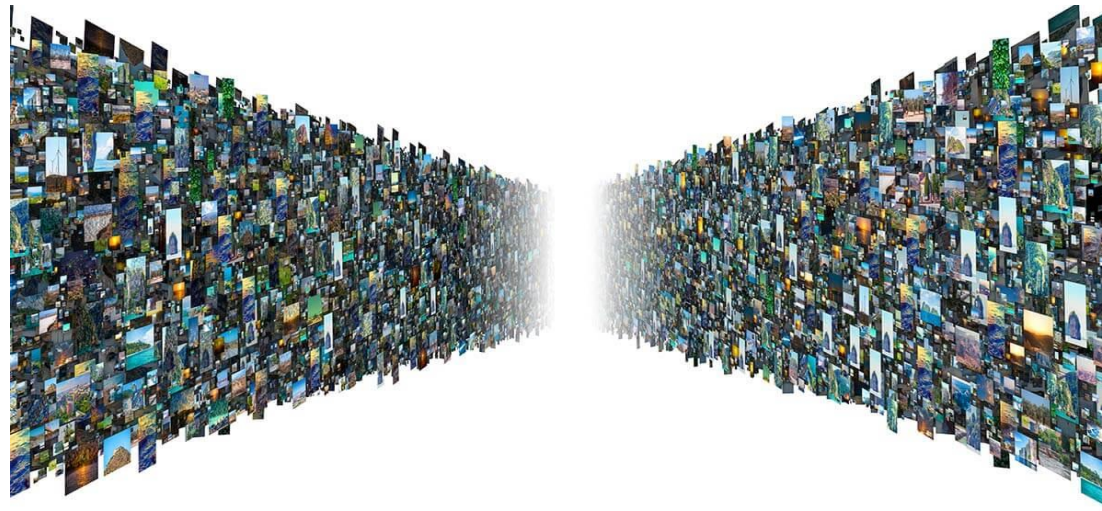


What is this course about?

- Understanding **systems** that **recommend** something
(obviously — it's the title of this course!)

Too much information

- At times, we can suffer from **information overload**
- *“It’s good to have choices as long as there aren’t too many”*
— *Made-up quote*



Too much information

- Have to try five new flavors of ice cream and tell your favorite



- Now try ten million flavors of ice cream and tell your favorite



Importance of Recommendation

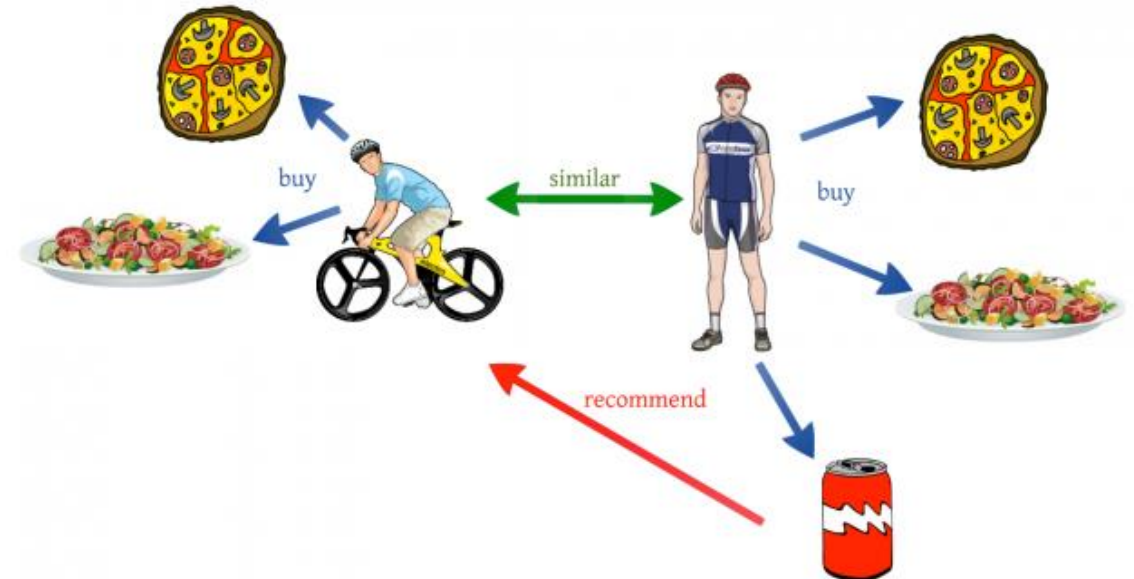
- Why are recommendations so important?
- Value of recommendation
 - *To increase sales*
 - *To improve user experience*
 - *To maximize productivity*
- Both **Spotify** and **Netflix** rely heavily on songs and movies recommendations to improve user experience
- A large part of sales for **Amazon** are recommendation-based

Recommendation


- A suggestion to help user in decision-making

Example



If **cyclist A** always orders *pizza* and *salad* at our food joint, and **cyclist B** eats *pizza* and *salad* as well. Then recommend cola to **cyclist A** if **cyclist B** had been ordering it lately



Recommendation: Example



Search in Daraz



Categories ▾

Muhammad B. - 25 Apr 2022

A

takes 3-4 days time
SAF-NAZ - answered within 2 days

<

1

2

3


4

...

7

>


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Recommendation: Example



Episode guide 54 > Cast & crew · User reviews · Trivia · IMDbPr

Code Geass

Original title: Kôdo glasu - Hangyaku no rurûshu: Code Geass - Lelouch of the Rebellion
TV Series · 2006–2008 · TV-14 · 24m

IMDb RATING **8.7**/10
70K

YOUR RATING ☆ Rat



Play trailer 1:30

Animation Action Drama

+ Add to Watchlist
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★ 9.0 ☆
Hunter x Hunter

+ Watchlist



Formulation for Recommender System

- $\mathbf{U} = \{Users\}$
- $\mathbf{I} = \{Items\}$
- f = utility function measuring the usefulness of item i to user u
$$f : \mathbf{U} \times \mathbf{I} \rightarrow \mathbf{R}$$
- $\mathbf{R} = \{Recommended\ Items \text{ — strictly an ordered list}\}$
- For each user u , what we want to do is to choose the item i that maximizes f

$$S_u = \operatorname{argmax}_i f(u, i)$$

Recommender System: **Formal Definition**

- A **Recommender System (RS)** helps match users with items
 - *It eases information overload*
 - *It helps improve user experience, increase sales and suggest novel items*



Recommender System: How does it work?

- Recommendations for a user may be based on:
 - *Past behavior (pattern) of that user*
 - *Similarity with other users*
 - *Item similarity*
 - *Context*

so on...

Paradigms of Recommender System

- Some of the approaches to designing a Recommender System are:
 - *Collaborative*
 - *Content-based*
 - *Demography-based*
 - *Social or trust-based*
 - *Hybrid*

Collaborative Approach

- **Collaborative:** *"Tell me what's popular among my peers"*
- **Collaborative Filtering (CF)** is still one of the most common technique to develop a Recommender System based on collaborative paradigm
- **Collaborative Filtering** can be:
 - User-based: Find users *similar* to me and recommend to me what they like
 - Item-based: Recommend to me an item *similar* to the ones I normally like

Collaborative Approach

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Question: How do you measure this "similarity"?

Content-based Approach

- **Content-based:** *“Recommend to me an item based on the features of what I just liked or searched”*
- This approach does not require usage history for other users or the user’s own usage pattern i.e. minimal collaboration

Demography-based Approach

- **Demography-based:** *“Recommend to me an item keeping in view either my age, where I live or my education”*
- The main idea behind Knowledge-based Recommendation Systems

Other Approaches

- Social or trust-based approach involves recommendations based on what people in a user's connections like
 - Example: [Facebook](#) *groups recommendations*
- Hybrid approaches are usually a combination of two or more of the previously mentioned design strategies

Serendipity

- Expand the user's taste into neighboring areas
Basic Idea: At times, it's good to recommend something different to the user



Summary

- Course Introduction
- Recommender System basics
- Common approaches

References

Ladislav Pleska NSWI66 lectures
X. Amat's NF Prize presentation
Recommender System handbook by Ricci et al