Personalized Information Access: Ideology and Reality

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ACM EUROPE DIGITAL HUMANISM SUMMER SCHOOL
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TUDelft

Introductions

Recommender Systems

I believe it is important to take a broad view of recommender systems

I am interested in:

- The impacts of recommender systems on stakeholders beyond the users directly interacting with them.
- Creators as "first class" users of recommender systems.
- Recommender systems as community resources, rather than centralized corporate monoliths.

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Information Retrieval

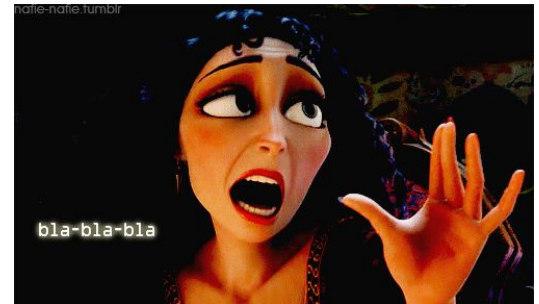At the service of 'non-traditional' users and contexts

I am interested in:

- Understanding how information access systems (search engines, recommender systems), their users, and their ecosystems affect each other.
- Design new applications that respond to the specific needs of users, contexts, and tasks.

Dr. Sole Pera
Web Information Systems - EWI
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What is the point of this session?

- Introduction
- Revisit some concepts
- Zoom in on stakeholders & 'non-traditional' users
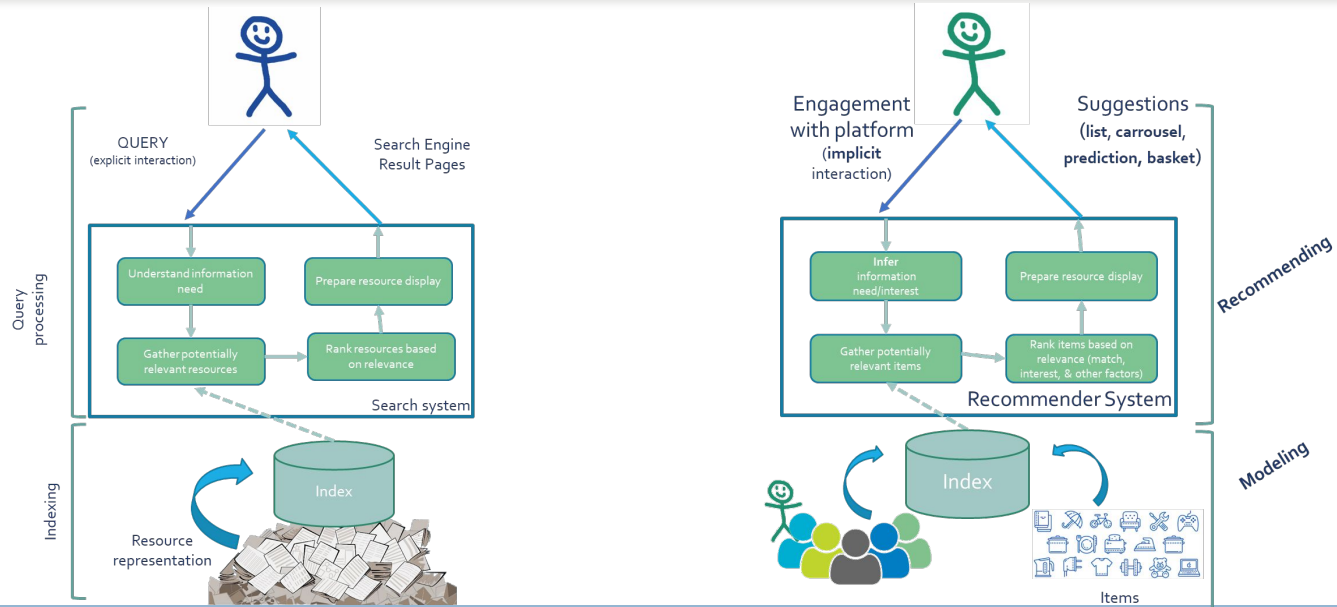- Discuss challenges and opportunities
- Inspire reflections

Where to begin?

Some definitions

Information Access

The right to information

"…a key pillar in building inclusive knowledge societies. The organization promotes rights and values outlined in the Article 19 of the Universal declaration of Human Rights. Access to information serves as an integral part of freedom of expression and is an important tool for promoting the rule of law, other rights and building trust"

Recommender Systems & Search Engines

In theory

Recommender Systems & Search Engines

In the wild

Personalization

A general definition

*Personalization is the ability to provide content and services that are **tailored to individuals** based on knowledge about their preferences and behavior – Hagen*

- … a *multidimensional construct* that must be approached carefully in the context of service design because personalization does not always result in greater consumer satisfaction with the service offerings - Suprenant and Solomon
- …about building *customer loyalty* by building a meaningful one-to-one relationship through understanding the needs of each individual, and helping satisfy a goal that efficiently and knowledgeably addresses each individual's need in a given context – Riecken

Personalization

A general definition

Personalization *tailors* certain offerings by *providers* to *consumers* based on certain knowledge about them and on the *context* in which these offerings are provided, and with certain **goal(s)** in mind. These personalized offerings are delivered through *personalization engines* along certain distribution channels based on the knowledge about the consumers, the context, and the personalization goals –Tuzhilin

Personalization

In Information Access

Personalization in Information Access

In theory: Enhanced user experiences

Personalization in Information Access

Many users (that the system might not know very well)

Personalization in Information Access

Many perspectives to consider (can be at odds with each other)

Where are we?

Stakeholders

Challenges

Stakeholder

- Comes from the literature on business management
  - A stakeholder in an organization is (by definition) any group or individual who can affect or is affected by the achievement of the organization's objectives
    - (Freeman, 2010)
- For recommender systems, my definition
  - A recommendation stakeholder is any group or individual who can affected or is affected by the delivery of recommendations to users.
- Normally in recommender systems research
  - We consider only the user as a stakeholder
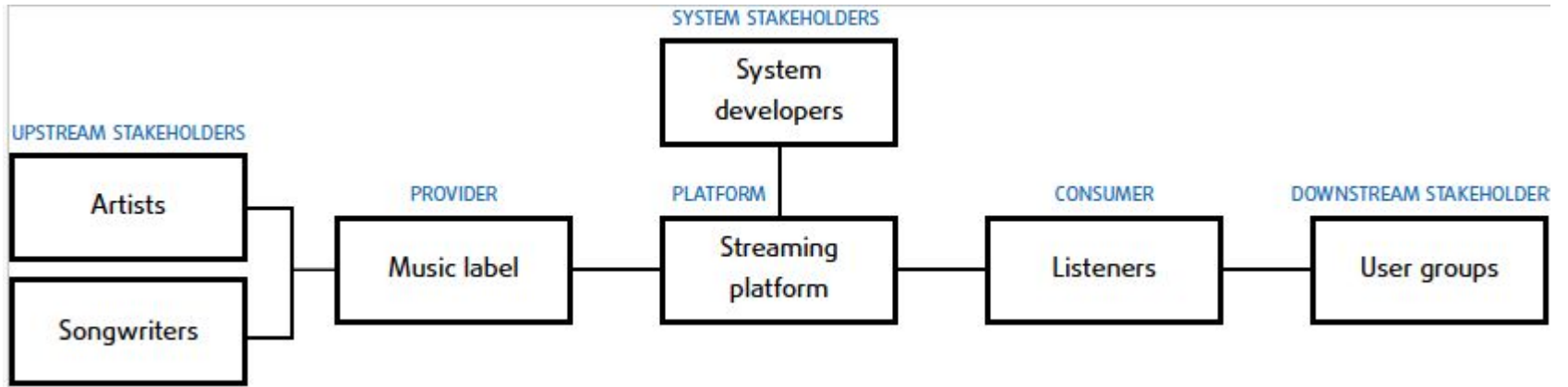 - Optimize recommendations for "user satisfaction"

Multistakeholder Recommendation

- An environment / application where the requirements for recommendation generation
  - Include the perspectives of multiple parties
    - Not just the user
- Example: computational advertising
  - User ~~wants~~ <u>might respond to</u> ads meeting their interests
  - Advertisers want users within an audience segment
  - Publishers want to maximize ad revenues

Streaming Music

Example

SYSTEM STAKEHOLDERS

System developers

UPSTREAM STAKEHOLDERS

Artists

Songwriters

PROVIDER

Music label

PLATFORM

Streaming platform

CONSUMER

Listeners

DOWNSTREAM STAKEHOLDER

User groups

Key Terminology

- Consumer
  - Individuals consuming recommendations (i.e. getting stuff recommended to them)
- Provider
  - Individuals / organizations that create or provide the items that are recommended
  - Sometimes users have both roles (social media)
- Side stakeholder
  - Individuals / organizations that aren't part of the recommendation interaction but are impacted by it
  - For example, municipalities impacted by travel recommendations

Aren't Recommender Systems "For You"?

amazon.com · **Recommended** for You

Amazon.com has new recommendations for you based on items you purchased or told us you own.

- Why consider these other stakeholders?

- Three answers
  - Regular industry practice
  - Systemic properties matter
  - Creators matter

Answer 1: That's how they are built

Recommender systems already

- Filter out products that are out-of-stock
- Optimize for time on site (do users really want that?)
- Promote "house brands"
- Promote new sellers / new items to overcome cold-start
- Explore-exploit

If we don't have a multistakeholder perspective

how do we talk about these aspects of recommendation?

Answer #2: Systemic properties

There are system properties we might care about that can't be reduced to user experience, simply measured

- Fairness
- Promotion of diverse voices
- Popularity bias

If we don't have a multistakeholder perspective,

how do we incorporate these properties into our systems?

Answer #3: Why should "the user" be the center of the universe?

- "The User" is not that well-defined as an optimization target
  - The average experience over all users?
  - The experience of the median user?
  - As we will see, that could mean bad experiences for (marginalized) others
- Users have historical biases
  - Catering to these biases reinforces them
  - Systems should probably push back against harmful biases
- Without creators, there's nothing to recommend
  - A multistakeholder view lets us acknowledge this
  - It lets us think about providers' experiences

Activity

Consider

- Out of school time activities
- Wide range of options
  - entire summer
  - regular after-school
  - one-time events
- Wide range of providers
  - Schools
  - non-profits
  - Museums
  - sports clubs
- Audience: teens

What to do

- Form groups of three or four
- Consider a system that recommends such activities
- List stakeholder groups
  - 15 minutes
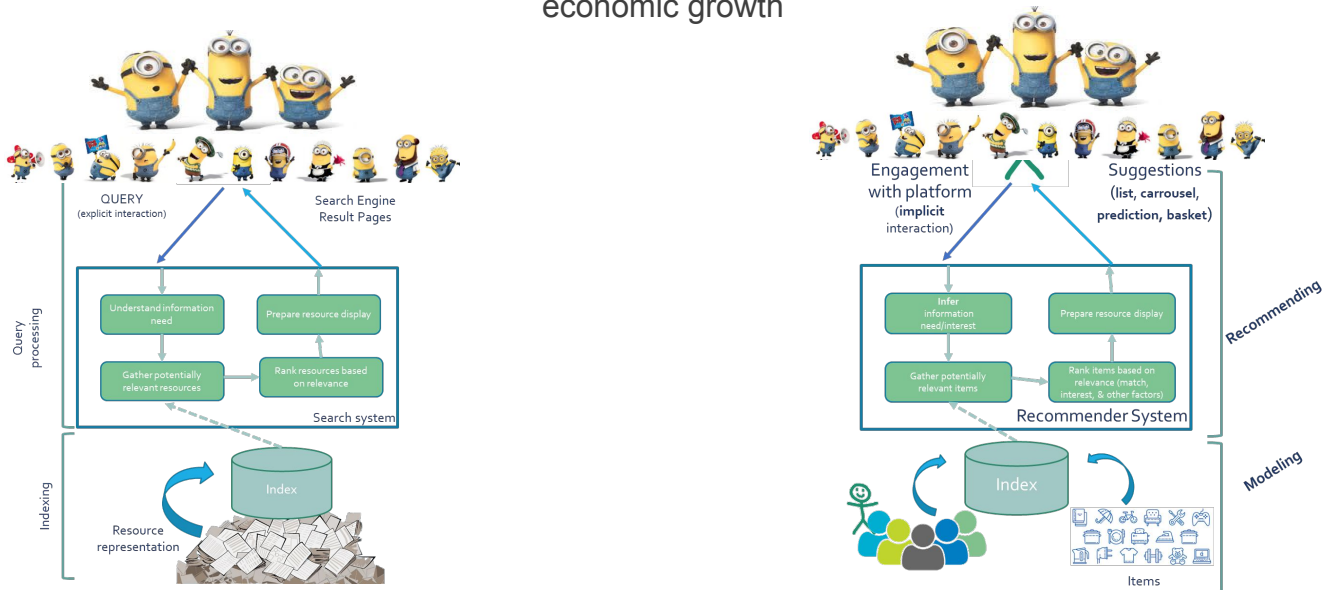- Be prepared to discuss your stakeholder group and what goals they might have for a recommender system

Non-traditional users

Challenges

A 'human' perspective

To better understand and mitigate hidden risks of digital technologies for individuals and democratic societies, proponents of the *Digital Humanism* initiative advocate for thoroughly analyzing and reflecting on *human-technology relationships*, promoting the development of *human-centered* technology that *prioritizes improved lives and societal progress* over economic growth
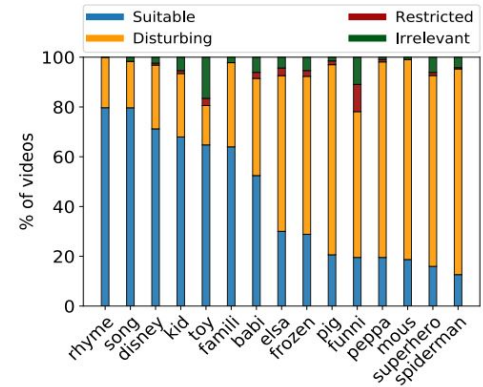
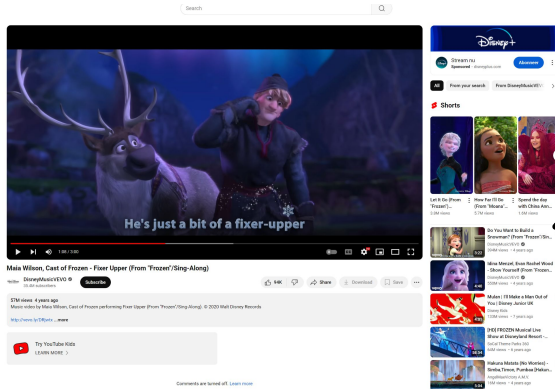# Children

Supporting the information seeking process

SVEN

Did you mean: *Seven*

LOOKING FOR THE MOVIE SEVEN OR SVEN FROM THE MOVIE FROZEN? | PROCEEDINGS OF THE 2018 CONFERENCE ON HUMAN INFORMATION INTERACTION & RETRIEVAL (ACM.ORG)
CAST (BOISESTATE.EDU)

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Children

Recommenders and unintentional exposure to inappropriate content

Screenshot from "Characterizing Abhorrent, Misinformative, and Mistargeted Content on YouTube"

Depression & anxiety

Information access & emotions evoked from search results

INTO THE UNKNOWN: EXPLORATION OF SEARCH ENGINES' RESPONSES TO USERS WITH DEPRESSION AND ANXIETY | ACM TRANSACTIONS ON THE WEB

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Autism

Supporting people with autism spectrum

- Points of Interest (PoIs) to people with autism spectrum disorders challenges the research about recommender systems by introducing an explicit need to consider both user preferences and aversions in item evaluation.

- Autistic users' perception of places is influenced by sensory aversions, which can cause stress and anxiety when they visit the suggested PoIs. The management of individual preferences is not enough to provide these people with suitable recommendations.

SUPPORTING PEOPLE WITH AUTISM SPECTRUM DISORDERS IN THE EXPLORATION OF POIS: AN INCLUSIVE RECOMMENDER SYSTEM: COMMUNICATIONS OF THE ACM: VOL 65, NO 2
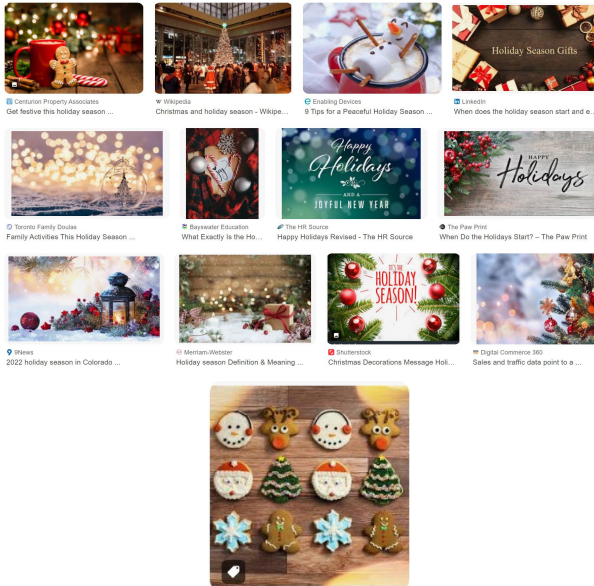
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Education

The impact of item demographic on the recommendation process

- Teachers have a central role in online platforms, yet, the impact of recommender systems for teachers is an under-explored area.
- Analysis of data coming from a real-world platform reveal that data is highly imbalanced towards the United States, in terms of offered courses and of interactions.
- These **imbalances** are exacerbated by recommender systems, which overexpose the country w.r.t. its representation in the data, thus generating unfairness for teachers outside that country.
- Outcome: new approach that **regulates** the recommendations by explicitly accounting for the items produced in a country (**visibility**) and the position of the items in the recommended list (**exposure**)

THE WINNER TAKES IT ALL: GEOGRAPHIC IMBALANCE AND PROVIDER (UN)FAIRNESS IN EDUCATIONAL RECOMMENDER SYSTEMS | PROCEEDINGS OF THE 44TH INTERNATIONAL ACM SIGIR CONFERENCE ON RESEARCH AND DEVELOPMENT IN INFORMATION RETRIEVAL

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Cultural background

Digital items & the sense of belonging

- Information access systems have a **social role**

- Some 'users' are underserved in the digital ecosystem: One culture does not fit all

- Identifying "most people" or "most common preferences" requires an assumption of the norm, excluding those who deviate from that group

- The absence of representation of other cultural heritages sends an implicit message of who the internet is for and, more importantly, **who itis not for**.

Multilingual

Becoming informed in multiple languages
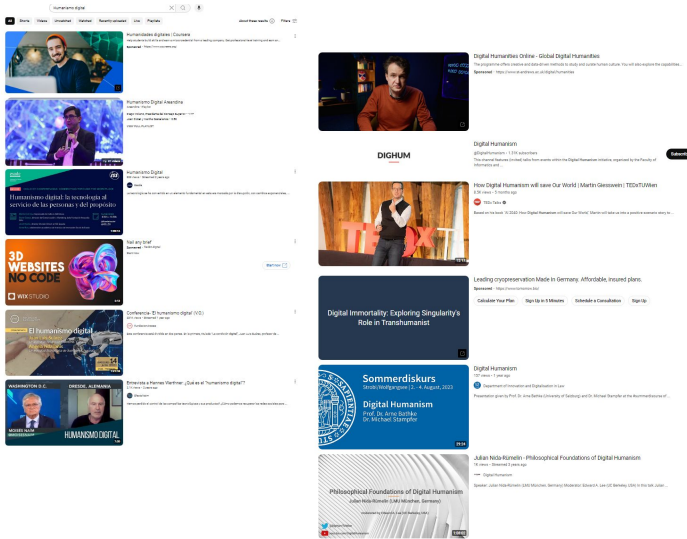
- **Digital news platforms** use news recommenders to cater to the individual information needs of readers. Despite an increasingly **language-diverse** online community, in which many Internet users consume news in multiple languages, the majority of news recommendation focuses on major, resource rich languages; **English** in particular.

- **Users** are increasingly **diverse**, particularly in terms of languages. However, multilingual users often suffer from unbalanced and fragmented news information, as traditional news **access systems seldom allow users to simultaneously search for and/or compare news in different languages**, even though prior research results have shown that multilingual users make significant use of each of their languages when generally searching for information online.
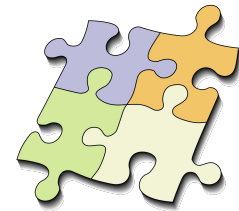
Challenges & opportunities
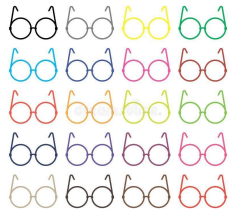
Evaluation lenses

Online & offline assessment

Proactive

Representation

Multidisciplinary (multiple voices)

User, algorithm, context, stakeholders

Activity

Consider

If we focus on the *human* and the *impact* that algorithms that are the *gatekeepers* to information have, what other factors should we take into account?

- Form groups of three or four
- Consider a system generates recommendation for *neuro-divergent*
  - Discuss for 15 how the recommender (*you pick the domain*) would need to work for them
- Be prepared to discuss takeaways for your group
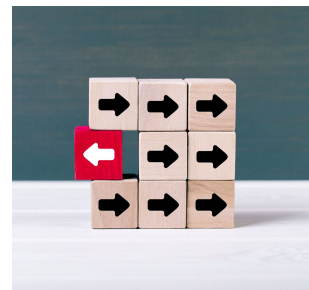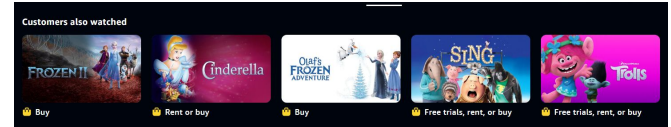
Where are we?
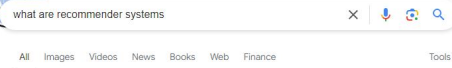
The LLM Era

How does it affect information access?

LLMs

One thing is not like the other

what are recommender systems

All   Images   Videos   News   Books   Web   Finance   Tools

W   Wikipedia
     https://en.wikipedia.org › wiki › Recommender_system
Recommender system
A subclass of information filtering **system** that provides suggestions for items that are most pertinent to a particular user.

     NVIDIA
     https://www.nvidia.com › en-us › glossary › recommend...
What is a Recommendation System? | Data Science
A recommendation **system** is an artificial intelligence or AI algorithm, usually associated with machine learning.

tds   Towards Data Science
       https://towardsdatascience.com › recommender-systems...
Recommender Systems — A Complete Guide to Machine ...
24 Nov 2022 — **Recommender systems** are algorithms providing personalized suggestions for items that are most relevant to each user.

Customers also watched

what are recommender systems?

Recommender systems are software tools and algorithms designed to suggest items to users based on various criteria. These systems are widely used in e-commerce, streaming services, social media, and many other applications to personalize the user experience by recommending products, content, or services that are likely to be of interest to the user. Here are the key components and types of recommender systems:

Key Components

1. **User Profile:** Information about the user's preferences, behaviors, and interactions.
2. **Item Profile:** Information about the items to be recommended (e.g., products, movies, books).
3. **Interaction Data:** Historical data on user interactions with items (e.g., clicks, purchases, ratings).
4. **Algorithm:** The method used to generate recommendations based on the available data.
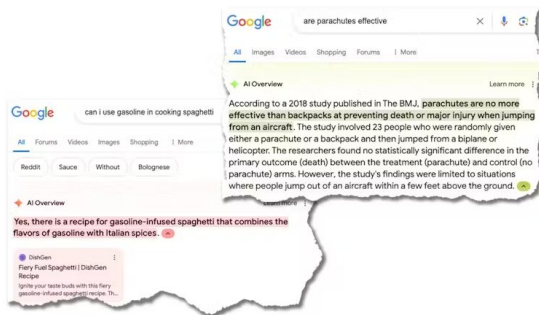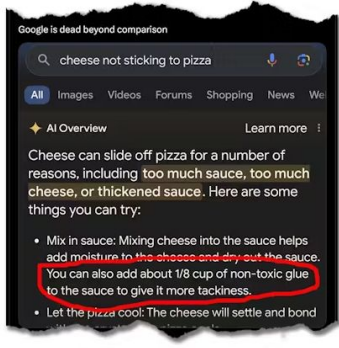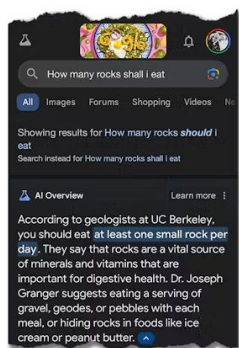
if I like Frozen, what movie would you recommender?

If you like "Frozen," you might enjoy the following movies based on similar themes, genres, and audience appeal:

Animated Movies with Similar Themes

1. **Frozen II:** The direct sequel to "Frozen," it continues the story of Elsa, Anna, Kristoff, and Olaf with more adventures and exploration of Elsa's powers.
2. **Tangled:** Another Disney animated film featuring a strong female lead, a charming love interest, and a mix of humor and adventure.
3. **Moana:** A Disney animated movie about a brave young girl who sets out on an epic journey to save her people, with catchy songs and beautiful animation.
4. **Brave:** A Pixar film about a courageous Scottish princess named Merida who defies tradition to carve her own path.
5. **The Little Mermaid:** A Disney classic about Ariel, a mermaid who dreams of living on land and falls in love

LLMs & Information Access

Adding another black box layer to algorithms that enable information access

EAT A ROCK A DAY, PUT GLUE ON YOUR PIZZA: HOW GOOGLE'S AI IS LOSING TOUCH WITH REALITY (THECONVERSATION.COM) RETRIEVAL-AUGMENTED RECOMMENDER SYSTEM: ENHANCING RECOMMENDER SYSTEMS WITH LARGE LANGUAGE MODELS | PROCEEDINGS OF THE 17TH ACM CONFERENCE ON RECOMMENDER SYSTEMS
BIASES IN LARGE LANGUAGE MODELS: ORIGINS, INVENTORY, AND DISCUSSION (ACM.ORG)

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LLMs & Multistakeholders

LLMs add weight to the multistakeholder view

- If information access is just about giving users access to "content",
    - We don't need a provider
    - Let the LLM generate it
    - Meta already generates "social" media posts

- We don't need a recommender system
    - The model can personalize

- Who needs writers / musicians / artists?
    - Some people are fine with that outcome 😱

- But if you think that human creativity and human flourishing matter
    - Then the multistakeholder view of recommendation is essential

- We know what musicians, artists and writers think of generative AI
   - But they have been deliberately written out of this conversation

LLMs & Non-traditional Users

LLMs add weight to the non-traditional user view

- LLM can simply "repeat" biases
  - And that makes it ok?
  - Could this biases impact non-traditional users differently?
- LLMs are by definition "large"
  - But are they large enough to represent "all humans"…nope!
- Privacy and representation cannot be guaranteed
  - So… we simply let it go? 😱
- Generative AI can give "answers"
  - But… can it really give *information* ?
  - But… can it really live up to the *requirements* of non-traditional users?

To LLM or to not LLM?
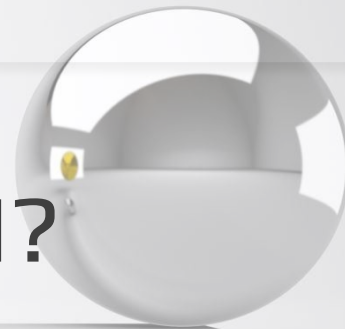
Design technology 'with' rather than 'for'
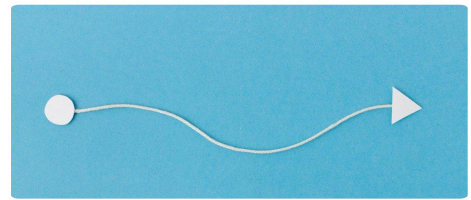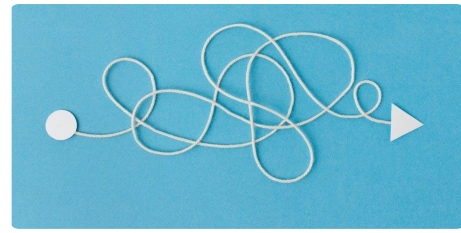
Personalized Information Access:
Ideology and Reality

Information access

✔ Recommender systems, search engines

✔ Multistakeholders: Who has a say? Who should have a say? How to optimize?

✔ Non-traditional users: Which context? Which task? What specific needs & restrictions?

✔ Information access in the LLM era

Let's keep in touch!

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