

# Economics of Recommender Systems

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## ABSTRACT

This tutorial dives into the economics of recommender systems (RSs), presenting existing and ongoing research on how they influence consumer choices, shape market outcomes, and change the incentives of those who interact with them, whether by designing, catering to, or using these systems. The tutorial also touches on the broader implications of this research for antitrust and competition policy. By fostering a collaborative and interdisciplinary research community, this tutorial aims to deepen the understanding of the economic effects of recommender systems and inform the development of policies to mitigate potential risks associated with their diffusion.

## CCS CONCEPTS

• **Information systems** → **Recommender systems**; • **Theory of computation** → *Algorithmic game theory*; • **Applied computing** → Economics; • **Social and professional topics** → Economics of information.

## KEYWORDS

Recommender Systems, Algorithmic Recommendations, Machine Learning and Competition Policy

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This tutorial aims to convene scholars from diverse backgrounds to dive into the economics of recommender systems (RSs). Recommender systems impact consumption choices by shaping how users select content and/or consumer products and services. That is, RSs influence demand. Because of this, RSs also indirectly influence the incentives of those who interact with these systems, whether by designing them or catering to them. This tutorial explores the

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diverse issues related to RSs that are of interest to computer scientists, economists, and legal scholars. How do recommender systems influence consumer choices? Do they help users identify optimal consumption options (i.e., lower search frictions), or do they primarily provide data driven insights into users' personal preferences (i.e., provide information useful to make choices)? How can we effectively measure their performance? What methods can be used to establish the causal impact of recommendations on consumption patterns? How do algorithmic recommendations shape product choices? Do content creators modify their output to align with algorithmic preferences? In other words, are recommender systems influencing the type of content and/or goods supplied by altering creators' incentives? Specific emphasis will be given to Antitrust and competition policy issues: Can RSs influence market dynamics by determining who gets to sell? Will markets become more or less concentrated with the diffusion of algorithmic recommendations? Will firms have incentives to increase or decrease the prices at which they sell their products? How do algorithmic recommendations affect entry and exit decisions and R&D investments? What is the final impact on consumer welfare?

Additionally, the tutorial addresses ongoing policy discussions. The potential for algorithmic recommendations to have adverse effects has sparked an extensive debate. Critics argue that algorithms' power to influence choices comes with significant responsibilities. Specifically, in terms of the economic impacts of recommender systems, there is concern that these algorithms might contribute to market concentration, potentially leading to reduced choices and higher prices. Economic research plays an important role in evaluating the impact of recommender systems on the economy and in developing policies to address the risks posed by their widespread adoption. The ultimate goal is to understand how consumer behavior differs when decisions are made with and without the assistance of this technology.

The tutorial has three primary objectives. Firstly, it seeks to cultivate a collaborative and interdisciplinary research community focused on understanding the economic implications of recommendation algorithms. Secondly, it aims to assist researchers in formulating research inquiries that resonate with a wider audience within the research community. Lastly, it aims to facilitate the exchange of knowledge and the dissemination of ideas.

Special attention will be devoted to several active areas of research. **Theoretical exploration** conceptualizing recommender systems as tools that influence consumption patterns by transmitting information and reducing market inefficiencies and examining

their resultant effects. **Empirical analysis** focusing on estimating the causal impact of recommender systems on consumption behaviors. This involves moving beyond mere correlation to identify and understand the cause-and-effect relationships at play. **Experimental research** involving the creation of controlled environments that integrate cutting-edge recommender systems with meaningful economic scenarios aimed at uncovering their real-world impacts. **Policy considerations** related to the proliferation of these technologies and the economic implications of regulatory initiatives (e.g., the European Union Digital Services Act) aimed at governing their usage in market settings.

## OUTLINE

- Economic Significance of Recommender Systems
  - Estimating the causal effect of recommender systems on consumption: correlation or causation?
  - Examining the role of recommender systems in generating economic surplus and the tools for quantifying this surplus.
  - Investigating recommender systems as redistributive mechanisms in multi-sided markets and their implications on surplus distribution.
  - Discussing the reaction of firms to recommender systems in terms of pricing, product design, and market strategies.
  - Analyzing how recommender systems can lead to market power potentially affecting consumer welfare through self-preferencing, risk-taking, and information design.
- Theoretical Foundations of Economics in Recommender Systems
  - An overview of the conceptual frameworks used in economic studies of recommender systems.
  - Recommender systems and information transmission.
  - Recommender Systems reducing marketplace frictions.
  - Key economic questions: Do recommender systems bias choices? What drives these biases? What is the impact on market competition?
- Recommender Systems in Practice
  - Experimental and numerical approaches to study the economic impacts in real marketplaces or test-bed controlled environments.

## DURATION

180 minutes

## TARGET AUDIENCE

Conference attendees with an interest in the intersection of economics and recommender system technology, including early-career researchers and professionals from various disciplines.

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