

Fairness and Control of Exposure in Two-sided Markets

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ABSTRACT

A large number of two-sided markets are now mediated by search and recommender systems, ranging from online retail and streaming entertainment to employment and romantic-partner matching. I will discuss in this talk how the design decisions that go into these search and recommender systems carry substantial power in shaping markets and allocating opportunity to the participants. This does not only raise legal and fairness questions, but also questions about how these systems shape incentives and the long-term effectiveness of the market.

At the core of these questions lies the problem of where to rank each item, and how this affects both sides of the market. While it is well understood how to maximize the utility to the users, this talk focuses on how rankings affect the items that are being ranked. From the items perspective, the ranking system is an arbiter of exposure and thus economic opportunity. I will discuss how machine learning algorithms that follow the conventional Probability Ranking Principle [1] can lead to undesirable and unfair exposure allocation for both exogenous and endogenous reasons. Exogenous reasons often manifest themselves as biases in the training data, which then get reflected in the learned ranking policy. But even when trained with unbiased data, reasons endogenous to the system can lead to unfair or undesirable allocation of opportunity. To overcome these challenges, I will present new machine learning algorithms [2,3,4] that directly address both endogenous and exogenous factors, allowing the designer to tailor the ranking policy to be appropriate for the specific two-sided market.

CCS Concepts/ACM Classifiers

• Information Systems ~ Learning to Rank; Information Systems ~ Recommender Systems

Author Keywords

Fairness; Exposure Allocation; Two-sided Markets

BIOGRAPHY

Thorsten Joachims is a Professor in the Department of Computer Science and in the Department of Information Science at Cornell University, and he is an Amazon Scholar. His research interests center on a synthesis of theory and system building in machine learning, with applications in information access, language technology, and recommendation. His past research focused on counterfactual and causal inference, learning to rank, structured output prediction, support vector machines, text classification, learning with preferences, and learning from implicit feedback. He is an ACM Fellow, AAAI Fellow, KDD Innovations Award recipient, and member of the SIGIR Academy.



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REFERENCES

- [1] Robertson S.E. The probability ranking principle in IR. J. Doc., 33:294–304, 1977.
- [2] A. Singh, T. Joachims, Fairness of Exposure in Rankings, ACM International Conference on Knowledge Discovery and Data Mining (KDD), 2018.
- [3] M. Morik, A. Singh, J. Hong, T. Joachims, Controlling Fairness and Bias in Dynamic Learning-to-Rank, ACM Conference on Research and Development in Information Retrieval (SIGIR), 2020.
- [4] H. Yadav, Zhengxiao Du, T. Joachims, Fair Learning-to-Rank from Implicit Feedback, ACM International Conference on Research and Development in Information Retrieval (SIGIR), 2021.

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