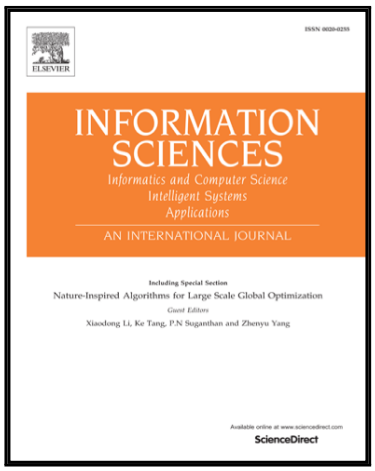

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A Pareto Optimal Mechanism for Demand-Side Platforms in Real Time Bidding Advertising Markets

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Abstract

Real time bidding (RTB) advertising has been widely recognized as one of the most promising big-data-driven business models, and a fast-growing research field of computational advertising in recent years. In RTB markets, each ad impression is sold through a two-stage resale auction session, in which demand side platforms (DSPs) play an important role as intermediators. Specifically, DSPs buy ad impressions from the Ad Exchange (AdX) platform and resell them to their registered advertisers, who are interested in the target audience behind the ad impressions. The mechanism design of this two-stage resale auction is a hot research topic and also a critical component in maintaining the effectiveness and efficiency of the RTB ecosystems. In this paper, we strive to identify and design a new mechanism for this auction model in stochastic market environments, with the aim of maximizing the total expected revenue of the winning advertiser and the DSP, and improving the expected revenues for both the winning advertiser and the DSP from each ad impression. Our proposed new mechanism is Pareto optimal for the advertisers and DSPs. We study the equivalent forms of our proposed mechanism in cases when the stochastic market environments can be characterized by uniformly or normally distributed random variables, respectively. We also validate our auction mechanism using the computational experiment approach. The experimental results indicate that our mechanism can make both advertisers and DSPs better off. Our work is expected to provide useful managerial insights for DSPs in RTB market practice.

Keywords: Computational Advertising, Real Time Bidding, Demand Side Platform, Pareto Optimal,

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