Third-Party Data Providers Ruin Simple Mechanisms

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ABSTRACT

Motivated by the growing prominence of third-party data providers in online marketplaces, this paper studies the impact of the presence of third-party data providers on mechanism design. When no data provider is present, it has been shown that simple mechanisms are "good enough" — they can achieve a constant fraction of the revenue of optimal mechanisms. The results in this paper demonstrate that this is no longer true in the presence of a third-party data provider who can provide the bidder with a signal that is correlated with the item type. Specifically, even with a single seller, a single bidder, and a single item of uncertain type for sale, the strategies of pricing each item-type separately (the analog of item pricing for multi-item auctions) and bundling all item-types under a single price (the analog of grand bundling) can both simultaneously be a logarithmic factor worse than the optimal revenue. Further, in the presence of a data provider, item-type partitioning mechanisms—a more general class of mechanisms which divide item-types into disjoint groups and offer prices for each group—still cannot achieve within a log log factor of the optimal revenue. Thus, our results highlight that the presence of a data-provider forces the use of more complicated mechanisms in order to achieve a constant fraction of the optimal revenue.

KEYWORDS

mechanism design; ad auctions; simple mechanisms; information asymmetries; signaling

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