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Robustness and Separation in Mechanism Design under Approximate Incentive Compatibility

We study a multidimensional mechanism design problem where a seller offers multiple products to a single buyer. The seller possesses only marginal distributional information about the buyer's random valuation of each product. The buyer is not a perfect optimizer and is satisficing whenever his incentive is epsilon away from the optimal—a notion called approximate incentive compatibility (IC). We show by a separation theorem that the optimal mechanism first allocates epsilon among multiple products and then separately screens each product under approximate IC. To compute the optimal mechanism, we first propose a discrete approximation that, powered by our separation theorem, can be reformulated as a scalable finite-dimensional convex program; we then devise an oracle that efficiently extends solutions of the discretization to feasible mechanisms with attractive performance guarantees. We also establish a side result for the robust screening problem under approximate IC that the hard/soft floor mechanism is optimal among deterministic mechanisms.

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