The Effects of Learning and Competition in Dynamic Stochastic Optimization

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Optimization models for typical problems using data analytics, such as pricing, recommendation systems, and assortment selection, require a strategy to gather sufficiently informative data to learn the distributions of uncertain outcomes and their dependence on decision variables. The objective in these models generally loses useful properties such as convexity in the decision variables, but policies can often be constructed to achieve asymptotic optimality in the absence of competition.

This talk will describe these general developments and will then highlight the differences that can occur in settings in which competitors also benefit from actions that increase learning. The talk will describe how such situations can lead to limited experimentation and actions that are quite different from those in traditional models of individual decisions.