Title: Blind Nonparametric Revenue Management

Abstract:

In most revenue management studies one assumes knowledge of how consumers react to prices, or alternatively, that the demand function is known (the demand function maps prices into instantaneous demand rate). The main focus of the talk is on the implications on performance and design of pricing strategies associated with removing this assumption.

In the first part of the talk, we present an empirical example that highlights some of the shortcomings of parametric approaches and illustrates the need for nonparametric modeling of the demand function.

In the second part of the talk, we move on to see how such ideas come into play in a dynamic pricing problem. For that purpose we consider a prototypical revenue management problem where the decision maker observes realized demand over time, but is otherwise "blind" to the underlying demand function. Few structural assumptions are made with regard to the demand function, in particular, it need not admit any parametric representation. We introduce a general method for solving such blind revenue management problems that is based on learning the demand function "on the fly" and optimizing prices based on that. The analysis, which involves the classical trade off between exploration and exploitation, leads to several qualitative and operational insights with regard to dynamic optimization problems under uncertainty in general, and the practice of price testing in the particular context of blind revenue management problems.