Department of Applied Mathematics and Statistics
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SEMINAR

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304 Whitehead Hall
Refreshments: 3:30 p.m.
Seminar: 4:00 p.m.

CALL CENTER STAFFING FOR PROFIT OPTIMALITY

Abstract

We develop an approximate algorithm to design an agent staffing and telephone line provisioning schedule for a call center that obtains profit optimality. The call center is modeled as a multi-server queue with a time-varying arrival rate, additional waiting spaces, and the option of abandonment for customers in the queue. We assume that there is a reward for every successful service completion, a penalty for every abandoned call, and a cost for the number of agents and telephone lines used.

Using asymptotic scaling methods, we obtain a strong law of large numbers limit for this queueing process. This limiting process is a deterministic dynamical system that is a good approximation (asymptotically exact) of the mean behavior for the original queueing model. The scheduling problem can then be recast as a problem in classical mechanics, where the number of customers in the system corresponds to "position", the marginal cost per customer plays the role of "momentum", and a modified profit rate corresponds to the "Lagrangian", which has units of "energy". We then derive this optimal schedule by using variational calculus methods.

(This is joint work with Robert Hampshire of Princeton University.)