

# Online Learning and Optimization for Queues with Unknown Demand Curve and Service Distribution

*Monday, June 17, 2024 3:30 PM (30 minutes)*

We investigate an online learning and optimization problem in a queueing system having unknown arrival rates and service-time distribution. The service provider's objective is to seek the optimal service fee  $p$  and service capacity  $\mu$  so as to maximize the cumulative expected profit (the service revenue minus the capacity cost and delay penalty). We develop an online learning algorithm is able to effectively evolves the service provider's decisions utilizing real-time data including customers' arrival and service times, without needing the information of the arrival rate or service-time distribution. Effectiveness of the online learning algorithm is substantiated by (i) theoretical results including the algorithm convergence and analysis of the regret, i.e. the cost to pay over time for the algorithm to learn the optimal policy, and (ii) engineering confirmation via simulation experiments of a variety of representative examples. This is joint work with Yunan Liu from NCSU and Guiyu Hong from CUHK-Shenzhen.

**Primary authors:** CHEN, Xinyun (The Chinese University of Hong Kong, Shenzhen); Prof. LIU, Yunan (North Carolina State University); Mr HONG, Guiyu (The Chinese University of Hong Kong, Shenzhen)

**Presenter:** CHEN, Xinyun (The Chinese University of Hong Kong, Shenzhen)

**Session Classification:** Parallel session: Online learning in stochastic networks