Marketing Colloquia
Fall 2023 - Abstract

Qiaochu Wang

Doctoral Candidate, Marketing
Carnegie Mellon University, Tepper School of Business

Thursday, September 28, 2023
Where: *741 JMHH*
When: *12:00 PM* to 1:20 PM

ALGORITHMS, ARTIFICIAL INTELLIGENCE, AND SIMPLE RULE-BASED PRICING

ABSTRACT:

Automated pricing strategies in e-commerce can be broadly categorized into two forms -- simple rule-based such as undercutting the lowest price, and more sophisticated artificial intelligence (AI) powered algorithms, such as reinforcement learning (RL) algorithms. Although simple rule-based pricing remains the most widely used strategy, a few retailers have started adopting pricing algorithms powered by AI. RL algorithms are particularly appealing for pricing due to their abilities to autonomously learn an optimal policy and adapt to changes in competitors' pricing strategies and market environment. Despite the common belief that RL algorithms hold a significant advantage over rule-based strategies, our extensive pricing experiments demonstrate that when competing against RL pricing algorithms, simple rule-based algorithms may result in higher prices and benefit all sellers, compared to scenarios where multiple RL algorithms compete against each other. To validate our findings, we estimate a non-sequential search structural demand model using individual-level data from a large e-commerce platform and conduct counterfactual studies. The results show that in a real-world demand environment, simple rule-based algorithms outperform RL algorithms when facing other RL competitors. Our research sheds new light on the effectiveness of automated pricing algorithms and their interactions in competitive markets and provides practical insights for retailers in selecting the appropriate pricing strategies.

Wharton
UNIVERSITY *of* PENNSYLVANIA

MARKETING DEPARTMENT