Strategic pricing without perfect information

Simón Rodríguez
Universidad de Comillas
https://www.iit.comillas.edu/personas/srsantana
srsantana@icai.comillas.edu

Abstract

In today's digital economy, businesses must make critical decisions under intense competition and uncertainty none more so than pricing. Yet, many traditional tools for modeling competition, especially those grounded in game theory, depend on unrealistic assumptions about what firms know about each other. In this talk, I'll introduce a support framework for personalized pricing based on Adversarial Risk Analysis (ARA) that is designed to operate effectively in competitive settings without requiring such strong assumptions.

Our approach is designed to aid decision–makers reason systematically about how competitors and customers might behave, even when much is unknown. It integrates forecasting of competitor pricing strategies and customer purchasing decisions into a coherent and practical framework. By structuring the competitive landscape through the lens of each player?s decision problem, this method enables more informed and strategic pricing choices.

ARA provides a principled way to model and quantify uncertainty about others' objectives, constraints, and information, helping decision-makers act optimally in one–sided competitive scenarios. Rather than assuming equilibrium, it allows us to simulate the likely behavior of rivals while preserving a Bayesian decision–theoretic foundation, which is especially valuable in data–scarce or rapidly evolving markets.

Finally, we will explore the framework's applicability using two real—world examples: one from retail and another from the more complex setting of pension fund management, where competitive dynamics and customer behavior differ substantially.