Strategic Positioning in Information Product Space  
Project Summary

Networked information technology has led to unprecedented opportunities for exchanging information in a constantly changing population of participants whose interests and needs vary over time. In particular, this project is concerned with populations comprised of participants (consumer agents) seeking information products, and participants (producer agents) who can offer products. Substantial research has gone into studying how producers and consumers can settle the terms of a transaction over products that they agree should be exchanged. But, given the many possible variations of information products that can be offered at different prices and in different combinations, a critical and poorly understood problem is how agents should position themselves in this product space to differentiate themselves from competitors and attract desirable partners with whom to transact.

To address this problem, the investigators will build on their prior work, which has used economic analysis and computer simulation to study how producers of information goods can learn to position themselves strictly based on price schedules (choosing between charging, for example, on a per-item basis or for an entire bundle). The investigators have found that a monopolist producer can learn profitable price schedules, but schedules that extract more profit take longer to learn, which implies that a producer must consider population stability and the cost of long learning lags. When competing with other producers, learning can sometimes lead to price wars, but the investigators have identified conditions under which producers stabilize by positioning for complementary consumer niches. A critical aspect of this prior work is the integration of traditional economic emphasis on equilibrium properties with the use of computer simulation to study the dynamic behavior of nonstationary populations in open, networked environments.

This prior work did not encompass several important features of the environment. First, producers may differentiate themselves along dimensions other than price schedules, such as the characteristics of information goods and investments in advertising. Adding product differentiation to a producer’s choice set has implications for how a producer can experiment to learn consumer demand. Second, consumers might only become aware of available product choices over time or after incurring a search cost, so it is important to model the effects of consumer learning on producers’ decisions. Finally, consumers might buy strategically so as to send profit signals that influence producer decisions to the consumers’ benefit. This project will extend economic theory to account for these concerns, and create computational agents that can make adaptive, strategic decisions about product positioning.

More broadly, this project contributes to the investigators’ ongoing studies into computational mechanisms that allow large, unstructured populations of decision-making agents to adaptively self-organize, and into developing economic theories about how firms decide how they should differentiate from each other. The project brings together economists and computer scientists to enable the continuation of an interdisciplinary collaboration that has already demonstrably made contributions to both fields. Thus, the project promises impact on several levels, ranging from detailed theories and implementations for understanding and controlling dynamic, adaptive product positioning...
decisions in electronic commerce, to more far-ranging insights into strategic decision-making in evolving, open infrastructures, and finally to providing cross-disciplinary training to prepare graduate students for tackling the increasingly prevalent challenges that arise as information technology becomes interwoven in our social institutions.