COLLEGE OF ENGINEERING

Control Seminar

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Bayesian Learning With Non-myopic Strategic Agents

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3:30 – 4:30 pm 1500 EECS

ABSTRACT: We consider problems involving multiple strategic (selfish) agents making decisions dynamically in the presence of asymmetric information. Specifically, we consider an environment where many players need to decide whether to buy a certain product (or adopt a technology) or not. The true value of the product is not known to the players; instead, each player observes previous players' actions and has his own noisy private information on the product quality. It is well known that in such settings, agents start ignoring their private information thus generating trands/fads, also known as informational cascades, where learning stops in the network as a whole. These results, however, depend on a crucial assumption: players only enter the marketplace once and so they can act myopically. What happens when agents are given the option to return to the market? Agents can no-longer act myopically and have to strategize over the entire time horizon. Clearly there are tradeoffs between waiting for more information and buying early (due to discounting). In this talk, we present a novel methodology for characterizing "structured" Perfect Bayesian Equilibria (SPBE) of these dynamic games with asymmetric information akin to the backward sequential decomposition in MDPs and POMDPs. The corresponding "state" is an appropriate belief based on the common information among agents. By applying this methodology to the problem at hand, and by identifying sufficient statistics that summarize the "state", we provide a characterization of SPBE with non-myopic strategies through a fixed-point equation of dimensionality that grows only quadratically with the number of players. Based on this characterization we study informational cascades and show that they occur with high probability. Furthermore, only a small portion of the total information in the system is revealed before a cascade occurs.

BIO: Achilleas Anastasopoulos is currently an Associate Professor at the EECS Department at U-M. His research interests lie in the general area of resource allocation and information elicitation on networked systems with strategic agents, as well as the connections between stochastic control, communications and information theory.

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