EPSTEIN INSTITUTE SEMINAR ▪ ISE 651

Distributed Learning Dynamics Convergence in Routing Games

ABSTRACT – The present talk starts with a brief presentation of the state of the art in traffic monitoring, leading to a new result in routing games. Routing games offer a simple yet powerful model of congestion in traffic networks, both in transportation and communication systems. The congestion in such systems is affected by the combined decision of the agents (drivers or routers), so modeling the decision process of the agents is important, not only to estimate and predict the behavior of the system, but also to be able to control it. This decision process is often called learning, as agents "learn" information about the system or about the other agents. We propose and study different models of learning with the following requirement: the joint learning dynamics should converge asymptotically to the Nash equilibrium of the game. In particular, we focus on two important properties: Is the model robust to stochastic perturbations (such as measurement noise)? And does the model allow heterogeneous learning (different agents may follow different learning strategies)? We study these questions using tools from online learning theory and stochastic approximation theory. We then present experimental results obtained with an online gaming application in which distributed players can play the routing game: they connect to the web app and participate in the game, by iteratively making decisions about their routes and observing outcomes.

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SPEAKER BIO – **Dr. Alexandre Bayen** is the Liao-Cho Professor of Engineering at UC Berkeley, in the department of Electrical Engineering and Computer Science and Civil & Environmental Engineering. He is the Director of the Institute of Transportation Studies, and a Faculty Scientist at the Lawrence Berkeley National Laboratory, where he is the Director of the Transportation Initiative. He received the BS from Ecole Polytechnique, France, the MS and PhD from Stanford University, worked at NASA, and at the Department of Defense in France, where he holds the rank of Major. He has published two books, over 200 peer referred journal and conference publications, his research has been covered several hundred times in the mainstream media. He is the recipient of several awards, including CAREER (NSF), PECASE (White House), Ruberti Prize (IEEE), Huber Prize (ASCE), TRANNY (CTF) and NAE Gilberth Lecture.

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3:30PM – 4:50PM
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