EPSTEIN INSTITUTE SEMINAR ▪ ISE 651

Solving Stackelberg Equilibrium in Stochastic Games

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ABSTRACT – In this work we consider a security problem where police decide a patrolling policy over a set of targets given a strategic adversary in a dynamic environment. This dynamic problem can be modeled as a discounted stochastic game where the Stackelberg equilibrium of this game is the reward maximizing policy the defender commits to.
In this work we investigate how to compute stationary policies that form a strong Stackelberg equilibrium for discounted stochastic games. We show that for a class of instances (with myopic follower strategies) both, value iteration (VI) and policy iteration (PI) converge to a strong Stackelberg equilibrium. This class of instances includes problems where the follower has a discount constant equal to 0 or when only the leader controls the transition matrix. We present counterexamples that show (VI) and (PI) do not converge to the Stackelberg equilibrium in general. Our computational results show that (VI) converges to the unique strong Stackelberg equilibrium when considering instances that arise from security problems.

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SPEAKER BIO – Fernando Ordóñez is a Professor in the Industrial Engineering Department at the University of Chile and an Adjunct Research Professor in the Industrial and Systems Engineering Department at USC. He received his Mathematical Engineering degree, from the University of Chile in 1997 and his Ph.D. in Operations Research from MIT in 2002. His research focuses on mathematical optimization models, uncertainty, algorithms, and applications of optimization to engineering and management science. His research was awarded the Wagner prize for Excellence in Operations Research practice in 2012 and the Rist Prize of the Military Operations Research Society in 2011.

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