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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