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Predator-Prey Interactions using Deep Reinforcement Learning
KAYHAN ULGEN, SIDDHARTHA VERMA, Florida Atlantic University — Collective behavior can allow animals to effectively perform a variety of tasks which may be difficult for a single individual to accomplish. For instance, packs of wolves, nest building ants, schools of fish, all benefit to various extents from interactions among individuals. Such interactions are extremely complex and may be difficult to formulate a priori, even in the simplest of scenarios involving two or more individuals. Past studies of such collective behavior, including foraging, hunting, and schooling, have relied on simplified rule-based statistical models. We simulate predator-prey interactions between up to three independent learning agents using a reinforcement learning algorithm, where the individuals attempt to either intercept others, or try to evade capture. The algorithm allows the individuals to learn efficient strategies autonomously to accomplish a specified goal. More specifically, the agents are modeled as point particles in two dimensional space and allowed to move within a constrained region. The agents are trained using two independent neural networks, which act as distinct brains belonging to each individual. The trained individuals exhibit behavior which resembles that observed in nature.

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