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SiMAMT: An Interactive 3D Graphical Simulation Environment for Strategy-Based Multi-Agent Multi-Team Systems

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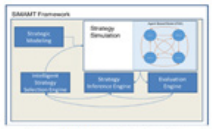
Multi-agent multi-team environments are complicated and complex. The normal approach is to simplify the structure by using a single policy for each agent, such as in swarming or flocking algorithms. While this type of simulation environment may provide multiple agents working within the system, their interactions are single-dimensional and their group behavior minimal. SiMAMT, in contrast, is a hierarchical, strategy-based approach that provides large-scale, complex strategic initiatives realized by independent intelligent single agents. These agents are independent because they have their own talents, skills, abilities, and behaviors that are influenced by the commands given to them from the layer above (e.g., the team). These agents can all have their own behaviors, or several could have similar behaviors, or entire teams could share one behavior, depending on the scenario. Further, SiMAMT utilizes strategy-based behaviors at every level, so the players are influenced by the team's strategy, the teams are influenced by the unit's strategy, the units are influenced by the battalions' strategy, etc. Whichever hierarchical structure the environment needs — sports, military, organizational, etc. — can be supported by the SiMAMT system. The simulation environment provides the 3D visual environment to view the progress of the simulation from both an overall perspective and from a first-person perspective from each agent. This combination view provides insight into how each layer of the structural hierarchy is performing — agents, teams, overall interaction, etc. Additionally, it provides overall views of the strategy that each team is using, each agent's behavior, and the overlaps of both. The simulation also provides statistics as the simulation is running to relay observations, transitions, most likely strategies in play (the SiMAMT framework provides strategic inference to determine the most likely strategy being employed by the other teams in the environment), and overall simulation results. Overall, the goal of the simulation is to allow multi-agent teams to perform strategically in interactive time while performing strategy-inference to improve their performance. The SiMAMT simulation achieves this goal, and this will be demonstrated in the experiments.

Biography

Michael Franklin holds a Ph.D. in Computer Science specializing in Artificial Intelligence and Robotics. His research areas also include Machine Learning, High-Performance Computing, Big Data and Data Science, and Serious Games and Simulations. Dr. Franklin worked for over 25 years in the IT industry helping companies large and small solve their technical issues. He specialized in Solutions Engineering for Fortune 500 companies where he integrated their vision and business plan with their technology and implementation. After over two decades of success running his own consulting firm and helping push the IT industry forward, he returned to his first passion: teaching. He is an enthusiastic speaker well-known for engendering passion in his listeners, motivating them to succeed, and equipping them to thrive.



Publications

- Strategy inference in stochastic games using belief networks comprised of probabilistic graphical models
- eSense: BioMimetic modeling of echolocation and electrolocation using homeostatic dual-layered reinforcement learning
- Strategy inference via real-time homeomorphic and isomorphic tree matching of probabilistic graphical models
- Strategy Inference in Multi-Agent Multi-Team Scenarios
- Overwatch: An Educational Testbed for Multi-Robot Experimentation

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