ITAI 4373
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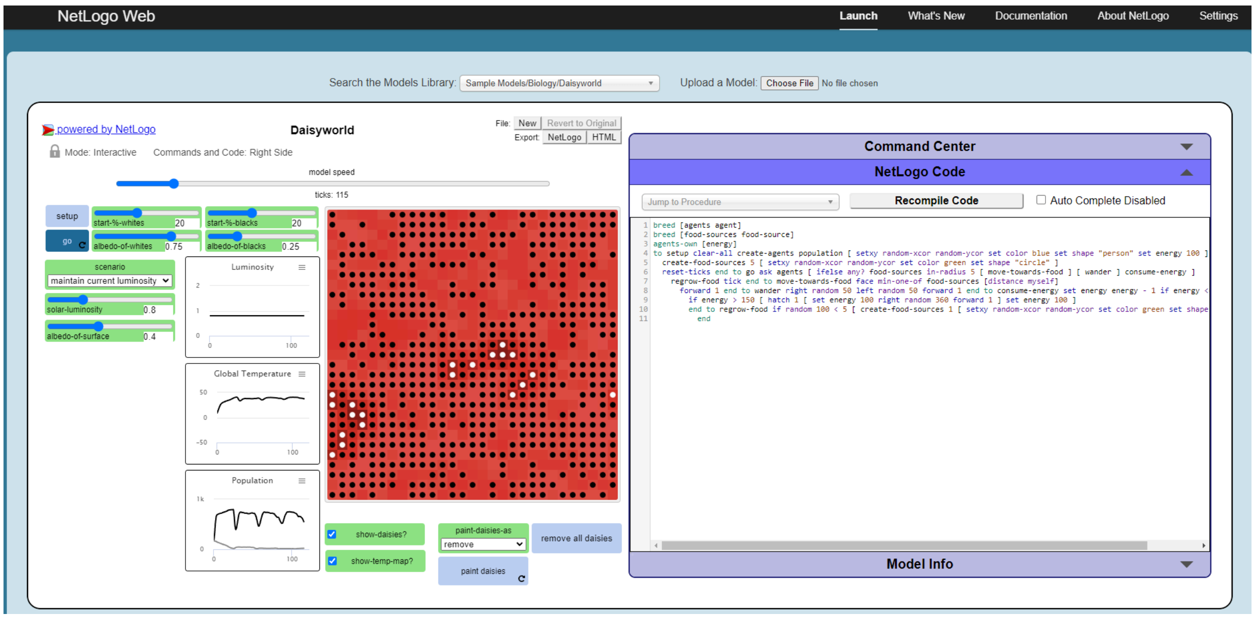
Lab 01



Reflective Journal

Creating adaptive foraging agents in NetLogo helped me understand important ideas about AI behaviors and real-time simulations during this lab. I now know how simple rules defined for individual agents in agent-based modeling (ABM) can replicate complex behaviors. The patterns of group behavior that emerged—such as energy use, reproduction, and mortality in the population of agents—emphasized the dynamic interaction between the decisions made by each individual and the overall results of the system. This lab improved my comprehension of how AI systems can mimic natural behaviors, such acquiring resources and making decisions, and it also provided me with a grasp of how local behaviors can result in large-scale patterns. Managing the interplay between agents and food sources was one of the challenges I faced. Agents had a hard time finding food at first and would frequently walk aimlessly. The detection radius and movement functions were adjusted to effectively detect and move toward close food, resolving this issue. Controlling the population dynamics was another difficulty since the agents either perished too soon or reproduced too quickly. Over time, adjusting food regrowth probabilities and energy consumption rates helped to maintain a more balanced population size. Managing the interplay between agents and food sources was one of the challenges I faced. Agents had a hard time finding food at first and would frequently walk aimlessly. The detection radius and movement functions were adjusted to effectively detect and move toward close food, resolving this issue. Controlling the population dynamics was another difficulty since the agents either perished too soon or reproduced too quickly. Over time, adjusting food regrowth probabilities and energy consumption rates helped to maintain a more balanced population size. My simulation model's strengths include its capacity to depict emergent characteristics like population fluctuations and resource competition, as well as fundamental AI behaviors like foraging and reproduction. The model is constrained, though, in that it oversimplifies behaviors and settings found in the real world. Agents are, for instance, either aimlessly traveling or meandering in the direction of food, with no external influences like impediments in the surroundings or different kinds of food. I would add predator agents or different food types with varying energy values to the model to increase realism. This would complicate the agents' decision-making and make the simulation more active. This lab changed the way I thought about AI simulations by demonstrating the adaptability and strength of agent-based models in simulating intricate behaviors. The application of these simulations to more realistic AI systems, such as swarm robotics or autonomous cars, where agents have to interact in uncertain situations, is what interests me the most. I found it interesting to see how small-scale agent behaviors, such as approaching food, may have a large-scale effect on population dynamics in the lab. It was amazing to observe how minor adjustments may have a significant impact on the entire system, highlighting how crucial it is to fine-tune AI models for practical uses.