ITAI 4373 – The New Nature of Work in AI

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**Reflective Journal – NetLogo and the Flocking model**

NetLogo is a tool that lets you create and explore simulations where many different agents interact, helping to study complex systems in areas like science, economics, or any other field of study. For this assignment, I was to explore the simulation in “Adaptive Foraging Agents,” however, I could not find this model on NetLogo, so I studied simulation in the “Flocking – Alternative Visualizations” model which was closely similar to the ‘Foraging’ one. Below is my Reflective Journal entry:

**Learning Outcomes**

* **Key Concepts Learned**  
  In this lab, I explored real-time simulation and AI behaviors through the Flocking model, which mimics bird flocking. The model highlights how simple rules—alignment, separation, and cohesion—can lead to complex, emergent behaviors, showing how systems can self-organize without centralized control.
* **Enhanced Understanding of Agent-Based Modeling**   
  This lab deepened my understanding of Agent-Based Modeling by demonstrating how individual agents (birds) following basic rules can create complex group behaviors. I saw how local interactions among agents lead to global patterns in real time.

**Technical Skills**

* **New Skills Acquired Using NetLogo**  
  I learned how to adjust parameters in NetLogo to control agent behaviors and use visualizations to explore alignment and cohesion in the flock. This experience helped me understand how to fine-tune simulations in real time.
* **Potential Real-World Applications**  
  These skills can be applied to real-world scenarios like crowd management, traffic systems, or disease spread modeling. Understanding how agents behave individually can help predict larger system outcomes in these fields.

**Challenges and Solutions**

* **Difficulties Encountered**  
  At first, it was difficult to understand the behavior of the birds and what different parameters meant.
* **How I Overcame These Challenges**  
  I experimented with the parameters and read the model information at the bottom of the web, which helped me understand the purpose of each parameter.

**Critical Analysis**

* **Strengths and Limitations of the Simulation Model**  
  The model’s strength lies in visually demonstrating emergent behavior from simple rules. However, a limitation is that all the birds always move at a constant speed, which doesn’t fully reflect real-world flocking.
* **Suggested Improvement**  
  Introducing variable speeds based on proximity or environment would make the model more realistic, especially in simulating more dynamic interactions between agents.

**Course Connections**

* **Relation to Module 1 Concepts**  
  This lab reinforced concepts from Module 1, particularly around how simple AI rules govern complex behaviors in real time. It was a practical demonstration of emergent phenomena.
* **New Insight**  
  I realized that even simple, deterministic models can produce unpredictable, lifelike outcomes, emphasizing the value of real-time simulations in studying complex systems.

**Personal Reflection**

* **Influence on Perception of AI Simulations**  
  This lab showed me the power of simplicity in AI simulations. I now appreciate how simple rules, rather than complex algorithms, can model dynamic systems effectively.
* **Aspect of Interest**  
  I was particularly fascinated by the constant adaptation of the flock, where no static pattern emerged, yet the system remained ordered—a reminder of how chaotic yet structured real-world behaviors can be.

**Key points and Screenshots:**

Below are some screenshots from the simulation, the first one shows that the boids (birds) in the same direction have the same color. The second screenshot shows two groups, red when boids are separating and green when they are cohering.

A screenshot of a computer

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