Advanced Self-organisation of Social Systems: Project Prep

Ruurd Bijlsma (S3860469)

Department of Artificial Intelligence, University of Groningen

1 Project prep

1.1 Project Summary

Netlogo: How the predator manages to catch moving prey. Study navigation strategies ('guidance rules') of the predator

When a predator hunts a school of fish or a flock of birds, there are several guidance strategies to consider. The most obvious strategy would be to move towards the current position of the prey. However, at the time of arrival, the prey would have moved towards a new position. An alternative strategy would be to move towards a position at which the predator expects to intercept the prey. This can be achieved by applying 'proportional navigation', a strategy in which the predator adjusts the rotation of velocity vector proportionally to the rotation rate of line of sight of its prey. This strategy is frequently used in homing missiles and is optimal when the prey moves in a straight line. But is it also optimal when the prey tries to escape? In this project, two or more strategies should be implemented in an existing Netlogo model. The model will be run for different navigation strategies and predation success will be compared.

References
Olberg, R., Worthington, A. & Venator, K. 2000 Prey pursuit and interception in dragonflies. Journal of Comparative Physiology A-Sensory Neural and Behavioral Physiology. **186**, 155-162. [1]

1.2 Questions

- Does the prey have to be a flock or a school, or can it be a singular prey. I assume it has to be a group of prey.

- The project description mentions it should be implemented in an existing Netlogo model. Is there specific model for this or should I pick one from the previous assignments.

- Should I also model the predators decision in which prey to go for?

1.3 Plan

- Create model for how the predator chooses a prey

  - Choose based on angular velocity in field of view (that's how dragonflies seem to do it, higher velocity across fov means the prey is closer)

- Create strategies for catching a target

  - Tracking current location

  - Intercepting future location based on

    * Prey's movement across field of view of predator

- * Prey's world movement

- Create prey escaping behaviours

  - Move in straight line

  - Move away from predator

  - ... more?

- Create performance metrics for prey and predator

  - Prey caught / second

  - Prey caught / distance traveled?

- Visualize results of different strategies

plan after read
tweak N and look at which has best results, interpret this.

Notes van gesprek 4 juni // filmpje er van maken focus op wat onverwacht is 16 of 18 juni meeting over hoe het gaat met project (hier moet het model al ver zijn)

References

[1] RM Olberg, AH Worthington, and KR Venator. Prey pursuit and interception in dragonflies. *Journal of Comparative Physiology A*, 186(2):155–162, 2000.