A Decision Theoretic (DT) Graduate Student Project:

Traffic Lessons from the Mother Nature

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Unlike human traffic, ants, birds, fish, and locusts do not get stuck in gridlocks. Army ants are very adept at moving in swarms. They overcome barriers by bridges. A narrow range of behavior allow ants to move as a group as quickly as possible. In an artificial model, a proximity range finder can be assumed. Here is one set of behavioral rules. *Collision avoidance* can be accomplished by changing travel heading. Directional changes must be large enough to avoid collisions but not large enough to cause new collisions (Krishna and Hexmoor, 2005). *Sidling behavior* is to maintain neighbors at a desired, collision-free distance. This is common in schools of fish that use *lateral-line sense* for navigation (Pitcher, 1992). There are ongoing attempts in the automotive industry to learn traffic lessons from the nature. Nissan's concept car EPORO mimic fish behavior while Volvo is learning safety lessons from the locusts.

References

M. Krishna, S. Chellappa, and H. Hexmoor, 2005. Reactive Navigation of Multiple Moving Agents by Collaborative Resolution of Conflicts, Journal of Robotic Systems, Volume 22, Number 5, pages 249-269, Wiley.

T.J. Pitcher, Behaviour of Teleost Fishes (Fish & Fisheries Series), Springer, 1992.

Background on DT: Sven Ove Hansson (1994)

Approach:

1. Use DT to formulate the problem.

2. Use MAS testbeds like netlogo to simulate a prototype.