Flocking Motions: Examination of Information Requirements.

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Abstract

A common dilemma in mobile robotic networks is maintaining connectivity without consuming a large amount of available resources. An accepted approach for connectivity maintenance is through the implementation of flocking motion algorithms, in part, because they do not require explicit communication between robots. We have explored three aspects of the required sensing resources needed for the production of flocking motions in a robotic network; (1) what type of information is required, (2) what is the required resolution of the information, and (3) what is the lower bound on required sensing? Through physical robot trials and computer simulations we have shown that flocking motions can be produced by simply detecting any combination of whole robots, parts of robots, or even groups of robots as input to the flocking algorithm. Our results also show that the resulting motions of the robots are not dependent on the type of information (e.g., position, velocity, bearing) sensed. Finally, we introduce a new flocking algorithm that only utilizes the number of robots within a given radius. We suggest that this is a possible lower bound on the resources required for the production of flocking motions.