

Distributed Coverage Control by Robot Networks in Unknown Environments Using a Modified EM Algorithm

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Abstract : In this paper, we study a distributed control algorithm for the problem of unknown area coverage by a network of robots. The coverage objective is to locate a set of targets in the area and to minimize the robots' energy consumption. The robots have no prior knowledge about the location and also about the number of the targets in the area. One efficient approach that can be used to relax the robots' lack of knowledge is to incorporate an auxiliary learning algorithm into the control scheme. A learning algorithm actually allows the robots to explore and study the unknown environment and to eventually overcome their lack of knowledge. The control algorithm itself is modeled based on game theory where the network of the robots use their collective information to play a non-cooperative potential game. The algorithm is tested via simulations to verify its performance and adaptability.

Keywords : distributed control, game theory, multi-agent learning, reinforcement learning

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