Local Interaction of Agents Leading to Global Cooperation in Multi-Robot Manipulation

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This paper presents a cooperation strategy in multi-agent system. The decision-making of each agent is solely based on its analysis of the local environment. The behavior of each agent affects its specific local environment. This impact is transferred to the global environment and other agent's local environment implicitly. Each agent has to adapt to the environment formed and changed by all other agents. Therefore, agents can reach global coordination without explicit communication by sensing the local environment. In each task, each agent builds an independent model. It senses the feedback of the environment and builds a model for the current state. The behavior of the agent is based on the difference between the two models. The application of this strategy in multi-robot box-pushing problem is discussed in the project. The measurement of force is used as the way to obtain local information. Computer simulation is made to prove the efficiency of this strategy. This strategy, which only involves simple rules and sensing of each agent, can simplify the execution and system design of multi-agent, complex tasks such as multi-robot box-pushing.

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