Rearrangement Task by Multiple Mobile Robots

Rearrangement tasks involving multiple objects are fundamental for mobile robots. Robots transport objects from an initial configuration to a goal configuration. This type of task has various applications in production systems. These production systems needs to cope with various situations than a traditional AGV system because robots have to determine the order of transportation and moving paths autonomously. At first, robots develop their motion plans, and then realize these plans. It is unfeasible to apply traditional methods in a rearrangement problem due to multiple robots and movable object. The search space increases exponentially with the number of robots and objects. Furthermore, a real-world environment is quite complex and is very different from a simulation. To realize a rearrangement plan, we must deal with these differences. To solve the rearrangement problem and generate motion plan, we divide the entire complicated problem into two sub-problems: Project Scheduling Problem (PSP) and path planning problem for single mobile robot1). The PSP and path planning problem for a single robot have been studied previously. To architect a more compatible rearrangement plan applicable to various working environment, we proposed a task allocation method2). To cope with the difference between a real-world environment and a simulation, we divide developed plan into several “behavior”. Each behavior is designed to deal with some specific differences in achieving each sub-goal.

Keywords: Multiple mobile robots, rearrangement task, environmental model.

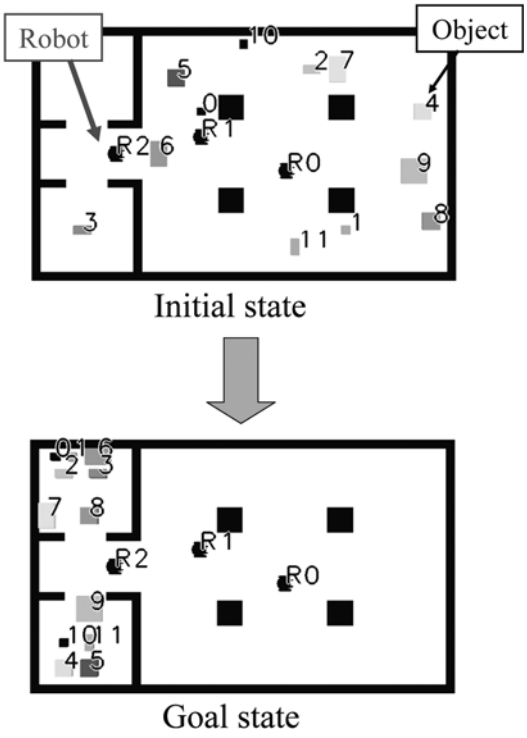

Fig.1 An example of a rearrangement task.

References

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Fig.2 A real-world environment.