AU J.T. 6(4): 173-178 (Apr. 2003)

An Approach for Handling Malfunction Agents

Peerapol Moemeng, Supannika Koolmanojwong, and Jirapun Daengdej
Faculty of Science and Technology, Assumption University
Bangkok, Thailand

Abstract

Our previous work focused on a modeling agent that works improperly in Multi-agent system (MAS), called malfunction agent. The results show that abandoning a malfunction agent from MAS improves overall in cost savings. As a further investigation on handling malfunction agent, we focused on a factor that relates to overall cost. We consider how the information is distributed to other agents. A malfunction agent should not be detected repeatedly by other functional agents. We compared a set of approaches to improve the information distribution. The experimental results have shown that each approach result in a different trade off in different MAS conditions.

Keywords: Malfunction agent, modeling agent, multi-agent system, handling, heterogeneous agent

Introduction

In a given environment, existence of heterogeneous agents working together is common. In a cooperative environment, it consists of agents with a different knowledge supporting each other to achieve an ultimate goal. Cooperative behavior becomes even more important in a competitive, critical environment (e.g. in outer / deep space, hazard field, deep mine). Damage could occur to the agent (e.g. computer virus, loss of data storage, malicious attacks from hackers or hardware failure). Hence, damaged agents could response improperly or behave unexpectedly in the MAS. Our previous work models the damaged agents as malfunction agents. Malfunction agent may obstruct the MAS plan though it does not intend to, since it performs actions incorrectly, with some errors that it could not observe itself.

Effects of Malfunction Agent in MAS

We investigated the effects of malfunction agents working in MAS, designed a framework to detect the malfunction, and then measured the cost effectiveness by determining the quantify unit for a factor, communication cost. Since there is no shared memory between agents (Zetocha *et al.* 2002). Agent communication occurs solely through messages. Prior research has shown that communication cost is lowered when leaving those malfunction agents out of the MAS. Malfunction agents are not desired in any MAS, but in the environment where we cannot avoid malfunctioning, we need a way to handle it.

Related Work

Some research focuses on how agents behavior can be modeled in a competitive environment, Garrido *et al.* (2000) presented an experiment on quantifying the utility of building agent models in distributed competitive environment. Modeling agent behavior enhances MAS performance; hence communication could be reduced. Ping Xuan and Victor Lesser (Ping *et al.* 2000a, 2001) described how communication and the cost of communication should be modeled into such framework. Denzinger and Kordt (2000) shows that cooperative behavior learning process has