DECENTRALIZED ORGANIZATIONS FOR ARTIFICIAL INTELLIGENCE: SOME IMPLEMENTATION ISSUES

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Abstract

This paper discusses some implementation issues in the field of decentralized artificial intelligence (DAI). We show that the concept of *active object* can serve as a basis for implementing many decentralized organizations like Blackboards, Asynchronous Teams and Cognitive Agents. A tool that supports active objects is detailed as well as three applications built above it.

Keywords: Decentralized Artificial Intelligence, Decentralized Organizations, Blackboards, Asynchronous Teams, Cognitive Agents.

1 INTRODUCTION

A decentralized organization is a set of modules (programs) that cooperate in a problem solving activity. The modules can behave as a distributed problem solver or as a society of agents. Distributed problem solving (DPS) (11) relies on environments where:

- The problem is solved by a set of autonomous modules, dispersed among several computers connected via network;
- The modules are organized according to an architecture. Architectures define the flow of control and communication among the modules;
- Modules run in parallel in order to speed up the problem solving activity;
- Modules cooperate by solving different pieces of the problem (tasks), by sharing results, or both.

Blackboards and asynchronous teams (A-teams) are good examples of decentralized organizations acting as distributed problem solvers.

Multi-agent systems (6), in their turn, favors the construction of distributed applications employing a set of highly autonomous modules (here called *cognitive agents* or simply *agents*). Agents are knowledge-based systems with the following features added: