Scaling up Multi-Agent Systems through Organizational Structuring

Victor Lesser
Computer Science Department
University of Massachusetts
Amherst, MA 01003, USA
lesser@cs.umass.edu

Abstract

Over the last four years, I have been working on the design of a distributed sensor network for vehicle tracking using adaptive radar sensors. This effort has re-ignited my long-term interest in the use of organizational structuring for handling scaling issues in multi-agent systems. In this lecture, I will first examine how organizational structuring was used in our design to reduce the computational and communication load involved in coordinating agent activities, and I will discuss experiments that indicate the complex set of issues that need to be considered in evaluating the effectiveness of different organizational variants. I will also briefly illustrate how it is possible to model the performance of these variants analytically, and predict their performance. I will then present bottom-up techniques, based on negotiation, for organizational instantiation and adaptation in a dynamic environment. Finally, I will discuss some recent work on a knowledge-based top-down approach for organizational design.

Bio Sketch

Victor R. Lesser received his B.A. in Mathematics from Cornell University in 1966, and the M.S. and Ph.D. degrees in Computer Science from Stanford University in 1969 and 1972, respectively. He then joined CMU as member of the research faculty. Since 1977, he has been a Professor of Computer Science at the University of Massachusetts, Amherst. He is a founding fellow of AAAI and is considered a leading researcher in the areas of multi-agent systems (he is one of the founders of the field), real-time AI, and blackboard systems (he was the system architect for the Hearsay-II speech understanding system which was the first blackboard system developed). Professor Lesser has been very active in helping to organize and promote the field of Multi-Agent Systems. He was General Chairman of the First International Conference on Multi-Agent Systems and was the founding president of the International Foundation for Multi-Agent Systems.

Proceedings of the IEEE/WIC/ACM International Conference on Intelligent Agent Technology (IAT'04)
0-7695-2101-0/04 $ 20.00 IEEE