
Preface

Recently, the study of intelligence emerged from interactions among many agents has been popular. In this study it is recognized that a network structure of the agents plays an important role. The current state-of-the art in agent-based modeling tends to be a mass of agents that have a series of states that they can express as a result of the network structure in which they are embedded. Agent interactions of all kinds are usually structured with complex networks. Research on complex networks focuses on scale-freeness of various kind of networks.

Computational modeling of dynamic agent interactions on richly structured networks is important for understanding the sometimes counter-intuitive dynamics of such loosely coupled systems of interactions. Yet our tools to model, understand, and predict dynamic agent interactions and their behavior on complex networks have lagged far behind. Even recent progress in network modeling has not yet offered us any capability to model dynamic processes among agents who interact at all scales on such as small-world and scale-free networks. Generally the high-dimensional, non-linear nature of the resulting network-centric multi-agent systems makes them difficult or impossible to analyze using traditional methods. Agents follow local rules under complex network constraints. The idea of combining multi-agent systems and complex networks is also particularly rich and fresh to foster the research on the study of very large-scale multi-agent systems.

We intend to turn this into an engineering methodology to design complex agent networks. Multi-agent network dynamics involves the study of many agents, constituent components generally active ones with a simple structures and whose behavior is assumed to follow local rules, and their interactions on complex network. A basic methodology is to specify how the agents interact, and then observe emergent intelligence that occur at the collective level in order to discover basic principles and key mechanisms for understanding and shaping the resulting intelligent behavior on network dynamics.

The volume contains refereed papers addressing various important topics that aims at the investigation of emergent intelligence on networked agents.

Especially most papers highlight on the topics such “network formation among agents”, “influence of network structures on agents”, “network-based collective phenomena and emergent intelligence on networked agents”.

The selected papers of this volume were presented at the Workshop on Emergent Intelligence of Networked Agents (WEIN 06) at the Fifth International Joint Conference on Autonomous Agents and Multi-agent Systems (AAMAS 2006), which was held at Future University, Hakodate, Japan, from May 8 to 12, 2006. WEIN 06 is concerned with emergence of intelligent behaviors over networked agents and fostering the formation of an active multi-disciplinary community on multi-agent systems and complex networks. We especially intended to increase the awareness of researchers in these two fields sharing the common view on combining agent-based modeling and complex networks in order to develop insight and foster predictive methodologies in studying emergent intelligence on of networked agents. From the broad spectrum of activities, leading experts presented important paper and numerous practical problems appear throughout this book. We invited high quality contributions on a wide variety of topics relevant to the wide research areas of multi-agent network dynamics. We especially covered in-depth of important areas including: Adaptation and evolution in complex networks, Economic agents and complex networks, Emergence in complex networks, Emergent intelligence in multi-agent systems, Collective intelligence, Learning and evolution in multi-agent systems, Web dynamics as complex networks, Multi-agent based supply networks, Network-centric agent systems, Scalability in multi-agent systems, Scale-free networks, Small-world networks.

We could solicit many high quality papers that reflect the result of the growing recognition of the importance of the areas. All papers have received a careful and supportive review, and we selected 19 papers out of 31 papers. The contributions were submitted as a full paper and reviewed by senior researchers from the program committee. All authors revised their earlier versions presented at the workshop with reflecting criticisms and comments received at the workshop. The editors would like to thank the program committee for the careful review of the papers and the sponsors and volunteers for their valuable contribution. We hope that as a result of reading the book you will share with us the intellectual excitement and interest in this emerging discipline. We also thank the many other referees who generously contributed time to ensure the quality of the finished product.

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