

## 平行应急管理系统中人工社会的语义建模

段伟<sup>1,2</sup>, 曹志冬<sup>2</sup>, 邱晓刚<sup>1</sup>, 王飞跃<sup>2</sup>, 曾大军<sup>2</sup>

1. 国防科学技术大学 机电工程与自动化学院 军事计算实验与平行系统技术研究中心, 长沙 410073;

2. 中国科学院 自动化研究所 复杂系统管理与控制国家重点实验室, 北京 100190

## Semantic modeling for artificial society in parallel emergency management system

DUAN Wei<sup>1,2</sup>, CAO Zhi-dong<sup>2</sup>, QIU Xiao-gang<sup>1</sup>, WANG Fei-yue<sup>2</sup>, ZENG Da-jun<sup>2</sup>

1. Research Center of Military Computational Experiments and Parallel Systems Technology, College of Mechatronics Engineering and Automation, National University of Defense Technology, Changsha 410073, China;

2. State Key Laboratory of Management and Control for Complex Systems, Institute of Automation, Chinese Academy of Sciences, Beijing 100190, China

- 摘要
- 参考文献
- 相关文章

全文: PDF (891 KB) HTML (1 KB) 输出: BibTeX | EndNote (RIS) 背景资料

**摘要** 分析平行应急管理系统对人工社会建模的内在需求, 提出采用网络本体语言对人工社会建立语义模型的方法. 将语义网技术合理地应用到智能体模型和人工社会关系网络描述中, 建立应急场景客观世界和社会关系的本体概念集合, 实现智能体的知识和推理规则的语义描述, 提高智能体的智能性和协同能力. 最后以学校暴发H1N1传染病流行行为情景, 构建了学生群体社会关系网络的语义模型, 以此为例阐述人工社会的语义建模方法、语义推理方法和语义模型的作用.

**关键词:** 平行系统 应急管理 人工社会 语义智能体 语义网

**Abstract:** According to the requirement analysis of modeling for artificial societies in parallel emergency management systems, we propose an approach that using web ontology language to build the semantic models for artificial societies. We introduce semantic web techniques to agent-based modeling and social networks, and build the set of ontology-based concepts for emergency scenes and social networks in real world, so as to improve the intelligence and cooperation of agents. Finally, we construct the semantic models of social networks among students based on the scenario of H1N1 influenza transmissions in school to test the effect of semantic modeling and semantic inference in parallel emergency management systems.

**Key words:** parallel systems emergency management artificial societies semantic agent semantic web

收稿日期: 2011-09-26;

基金资助: 国家自然科学基金(91024030, 90924302, 40901219, 71050001)

### 引用本文:

段伟, 曹志冬, 邱晓刚等. 平行应急管理系统中人工社会的语义建模[J]. 系统工程理论实践, 2012, (5): 1010-1017.

DUAN Wei, CAO Zhi-dong, QIU Xiao-gang et al. Semantic modeling for artificial society in parallel emergency management system[J]. Systems Engineering - Theory & Practice, 2012, (5): 1010-1017.

[1] 范维澄. 国家突发公共事件应急管理中科学问题的思考和建议[J]. 中国科学基金, 2007(2): 71-76. Fan W C. Advisement and suggestion to scientific problems of emergency management for public incidents[J]. Science Foundation in China, 2007(2): 71-76.

[2] Hendler J. Agents and the semantic web[J]. IEEE Intelligent System, 2001, 16(2): 30-37.

[3] Subercaze J, Maret P. SAM: Semantic agent model for SWRL rules based agents[C]// The International Conference on Agents and Artificial Intelligence, 2010(2): 245-248.

### 服务

- ▶ 把本文推荐给朋友
- ▶ 加入我的书架
- ▶ 加入引用管理器
- ▶ E-mail Alert
- ▶ RSS

### 作者相关文章

- ▶ 段伟
- ▶ 曹志冬
- ▶ 邱晓刚
- ▶ 王飞跃
- ▶ 曾大军

- [4] Katasonov A, Terzian V. Semantic agent programming language (S-APL): A middleware platform for the semantic web[C]// The IEEE International Conference on Semantic Computing, 2008: 504-511.
- [5] 王飞跃. 人工社会、计算实验、平行系统—关于复杂社会经济系统计算研究的讨论[J]. 复杂系统与复杂性科学, 2004, 1(4): 25-35. Wang F Y. Artificial societies, computational experiments, and parallel systems: A discussion on computational theory of complex social-economic systems[J]. Complex Systems and Complexity Science, 2004, 1(4): 25-35. 
- [6] 王飞跃. 平行应急管理系统PeMS的体系框架及其应用研究[J]. 中国应急管理, 2007, 1(12): 22-28. Wang F Y. PeMS: Parallel execution-based emergency management systems[J]. China Emergence Management, 2007, 1(12): 22-28.
- [7] 王飞跃. 平行系统方法与复杂系统的管理与控制[J]. 控制与决策, 2004, 19(5): 485-489. Wang F Y. Parallel system methods for management and control of complex systems[J]. Control and Design, 2004, 19(5): 485-489. 
- [8] Klyne G, Carroll J J, et al. Resource description framework (RDF): Concepts and abstract syntax[EB/OL]. W3C Recommendation, 10 February 2004, (2004.02.10) [2011.02.28]. <http://www.w3.org/TR/2004/REC-rdf-concepts-20040210/>. 
- [9] Smith M K, Welty C, et al. OWL web ontology language guide[EB/OL]. W3C Recommendation, 10 February 2004, (2004.05.21) [2011.02.28]. <http://www.w3.org/TR/2004/REC-owl-guide-20040210/>.
- [10] Horrochks L, Patel-Schneider P F, et al. SWRL: A semantic web rule language combining OWL and RuleML[EB/OL]. (2004.05.21) [2011.02.28]. <http://www.w3.org/Submission/2004/SUBM-SWRL-20040521/>.
- [11] Rao A S, Georgeff M. BDI agents: From theory to practice[C]// Proceedings of the First International Conference on Multiagent Systems, 1995: 312-319.
- [12] 胡立山, 石纯一. Agent-BDI逻辑[J]. 软件学报, 2000, 11(10): 1353-1360. Hu L S, Shi C Y. Agent-BDI logic[J]. Journal of Software, 2000, 11(10): 1353-1360.
- [13] Guerra-Hernández A, Castro-Manzano J M, El-Fallah-Seghrouchni A. CTL AgentSpeak(L): A specification language for agent programs [J]. Journal of Algorithms, 2009, 64(1): 31-40. 
- [14] Hindriks K V, De Boer F S, Van Der Hoek W, et al. Agent programming in 3APL[J]. Autonomous Agents and Multi-Agent Systems, 1999, 2(4): 357-401. 
- [15] Bordini R H, Hübner J F, Wooldridge M. Programming Multi-Agent Systems in AgentSpeak Using Jason[M]. Wiley Series in Agent Technology, 2007.
- [16] Winikoff M. JACKTM intelligent agents: An industrial strength platform[J]. Multi-agent Programming: Multi-agent Systems, Artificial Societies, and Simulated Organizations, 2005, 15(2): 175-193. 
- [17] Pokahr A, Braubach L, Lamersdorf W. Jadex: A BDI reasoning engine[J]. Multi-agent Programming: Multi-agent Systems, Artificial Societies, and Simulated Organizations, 2005, 15(2): 149-174. 
- [18] Moreira A, Vieira R, Bordini R, et al. Agent-oriented programming with underlying ontological reasoning[C]// Declarative Agent Languages and Technologies III: Lecture Notes in Computer Science, 2006, 3904: 155-170.
- [19] Enserink M, Cohen J. The novel H1N1 influenza[J]. Science, 2009, 326(5960): 1607. 
- [20] Han K, Zhu X, He F, et al. Lack of airborne transmission during outbreak of pandemic (H1N1) 2009 among tour group members, China, June 2009[J]. Emerg Infect Dis, 2009, 15(10): 1578-1581.
- [1] 钟永光, 毛中根, 翁文国, 杨列勋. 非常规突发事件应急管理研究进展[J]. 系统工程理论与实践, 2012, (5): 911-918.
- [2] 刘德海, 王维国, 孙康. 基于演化博弈的重大突发公共卫生事件情景预测模型与防控措施[J]. 系统工程理论与实践, 2012, (5): 937-946.
- [3] 熊刚, 王飞跃, 侯家琛, 董西松, 张家麟, 付满昌. 提高核电站安全可靠性的平行系统方法[J]. 系统工程理论与实践, 2012, (5): 1018-1026.
- [4] 张玲; 黄钧; 韩继业. 应对自然灾害的应急资源布局模型与算法[J]. 系统工程理论与实践, 2010, 30(9): 1615-1621.
- [5] 王煜; 陈学广; 洪流; 陈琛. 基于MDA的GBDSS决策服务组合平台模型与运作机制[J]. 系统工程理论与实践, 2010, 30(7): 1312-1319.
- [6] 刘德海;. 政府不同应急管理模式下群体性突发事件的演化分析[J]. 系统工程理论与实践, 2010, 30(11): 1968-1976.
- [7] 于辉; 陈剑; 于刚. 回购契约下供应链对突发事件的协调应对[J]. 系统工程理论与实践, 2005, 25(8): 38-43.
- [8] 于辉; 陈剑; 于刚. 协调供应链如何应对突发事件[J]. 系统工程理论与实践, 2005, 25(7): 9-16.
- [9] 寇纲, 李仕明, 汪寿阳, 杨列勋. 序言——突发事件应急管理[J]. 系统工程理论与实践, 0, ( ): 1-4.

版权所有 © 2011 《系统工程理论与实践》编辑部

地址：北京中关村东路55号 100190 电话：010-62541828 Email: xtl@chinajournal.net.cn

本系统由北京玛格泰克科技发展有限公司设计开发 技术支持：support@magtech.com.cn