
Editorial

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Biographical notes: Longbing Cao is a Senior Lecturer, and the Director of Knowledge Discovery Lab of the UTS Research Centre for Intelligent Information Systems. He received a PhD in Complex Systems and Intelligence Sciences in Chinese Academy of Sciences, and a PhD in Computer Sciences in University of Technology Sydney. His research interest covers agent technology, data mining and agent-mining interaction. He has plenty of applied research experience in areas such as telecom, capital market and social security.

He is an IEEE Senior Member, the co-chairs of three workshops on agent mining interaction, namely ADMI2006, ADMI2007 and AISADM2007.

Zili Zhang received his BSc from Sichuan University, MEng from Harbin Institute of Technology and PhD from Deakin University, all in computing. He is a Senior Lecturer in the School of Engineering and Information Technology at Deakin University, Australia and a Professor in the Faculty of Computer and Information Science at Southwest University, China. His research interests include agent-based computing, hybrid intelligent systems and artificial intelligence. He authored or co-authored more than 70 refereed papers in *International Journals or Conference Proceedings*, one monograph and four textbooks.

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Chengqi Zhang has been a Research Professor in Faculty of Information Technology at the University of Technology, Sydney (UTS) since 2001. He received a PhD Degree from the University of Queensland and a Doctor of Science Degree from the Deakin University, Australia, all in Computer Science. His research interests include business intelligence and multi-agent systems. He has published more than 200 refereed papers and three monographs, including 12 high quality papers in *Renowned International Journals*, such as, *Artificial Intelligence*, *Information Systems*, *IEEE Transactions* and *ACM Transactions*. He has been invited to present six Keynote speeches in *International Conferences* before. He has been elected as the Chairman of ACS National Committee for Artificial Intelligence from 2006. He has also been elected as the Chairman of the Steering Committee of International Conference on Knowledge Science, Engineering and Management in 2006. He is a member of Steering Committees of PRICAI, PAKDD and ADMA, serving as General Chair, PC Chair, or Organising Chair for six international conferences and a member of Program Committees for many international or national conferences. He is an Associate Editors for three international journals, including *IEEE Transactions on Knowledge and Data Engineering* (which is the prestigious Journal world-wide). He is a senior member of the IEEE Computer Society.

In the past 20 years, two of most prominent, dynamic and exciting research areas – agent technology (or Autonomous Agent and Multi-Agent Systems (AAMAS)), (Wooldridge, 2002) and data mining (or Knowledge Discovery in Databases (KDD)) (Han and Kamber, 2006) have emerged separately. These two independent research streams have been created and originally evolving with separate aims and objectives in respective areas.

Agent technology has emerged as a powerful computing paradigm for system analysis, design and implementation of autonomous intelligent systems. It has demonstrated strengths and advances in dealing with system complexities such as distribution, human involvement, societal characteristics. Many theoretical, methodological, experimental and practical issues in developing agent-based computing and agent-oriented intelligent systems can be better tackled by agent technology. As a result, the techniques are currently contributing to many diverse domains such as software engineering, user interfaces, e-commerce, information retrieval, robotics, computer games, education and training, ubiquitous computing and social simulation.

On the other hand, data mining or KDD is the process of analysing data to identify hidden but interesting patterns or relationships. The patterns and knowledge discovered may disclose hidden stories in data and business, and have potential to support smart operations and decision making. KDD applies and combines many existing computational techniques from statistics, information retrieval, machine learning, artificial intelligence, pattern recognition, and database technologies. KDD is increasingly and widely deployed into varying applications and fields, for instance, web mining and services, text mining, telecommunications, retail, governmental service, fraud, security, business intelligence studies.

Recent retrospect has disclosed many issues and challenges in respective areas of agent and data mining (Cao, 2005; Cao et al., 2007). For instance, the learning capability of agents is limited, while data mining systems are not smart enough to support intelligent interaction between domain users and a system. However, many of such issues can benefit from the interaction and integration of agent and mining. In fact, recent years have seen an emerging and evident trend, which is the interaction and integration between agent and data mining (Zhang et al., 2005; Cao and Gorodetski, 2006). For example, agent-based data mining (Davies, 1994; Klusch et al., 2003) infrastructure, agent intelligence can be enhanced through data mining (Symeonidis and Mitkas, 2006; Kaya and Alhajj, 2005). On the other hand, human-involved data mining can benefit from human-agent interaction. The agent-mining interaction and integration has potential to strengthen both agent and mining intelligence, and towards the development of super-intelligent symbionts (Gorodetsky et al., 2005, 2007). This special issue of *International Journal of Intelligent Information and Database Systems* features eight papers that address agent-mining interaction.

‘MALEF: Framework for distributed machine learning and data mining’, by Jan Tožička, Michael Rovatsos, Michal Pěchouček and Štěpán Urban, presents a multi-agent learning framework for agent-based distributed learning and mining. The framework supports information exchange of local learning processes between agents, and reasoning to learn about learning decisions.

‘Agent-based evolutionary optimisation of trading strategies’, by Jiarui Ni, Dan Luo, Yuming Ou and Chao Luo, presents a practical case study, namely a human-friendly multi-agent systems for trading strategy optimisation through developing evolutionary techniques. The system can guide users to easily conduct the optimisation of stock trading rules jobs to their advantages.

‘Sketching a methodology for efficient Supply Chain Management agents enhanced through Data Mining’, by Andreas L. Symeonidis, Vivia Nikolaidou and Pericles A. Mitkas, introduces a methodology with proper metrics to build up an intelligent trading agent for Supply Chain Management. The paper analyses how data

mining can be used for enhancing agent intelligence, and what metrics can be used to evaluate the performance of such systems.

‘A multi agent recommender system that utilises consumer reviews in its recommendations’, by Debbie Zhang, Simeon Simoff, Silvana Aciar and John Debenham, presents an agent recommender that make recommendations based on text mining findings regarding consumer preferences. The authors demonstrate the potential of their approach in analysing digital camera reviews.

The paper ‘A human-centred intelligent system framework: meta-synthetic engineering’, by Xia Cui and Ruwei Dai, presents an intelligent information system framework for studying open complex giant systems by synthesising human qualitative intelligence and machine quantitative intelligence. Agent and data mining serve as building blocks in constructing such complex intelligent information systems. The proposed human-centred and meta-synthetic paradigm is very comprehensive and thoughtful for building up complex super-intelligent systems.

‘Concepts, Challenges, and Prospects on Multiagent Data Warehousing (MADWH) and Multiagent Data Mining (MADM)’, by Wen-Ran Zhang, presents an interesting multidimensional agent-oriented approach for brain modelling and decision making. The multiagent data warehousing and mining framework has potential to support agent discovery, full autonomy, and multidimensional agent-oriented OLAP and OLAM.

Finally, the paper ‘Granule mining oriented data warehousing model for representations of multidimensional association rules’, by Wanzhong Yang, Yuefeng Li, Jingtong Wu and Yue Xu, presents a novel granule mining oriented data warehousing model to facilitate the representations of multidimensional association rules. This framework can process data from multiple dimensions to the granularity of each table.

Agent-Mining Interaction and Integration is an emerging and promising area. It has demonstrated benefits and prospects in tackling issues in agent and mining areas, complementing each other toward a super-intelligent system development. Recently, several professional activities have been organised, such as the *2006 and 2007 ACM/IEEE/WIC International Workshop on Agent and Data Mining Interaction (ADMI2006/IADM2006,¹ ADMI2007²)*, the *2005 and 2007 International Workshop on Autonomous Intelligent Systems: Agent and Data Mining (AIS-ADM2005, AIS-ADM2007)*.³ The Agent-Mining Interaction and Integration (AMII) website⁴ collects and presents a comprehensive survey of research topics, driving forces, research groups, publications and activities on agent-mining interaction. With the booming research and development on agent-mining interaction, the following trend, challenges and prospects will be addressed or achieved:

- agent-mining interaction has emerged as a new challenging and promising research field in the information technology family
- agent-mining interaction can provide complementary and effective support to tackle some of issues in agent and data mining areas
- agent-mining interaction presents potential in building up super-intelligent symbionts with autonomy, flexibility, adaptive capabilities, as well as supporting knowledge discovery, domain intelligence, human involvement, web intelligence, etc.

- agent-mining interaction affords methodologies and techniques for intelligence meta-synthesis in dealing with open complex systems and enterprise business intelligence
- technologies developed in agent-mining interaction can greatly drive the paradigm shift of agent and data mining toward more practical and actionable algorithms, models and systems.

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Notes

¹<http://datamining.it.uts.edu.au/iadm>

²<http://issel.ee.auth.gr/ADMI/>

³<http://space.ias.spb.su/ais07>

⁴<http://www.agentmining.org>