Agents and Data Mining

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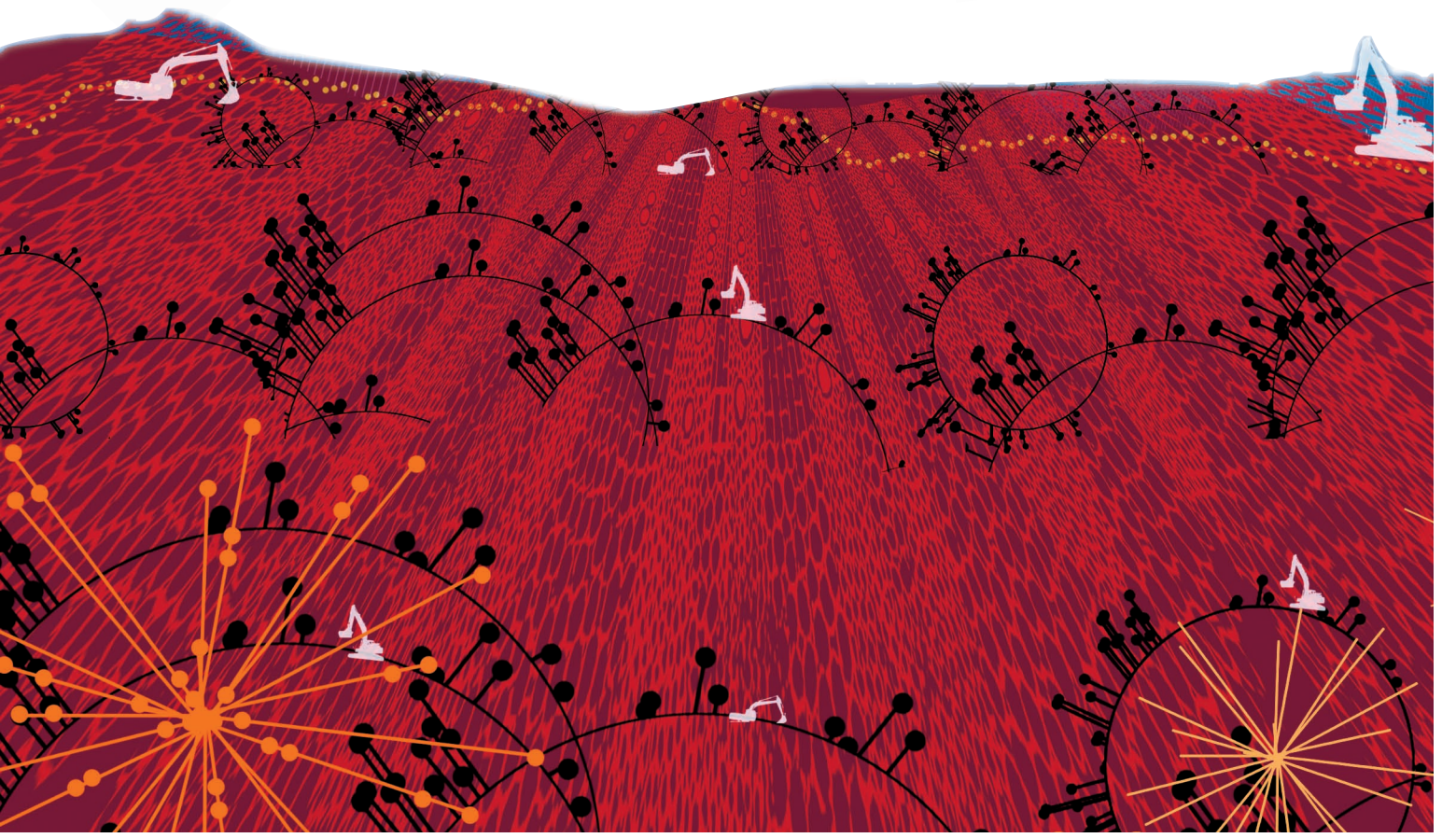

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Agent mining has emerged as a very promising field due to its unique contributions to complementary and innovative methodologies, techniques, and applications for complex problem-solving.

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Since the middle of the 1990s, increasing numbers of researchers and research groups have engaged in the interaction and integration of agents and data mining (or simply, agent mining). This special issue describes the latest advances in this synergistic research, including both agent-driven data mining and data-mining-driven agents.

We present an overview of this emergent field in the Expert Opinion department. The article establishes a synergetic framework and discusses theoretical underpinnings, key research issues, applications, and resources for agent-mining research and development. In particular, it outlines current issues in agent-driven distributed data mining, data-mining-driven agents, and mutual issues in agents and data mining.

Three articles in this issue present findings on agent-driven data mining—namely how agents can support data mining goals, tasks, and systems. Martin Rehák, Michal Pěchouček, Martin Grill, Jan Stiborek, Karel Bartoš, and Pavel Čeleda introduce an adaptive system for detecting attacks against computer networks and connected hosts. Their system uses intrusion detection and ensemble classification for network traffic monitoring. It employs agents to model trust, fuse data, and dynamically select the appropriate result aggregation technique to adapt to network traffic changes and support distributed cooperation by mobile agents.

Yun Xiong, Guangyong Zheng, Qing Yang, and Yangyong Zhu present the TREMAgent system in which agents support sequence-mining collaboration among transcription factors and transcription factor binding sites and provide autonomous mining of transcriptional regulatory elements.

Ning Zhong and Shinichi Motomura propose having agents implement peculiarity-oriented mining to identify unusual data in the human brain. Their approach could help provide a deeper understanding of human information-processing mechanisms.

Two articles employ data mining to enhance agent intelligence. Roger Nkambou, Philippe Fournier-Viger, and Engelbert Mephu Nguifo present an agent-based learning support system that combines sequential pattern mining with association rules to analyze students' behavior. The system then uses the identified knowledge to enhance the tutoring agents' ability to provide tailored hints.

Kyriakos Chatzidimitriou and Andreas Symeonidis designed a system that supports a trading-agent competition—that is, a supply chain management game. The system uses several data mining methods to determine auction prices.

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