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EDITORIAL

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Special issue: Innovative applications of big data and artificial intelligence

Big data refers to complex data sets that cannot be processed using traditional data processing techniques. It could also be defined as a large amount of unstructured or structured data from various sources. Artificial intelligence (AI) refers to the science of expressing and acquiring knowledge using data, algorithms, and computing powers. So far, the big data industry chain is gradually mature, leading to a combination of big data and AI techniques developed in comprehensive directions. The cutting-edge technologies of big data and AI have played an increasingly important role in the innovative development of various industries such as epidemic prevention and control, emergency management, social governance, manufacturing, medical services, intelligent transportation, Internet of Things/supply chain, Internet industry, new media, and so on. In addition, there are many typical innovative projects, which are being produced.

Focusing on the theme of "Innovative Applications of Big Data and Artificial Intelligence", this special issue in *Frontiers of Engineering Management* collects 10 papers with an aim to social networks.

Ou et al. summarize the advanced progress about the identification algorithms of spreading influence nodes from the viewpoint of social networks, emphasizing the contributions from physical perspectives and approaches, including the microstructure-based algorithms, community structure-based algorithms, macrostructure-based algorithms, and machine learning-based algorithms.

Sun et al. investigate the epidemic prevention effect of masks in different real-life gathering environments by using four real interpersonal contact datasets to represent four gathering environments and identify the heterogeneous influence of individuals' behavior on mask efficacy in gathering environments.

Xu et al. investigate the effect of online and offline reputation on the provision of online counseling services by collecting the data of 141029 physicians from 6173 offline hospitals located in 350 cities in China. They find that physician's online and offline reputation show a competitive and substitute relationship rather than a complementary relationship in influencing physicians to provide online counseling services in Internet hospitals.

Sakib et al. develop a data-driven predictive analytics approach to jointly predict the individualized re/hospitalization risk and community discharge likelihood over time in the presence of varied residents' characteristics and construct a sampling algorithm to generate accurate predictive samples for a heterogeneous population and facilitate facility-level performance evaluation.

Yan and Li conduct a thorough review of sentiment analysis (SA) from the view of emotional design. Conveying

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consumers' specific emotions in new products, referred to as emotional product development or emotional design, is strategically crucial for manufacturers. SA-based emotional design may provide manufacturers with real-time, direct, and rapid decision support.

Wang et al. introduce prior knowledge composed of domain dictionaries to enhance characters' dependence. Experimental results on two domains, including laser industry and unmanned ship, showed the superiority of their methods. The *F*1 values on laser industry entity, unmanned ship entity, laser industry relation, and unmanned ship relation datasets are improved by +1%, +6%, +2%, and +1%, respectively.

Industry 4.0 aims to transform chemical and biochemical processes into intelligent systems via the integration of digital components with the actual physical units involved. **Dorneanu et al.** present the state-of-the-art of the aforementioned technologies, and present a strategic plan for their integration toward the goal of an autonomous smart plant capable of self-adaption and self-regulation for short- and long-term production management.

The problem of mobile applications (Apps) leaking users' private information has aroused wide concern. As the number of Apps continuously increases, effective large-scale App governance is a major challenge. **Li et al.** propose a quantitative method, measuring an App's probability of leaking privacy, to filter out problematic Apps on a large scale.

Precisely understanding the business relationships between autonomous systems (ASs) is essential for studying the Internet structure. Business-based sibling relationships and structure-based exchange relationships have become an increasingly nonnegligible part of the Internet market in recent years. **Peng et al.** introduce new features and propose a graph convolutional network (GCN) framework, AS-GCN, to solve this multiclassification problem under complex scenes.

The idea of digital twins originates from modelling and simulation practices of engineering informatization, including virtual manufacturing (VM), model predictive control, and building information model. On the basis of the two-element VM model, **Zhou et al.** propose a three-element model to represent digital twins.

Finally, we would like to express our sincere gratitude to the contributing authors who generously share their insights and views. We are also grateful to the reviewers, the journal editors and the publisher for their help in facilitating the review and editorial process of this special issue.

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