Guest Editorial: Cognitive Analytics of Social Media for Industrial Manufacturing

I. Introduction

BUSINESS innovation and industrial intelligence pave the way to a future in which smart factories, intelligent machines, networked processes, and big data are brought together to foster industrial growth and shift the modalities. Industry 4.0 or the Industrial Internet of Things (IIoT) is the latest catchphrase of technological innovation in manufacturing with the goal of increasing productivity in a flexible and efficient manner. Concurrently, the new collaborative Web (called Web 2.0) resiliently defines the notion of the technosocial system of computer-mediated, web/internet-based technologies and channels that have the primary objective of creating and enabling a collaborative and interactive virtual community of participants who can share or communicate information. These social technologies are essentially transforming the way we communicate, collaborate, consume, and create data and characterize one of the insurgent impacts of information technology on any industry, both within and outside industrial boundaries. Social media augments as a nontrivial element to this industrial value chain with the intent of making it more efficient. Collaborative sensing or crowd sensing can be used to help producers, suppliers, and customers understand and use insights learned from large amounts of sensing data in order to obtain competitive advantages and design better user experiences.

Recently, cognitive analytics as a technology-based solution has attracted a lot of attention from both researchers and practitioners. This approach to information discovery and decision-making uses multiple intelligent technologies, such as machine learning, deep learning, artificial intelligence, natural language processing, and image recognition to understand data generate insights. This technology can be directed at improving industrial manufacturing efficiency.

Thus, this special issue is targeted to stimulate discussion on the design, use, and evaluation of cognitive models for social media analytics to leverage more in-depth insights from the vast amount of generated data for industrial sensing. Though the social data's cognitive analytics allow delving the voluminous data for machine intelligence, information and decision-making processes still have some open issues, such as security and privacy, data trustworthiness and quality, participation motivation and incentive, which need to be addressed. This special section will discuss the prospective developments and innovative ideas in advanced deep learning algorithms for IIoT.

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II. Articles Included in This Special Issue

Opinion dynamics modeling is an exciting aspect of social media marketing as well used in elections. The article "Modeling of Human Cognition in Consensus Agreement on Social Media and its Implications for Smarter Manufacturing Edge Server Quantification and Placement for Offloading Social Media Services in Industrial Cognitive Internet of Vehicle (IoV)" studies how knowledge exchanged happens among members of social groups and how cognitive influence plays its role in decisions. The time-variant nonlinear of the model has been adapted to sociopsychological studies and their stability and convergences have been studied in this article. One of the key features of the proposed model is its ability to accommodate both negative and positive ties among group members. The authors showed the accuracy of the model through two artificial networks.

Cognitive computing (CC) is emerging in several IIoT domains. To provide social media services to vehicles with low latency and high reliability, authors of "Edge Server Quantification and Placement for Offloading Social Media Services in Industrial Cognitive IoV" adopt edge to complement cloud computing. In this article, the authors propose a collaborative method for the quantification and placement of edge servers in order to offer social media services in Industrial Cognitive (ICIoV). In order to achieve a higher quality of service, they adopted a nondominated sorting genetic algorithm III (NSGA-III). For experimentation, a real-world ITS social media dataset of China is being used. The article "A Cognitive Joint Angle Compensation System Based on Self-Feedback Fuzzy Neural Network with Incremental Learning" proposed an online cognitive, joint angle error compensation method based on incremental learning to reduce joint angle error of robotic arms. The authors presented a joint angle error solver and a compensation module in the article, which ensures that the robot can obtain effective joint angle compensation in various situations. The joint angle error solver is used to solve joint angle error, and the compensation module uses a self-feedback incremental fuzzy neural network to predict and update the compensation in real time.

Cognitive manufacturing enables businesses to actively use advanced analytics to understand, reason, and learn the processes, people, and operations. Data classification can be applied in cognitively capable businesses for finding patterns in data. The article "A Deep Swarm-Optimized Model for leveraging Industrial Data Analytics in Cognitive Manufacturing" proposes an analytical model for real-time data classification. For this purpose, three soft computing techniques are being used: deep learning (convolution neural network and CNN),

machine learning (decision tree), and swarm intelligence. Two benchmarks dataset are used for experimentation and the results outperform the other existing cognition models in terms of classification accuracy.

The article "Fast and Accurate Convolution Neural Network for Detecting Manufacturing Data" introduces a clustering technique with particle for object detection (CPOD). CPOD helps in solving the object detection problem in smart factories. The approach cleans outliers, explores correlations between the images, and learns from clusters. A particle swarm optimization algorithm is used for parameter optimization. VOC 2012 (standard dataset) and a motorcycle wheel producing line dataset are being used for experimentation. The results are promising and detect objects with a short time and as well with high accuracy.

In the CC of intelligent IIoT, clustering is a fundamental machine learning problem to exploit latent data relationships. In the article "Multiple Kernel Driven Clustering with Locally Consistent and Selfish Graph in Industrial IoT," the authors proposed a graph-based multiple kernel clustering method to address the nonlinear clustering issue for CC of IIoT. A new graph model, Locally Manifold Kernel Graph (LMKG), is introduced that preserves the local manifold structure of the data in kernel space for multiple LMKG. The quantity of affinity graph achieves significant improvement while considering the consistency and selfishness of LMKGs. They have shown that their method can effectively handle nonlinear data from intelligent IIoT and other industrial sensor networks.

CC, a revolutionary artificial intelligent concept emulating the human brain's reasoning process, is progressively flourishing in the Industry 4.0 automation. With the advancement of various technologies, the evolution toward improved decision-making and data-driven intelligent manufacturing has already been evident. However, several emerging issues yet to be resolved. The article "A Blockchained Federated Learning Framework for CC in Industry 4.0 Networks" proposes a novel data-driven CC platform through the combined use of federated learning and blockchain for smart manufacturing in Industry 4.0. Federated learning helps in providing privacy and efficiency while blockchain provides robustness against attacks.

The article "Social Image Sentiment Analysis by Exploiting Multimodal Content and Heterogeneous Relations" includes an attention-based heterogeneous relational model to improve the multimodal sentiment analysis performance by incorporating rich social information. A novel progressive channel and region attention model is used to exploit the correlation between images and texts. They highlighted semantically rich image channels and a region attention schema representing emotional regions based on the attended channels. In addition, they aggregated the content information from social contexts to learn high-quality representations of data.

The editors would like to thank all the authors who submitted their work to this special section and also would like to express their thanks to the experts in the field who voluntarily participated in the review process on a very tight schedule. Finally, the editors want to give their sincere thanks to the Editor-in-Chief, Prof. R. Luo, for providing them with timely guidance and support.

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