Data Science challenges in Industry 4.0

Theme: Nowadays, industrial enterprises and companies are addressing the challenge of transforming the ideas of the Internet of Things, Industry 4.0, Cyber-Physical Systems, and similar concepts into reality. We’re currently realizing that Industry 4.0 is much more than just another buzz word. As it is well known, modern industrial production is characterized by a huge of data. However, this data is neither easily accessible, interpretable, nor fully connected to gain knowledge. Accordingly, the novel concept of digital twin is nowadays widespread as a virtual model of a process, product or service. This pairing of the virtual and physical worlds allows analysis of such data and monitoring of systems to head off problems before they even occur, prevent downtime, develop new opportunities and even plan for the future by using simulations. Digital twins are also supposed to provide a digital representation of a production landscape, but the challenges in building, maintaining, optimizing, and evolving digital twins in inter-organizational production chains that cross several boundaries have not been addressed yet in a systematic manner. In the Industry 4.0 era, also various data management research challenges have to be addressed. Huge amounts of heterogeneous sensor data (numerical, audio, video, etc.) have to be processed in real-time in order to control the production machines. In addition, unstructured data from production reports or external sources have also to be integrated to analyze and optimize the production process. Well established mathematical models for production engineering have to be integrated with data-driven machine learning for cross-domain knowledge generation. On the other hand, Industry 4.0 can be considered as the basis for new applications and business opportunities. By connecting physical objects, systems, machines, and applications, the data produced by these objects may become a valuable resource. Thus, data management and analysis operations have to be linked questions about value creation within and across enterprises. These ideas raise new requirements in terms of trust, data security, and data sovereignty, which also have to be considered in data-oriented industrial applications.

This special section will focus on (but not limited to) the following topics:

- Data Stream Processing for Industrial Data;
- Query Processing and Data Integration for Industrial Data;
- Machine Learning in Industrial Applications;
- Distributed Communication Networks and Data Analysis;
- IoT Analytics for Industry 4.0;
- Distributed Architectures for Efficient Management of IoT Data;
- New Hardware Architectures for Industrial Data Management;
- Applications for Industry 4.0 and IoT;
- Real-life cases of IoT-enabled manufacturing;
- Real-time data-driven decision-making models;
- Advanced manufacturing model under the support of cloud computing;
- Modelling and Reasoning for Industry 4.0, IoT;
- Standardization in Industrial IoT Applications;

Manuscript Preparation and Submission

Follow the guidelines in “Information for Authors” in the IEEE Transaction on Industrial Informatics [http://www.ieee-ies.org/pubs/transactions-on-industrial-informatics](http://www.ieee-ies.org/pubs/transactions-on-industrial-informatics). Please submit your manuscript in electronic form through Manuscript Central web site: [https://mc.manuscriptcentral.com/tii](https://mc.manuscriptcentral.com/tii). On the submitting page #1 in popup menu of manuscript type, select: SS on Data Science challenges in Industry 4.0

Submissions to this Special Section must represent original material that has been neither submitted to, nor published in, any other journal. Regular manuscript length is 8 pages.

Note: The recommended papers for the section are subject to final approval by the Editor-in-Chief. Some papers may be published outside the special section, at the EIC discretion.

Timetable: Deadline for manuscript submissions June 30, 2019

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