

Call for Papers

Data-Driven Process Monitoring and Control for Complex Industrial Systems

An open invited session at the IFAC World Congress 2020 in Berlin, Germany
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The increasing demands on industry that they be both economically profitable and environmentally safe has led to renewed interest in developing and implementing advanced methods for control, monitoring, and optimisation of complex industrial processes. Coupled with the relative ease with which process data can be stored, these requirements have led to renewed interest in data-driven methods in this domain. Although data-driven methods have had some success in industry, there still remain many open questions that need to be investigated and solved.

Firstly, industrial data that is sufficiently accurate, precise, and available when needed may not be available for certain key variables. This requires the development of soft sensors, whose implementation and updating, especially using data-driven methods, needs to be considered in the face of variable and uncertain process measurements, as well as changing process conditions.

Secondly, industrial data may not be of sufficient quality for the appointed task. In such cases, it is necessary to automatically assess the quality of the data before it can be used. Therefore, there is a need to develop automated, data-driven data quality assessment methods that can handle a wide range of processes and conditions with minimal human input.

Thirdly, industrial data, once it has been cleaned and made available, can be used in such applications as data-driven fault detection and diagnosis, optimisation, monitoring, and control. The primary concern lies in the development of robust methods that can be implemented in real industrial processes. Therefore, there is a pressing need to examine and define the different methods and examine their properties in real industrial applications.

Finally, there is a need to bring together industrial and academic researchers so that they can enrich each other's approaches to the problem by encouraging the formulation of problems so that both groups can easily and correctly understand the challenges.

For this open invited session, the topics of interest include, but are not limited to:

- Data-driven process monitoring and control, including model predictive control;
- Data-driven process modelling, including soft sensors and data quality assessment;
- Data-driven fault detection and diagnosis;
- Data-driven optimisation methods;
- Practical implementations of the above topics; and
- Survey papers discussing the impact and implications of the methods in industry.