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On the Opportunities and Limitations of Deep Artificial Intelligence Methods for Industrial Process Analytics

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The use of data for supporting inductive reasoning, operational management, and process improvement, has been a driver for progress in modern industry. Many success stories have been shared on the successful application of data-driven methods to address different open challenges, across different industrial sectors. The recent advances in AI/ML technology in the fields of image & video analysis and natural language have spiked the interest of the research community to explore their application outside these domains, namely in the chemical, food, biotechnological, semiconductor, and pharmaceutical industries, among others. But this boost in activity has also increased the difficulty of understanding the multiple underlying rationales for applying them, other than the mere curiosity of “to see what comes out” (still valid, but arguably inefficient). Furthermore, it is often difficult to assess the added value of using these new methods, as many times they are not rigorously compared with conventional solutions presenting state-of-the-art performances. Therefore, it is now opportune to discuss the role of the new wave of AI in solving industrial problems, supported by a fair and unpassionate assessment of their added value. Also, looking at a wider picture of the approaches that operate by induction from data, another aspect to bring to the table regards how to find the best balance and take the most of the possible synergies between statistics, machine learning, and deep AI. These questions will be addressed in the talk, and examples will be presented and discussed.

Keywords

Industrial Process Analytics; Artificial Intelligence & Machine Learning; Statistics

Classification

Both methodology and application

Primary author: P. SEABRA DOS REIS, Marco (Department of Chemical Engineering, University of Coimbra)

Presenter: P. SEABRA DOS REIS, Marco (Department of Chemical Engineering, University of Coimbra)

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