Chemical Engineering

Fall 2022 Seminar Series

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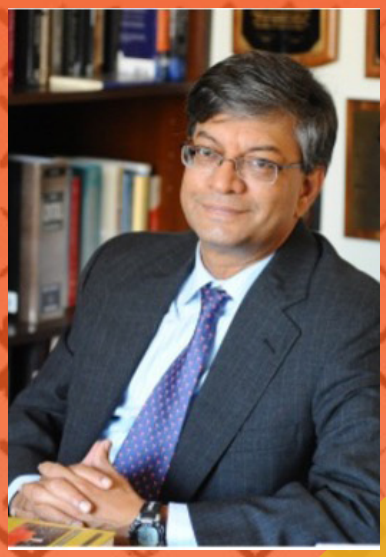

Artificial Intelligence in Chemical Engineering: Past, Present, and Future

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66-110
3:00-4:00pm
2:45pm Reception

Artificial intelligence (AI) started off with great promise in the early 1980s, spurred by the success of the expert system paradigm in certain applications. This prompted a flurry of research activities in chemical engineering in the mid-1980s. However, as the ensuing three decades showed, AI didn't quite live up to its promise in chemical engineering.

So, what went wrong with AI? In this talk, I will review the different phases of AI in chemical engineering over the last 35 years, providing some background and explanation to this question. I will also argue that this time it is different – I believe the time for AI in chemical engineering, and in other domains, has arrived, finally. I classify the opportunities into three categories - easy, hard, and harder problems – and show examples. The truly interesting and intellectually challenging problems lie in developing such conceptual frameworks as hybrid AI models, mechanism-based causal explanations, and domain-specific knowledge discovery engines. These breakthroughs would require going beyond purely data-centric machine learning, despite all the current excitement, and leveraging other knowledge representation and reasoning methods from the earlier phases of AI. They would require a proper integration of symbolic reasoning with data-driven processing. I will discuss the challenges and opportunities in the coming years.