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Machine Learning: Overview of the Recent Progresses and Implications for the Process Systems Engineering Field

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Highlights

- Recent advances in deep learning and reinforcement learning (RL) are reviewed.
- Motivation, early problems and recent resolutions of deep learning are discussed.
- The idea of RL and its success in the Go game (*a la* AlphaGo) are introduced.
- Applicability of RL to multi-stage decision problems in industries is discussed.
- Potential applications and research directions of ML in the PSE domains are given.

Abstract

Machine learning (ML) has recently gained in popularity, spurred by well-publicized advances like deep learning and widespread commercial interest in big data analytics. Despite the enthusiasm, some renowned experts of the field have expressed skepticism, which is justifiable given the disappointment with the previous wave of neural networks and other AI techniques. On the other hand, new fundamental advances like the ability to train neural networks with a large number of layers for hierarchical feature learning may present significant new technological and commercial opportunities. This paper critically examines the main ad-