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The artificial intelligence technologies in Industry 4.0: A taxonomy, approaches, and future directions

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Highlights

- Industry 4.0 is characterized by greater interdependencies, uncertainties, and the generation of vast amounts of data.
- Intelligent automation has emerged as a transformative factor in modern manufacturing.
- Machine learning and neural networks are the most frequently employed components for driving improvements in Industry 4.0.
- A comprehensive review and analysis of 45 articles provides insights into AI's current applications in Industry 4.0.

Abstract

Industry 4.0 transforms the manufacturing sector with dynamic, networked, complex industrial environments. These environments generate vast amounts of data and require technology and Artificial Intelligence (AI) to achieve intelligent, efficient, and sustainable production processes. This paper comprehensively reviews 45 articles on AI and Industry 4.0 integration. We propose a taxonomy for AI in Industry 4.0 and classify approaches into Industry 4.0 design and product quality control methods. Our analysis shows that 58% of papers use product quality control methods. Besides, this paper identifies challenges and open issues by illuminating the current landscape. The findings showed that machine learning is the most common AI method for improving Industry 4.0 with 41%, and Python is the most used tool for simulation.