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Special Issue Reprint

Recent Advances in Machine learning and Deep Learning Theories

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This Reprint presents a collection of cutting-edge research and review articles focusing on the integration of machine learning and deep learning theories for intelligent fault diagnosis in industrial and engineering systems. With the rapid advancement of computational intelligence, data-driven fault diagnosis has become a cornerstone of modern Prognostics and Health Management (PHM), enabling early detection, prediction, and mitigation of system failures. The contributions in this Reprint highlight innovative applications of artificial neural networks, convolutional and recurrent neural architectures, transfer learning, and hybrid intelligent systems for diagnosing faults in rotating machinery, robotic systems, power plants, and manufacturing processes. In addition, the included studies explore explainable AI models, data augmentation, and sensor fusion methods that enhance model interpretability and robustness under real-world operating conditions. By bringing together theoretical insights and practical implementations, this Reprint aims to serve as a valuable reference for researchers, engineers, and practitioners engaged in machine learning-based condition monitoring and intelligent fault diagnosis. It reflects recent trends shaping the future of autonomous and resilient industrial systems within the framework of Industry 4.0.

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