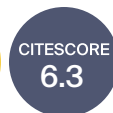




*agriculture*



*Special Issue Reprint*

## Big Data Analytics and Machine Learning for Smart Agriculture

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Modern agriculture is undergoing a transformation through the integration of advanced technologies, such as big data analytics and machine learning. Since the first edition of “Big Data Analytics and Machine Learning for Smart Agriculture” in 2023, the agricultural sector has progressed from Industry 4.0 to 5.0, underscoring the rapid pace of innovation in this field.

Big data analytics and machine learning are revolutionizing farm and agricultural system management by enabling more efficient resource use and increasing crop yields. Artificial intelligence is now used in fertilization recommendation systems, helping to optimize the application of agricultural inputs and support sustainable practices. AI technologies also assist in identifying plant diseases and pests—an essential aspect of Agriculture 5.0.

The integration of drones and other devices with AI enables precise crop monitoring and rapid responses to potential threats. Beyond crop production, AI is also applied in animal husbandry, for example, in optimizing meat production. AI-powered prognostic systems help predict failures in smart farms, thereby improving operational reliability. One of the key ongoing challenges is the standardization of data, due to the wide variety of measurement devices and differing environmental conditions during data collection. The efficient processing and analysis of large datasets is crucial for generating actionable insights and driving innovation in digital agriculture.



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