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Integrating Artificial Intelligence and Computer Vision for Dynamic Decision Support in Smart Agricultural Systems

Communication Info

Authors:
Imane TAYMI [1]
Mohammed AIT DAOUD [1]
Nabil AHARRANE [1]

[1] Faculty of Sciences
Ben M'Sick, University
Hassan II of
Casablanca, Morocco

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Abstract

The rapid evolution of digital technologies is driving agriculture toward data-driven and automated systems. This systematic review examines recent advances in integrating artificial intelligence (AI), computer vision, and sensor data to support decision-making in smart agriculture [1]. The analysis focuses on image-based detection of plant diseases, water stress, and growth anomalies using real-time field data. Recent studies highlight the role of machine learning in precision resource management and the growing adoption of smart sensing infrastructures [2]. The convergence of Artificial Intelligence of Things (AIoT) and edge computing further enhances system responsiveness and resilience in dynamic environments [3].

However, most existing approaches remain technology-centered and provide limited actionable recommendations for small-scale farming systems [4]. This review emphasizes the need for integrated system modeling and explainable AI to enable practical, transparent, and sustainable deployment of intelligent agricultural solutions [5].

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