

Smart Harvests: Deep Learning and the Future of Agriculture

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Abstract

Agriculture stands at the crossroads of tradition and technology. As the global demand for food continues to rise, deep learning is emerging as a transformative force capable of reshaping how we cultivate, process, and consume agricultural products. The keynote Smart Harvests: Deep Learning and the Future of Agriculture explores the intersection of artificial intelligence and agriculture, with a focus on fruit classification as a gateway application. Advances in data augmentation, transfer learning, and lightweight architectures have enabled deep learning models to achieve unprecedented accuracy in real-time classification, supporting smarter quality control, sustainable farming, and global food security. However, challenges remain - including limited datasets, computational costs, and model generalization - highlighting the need for human-AI collaboration, interpretable systems, and scalable deployment in the field. By bridging research insights with practical applications, the keynote demonstrates how deep learning can drive a new era of “smart harvests,” ensuring efficiency, resilience, and sustainability in agriculture.

Key Words: *Deep learning, Artificial intelligence, Sustainable farming*