Robotics-Based Data Collection and Machine Learning Analysis for Crop Insights

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Abstract*: Robotics and machine learning have become integral to advancing precision agriculture, enabling efficient crop monitoring and data-driven decision-making. This study employs autonomous robotic systems equipped with multispectral sensors and cameras to collect real-time data from crops. The collected data, including plant health metrics and environmental factors, is analyzed using supervised machine learning models such as Random Forest and Convolutional Neural Networks (CNNs).*

The study achieved an 87% accuracy in disease classification and an 8% improvement in yield prediction accuracy compared to traditional methods. Additionally, the robotic platform demonstrated a 30% reduction in data collection time, covering up to 5 hectares per hour. These findings underscore the potential of robotics and machine learning to enhance agricultural productivity and sustainability by delivering actionable insights and reducing resource wastage. The integration of these technologies paves the way for scalable and efficient precision farming solutions.

Keywords: Robotics, Crop Analysis, Machine Learning