

PRACTICE ABSTRACT n° 17

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Smart harvesting system for olives using drones and AI object detection models

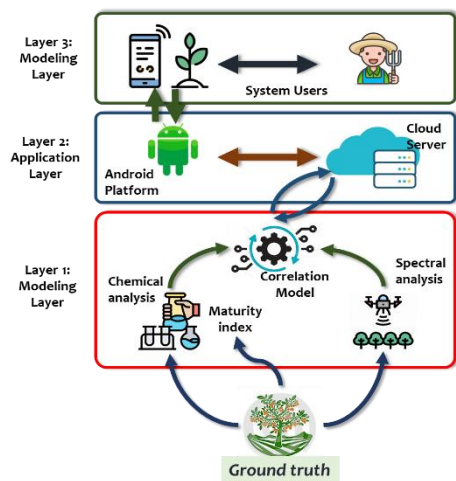
In the Beni Mellal region, olive cultivation plays a **significant role in agriculture, covering 65,500 hectares and contributing 12% to national production**. Traditionally, farmers determine the harvest period individually without a collective or scientific approach, leading to inconsistencies in olive oil quality. This study proposes a precision harvesting system utilizing drones and artificial intelligence (AI) to optimize the timing of the olive harvest.

A deep learning model was developed to analyze multispectral images collected by drones, correlating olive ripeness with chemical and sensory analyses of olive oil. The study **tested object detection models (YOLO, Faster R-CNN, and SSD)**, with YOLO providing the **best balance of accuracy (85%)** and speed, making it suitable for real-time applications. The results indicate that the **optimal harvesting period for Moroccan Picholine olives falls around mid-November**, though climatic variations must be considered annually.

Additionally, a mobile application, **CropCOST**, was developed to assist farmers in tracking orchard **management costs and receiving AI-based harvest recommendations**.

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The objective was to Find the **best technological solutions for optimal harvesting timing to improve ripeness of olives and quality of oil olive produced by using drones imageries and IA technologies**

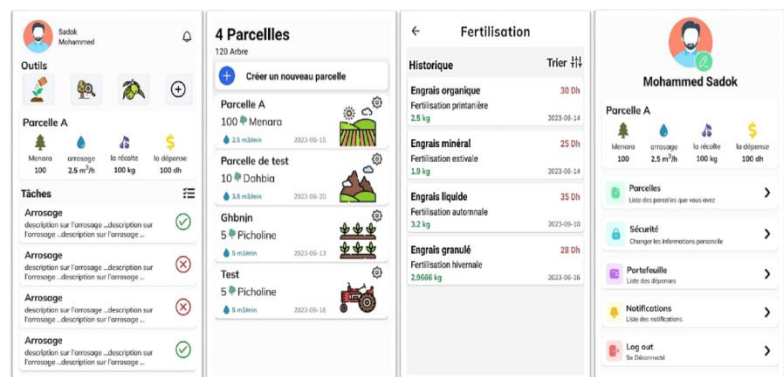


Framework for olive maturity detection by drones, cost management and recommendations dissemination by a mobile App.

The prototype has enabled the establishment of a robust sensor network to monitor essential storage conditions that integrate:

- Temperature sensors to measure internal and external conditions of the silo.
- Humidity sensors to regulate humidity levels.
- Real-time data collected are transmitted to a cloud-based platform

A mobile application is used for notification to farmers regarding the optimal harvesting conditions.



Screenshots of CropCOST mobile app. for olive cost management

The integration of this technology has enhanced olive oil quality and economic efficiency, benefiting over 400 farmers. The prototype's success demonstrates that precision agriculture **using UAVs and AI can significantly improve yield, quality, and sustainability in olive farming**