

Olive Fruit Classification Using Pretrained Deep Networks

Dimitrios Kosmopoulos
University of Patras, 26504, Rio, Greece

Abstract

The olive oil industry is a cornerstone of the global agricultural economy, where the final quality of olive oil is intimately tied to the ripeness and condition of the harvested olives. Ensuring accurate and efficient sorting and classification of olive fruit is critical to maximizing both yield and quality. In this study, we introduce a novel, automated classification framework that leverages state-of-the-art computer vision techniques. The system integrates a deep learning pipeline for segmentation and classification, built upon the YOLO architecture. We also present methods to enhance the results by using with large pre-trained vision-language models to improve generalization and robustness.

Importantly, the system addresses real-world variability, including the inadvertent presence of extraneous materials (e.g., leaves, twigs), which may otherwise compromise classification accuracy. This is approached as an open-set classification problem, where foundational models contribute to distinguishing outlier objects from valid olive classes with minimal supervision. Experimental evaluations, benchmarked against expert annotations, confirm the system's high classification accuracy and its capacity to reliably detect foreign objects. Additionally, the system's real-time performance supports high-throughput processing, making it viable for industrial deployment.

