PROJECT REPORT

COMPARATIVE YOLO VERSION N-X IN REAL-TIME OBJECT DETECTION AT CASA DEL CAFE

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2025

ABSTRACT

To address the challenge of real-time table management in café environments, this study investigates the performance of various YOLO (You Only Look Once) models in detecting empty and occupied tables. The research evaluates five YOLO versions (N, S, M, L, and X) based on three key criteria: FPS (Frames Per Second), Precision, and F1 Score. The Analytic Hierarchy Process (AHP) was employed to rank the models according to the weighted importance of these criteria. The results show that YOLO-N is the most effective model, offering the highest FPS, which ensures real-time performance in dynamic café settings. While YOLO-S performed best in terms of Precision and F1 Score, its lower FPS made it less suited for real-time table detection. The findings highlight the balance between speed and accuracy when selecting a model for real-time object detection. The research provides valuable insights for optimizing table management systems in cafés and offers a framework for evaluating YOLO models based on specific application needs. Future research could focus on improving both speed and accuracy through model refinement and dataset expansion.

Keywords: YOLO, Real-Time Detection, Table Management, FPS, Precision, F1 Score, Analytic Hierarchy Process (AHP), Object Detection, Café Environment, Model Evaluation