Applying a CNN-Based YOLOv7 Model to License Plate Detection

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***Abstract*—This undergraduate thesis investigates a CNN-based YOLOv7 model for vehicle license-plate detection. Automated plate localization can support later recognition and traffic or parking applications. The student studies convolutional networks and YOLOv7, prepares a plate-image dataset, trains the detector, and evaluates it with the reported precision, recall, and mean average precision workflow. The thesis reports a mean average precision of 0.7672137931034481 for the evaluated model. It notes that the dataset is small and that angle, lighting, and object size affect detection. The source does not specify enough independent test detail to establish general performance across cameras or traffic conditions, and it does not validate a deployed recognition system. The contribution is a documented student study or prototype whose stated scope can guide further testing.**

***Index Terms*—YOLOv7, CNN, license plate detection, computer vision**

I. Introduction

Automated plate localization can support later recognition and traffic or parking applications. This thesis investigates a CNN-based YOLOv7 model for vehicle license-plate detection. It begins from a practical engineering need and explains the technologies and workflow chosen for the case. The objective is to document a student implementation or comparative investigation, together with the evidence available in the manuscript. Broader operational or economic effects require separate measurements and are not assumed from the existence of a prototype [1]. Earlier ICTU student work on related designs is included here for context [2], [3], [4]. Related published studies provide context for the subject and methods [5], [6], [7], [8], [9], [10]. These contextual works were selected for this English summary; they are not asserted to appear in the original thesis bibliography.

II. Methods

The student studies convolutional networks and YOLOv7, prepares a plate-image dataset, trains the detector, and evaluates it with the reported precision, recall, and mean average precision workflow. The source is summarized through its stated design, implementation material, examples, and conclusion. Features shown in the manuscript are distinguished from proposals for later development. This review does not add a new experiment, fill missing measurements with estimates, or treat a planned capability as an observed result. The source thesis remains the provenance for the reported work [1].

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III. Results

The thesis reports a mean average precision of 0.7672137931034481 for the evaluated model. It notes that the dataset is small and that angle, lighting, and object size affect detection. The report's screens, configurations, examples, or measurements constitute the evidence for this summary. A capability described only as a design intention is not counted as a validated operational outcome. No additional performance, adoption, financial, or safety figure has been introduced here. The result is interpreted within the scope of the student's documented setup [1].

IV. Discussion

The source does not specify enough independent test detail to establish general performance across cameras or traffic conditions, and it does not validate a deployed recognition system. Further work could enlarge and augment the dataset, report the exact split and per-condition metrics, and test on independent real-world scenes. These limitations affect how the evidence should be read. The current manuscript can support understanding of the design and reported demonstration, while independent tests would be needed for stronger claims. Any later deployment should document its environment and separate observed outcomes from intended benefits [1].

V. Conclusion

The thesis documents a CNN-based YOLOv7 model for vehicle license-plate detection. The thesis reports a mean average precision of 0.7672137931034481 for the evaluated model. It notes that the dataset is small and that angle, lighting, and object size affect detection. The source does not specify enough independent test detail to establish general performance across cameras or traffic conditions, and it does not validate a deployed recognition system. Further work could enlarge and augment the dataset, report the exact split and per-condition metrics, and test on independent real-world scenes. Accordingly, the present contribution is a source-grounded account of the student work and its tested or illustrated scope. Claims about broader effectiveness should be assessed in later work using explicit evaluation conditions [1].

References

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