Deep Learning Algorithms for Real-Time Object Detection

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***Abstract*—This undergraduate thesis investigates real-time object detection with deep learning. Identifying objects in images or video requires a model that balances speed with recognition quality. The author reviews deep learning and object-detection approaches and implements a YOLO-based detection experiment. The report describes data preparation, training or evaluation, and examples of detected animals or other objects. The source presents a working detection demonstration and reports favorable results on its limited sample. It also notes weaker classification in more realistic settings. The small reported evaluation does not justify a general claim of robust accuracy across scenes. The available test material is limited and does not establish broad generalization, long-term camera performance, or reproducibility across new datasets. Scene conditions may differ from training examples. The contribution is a documented student study or prototype whose stated scope can guide further testing.**

***Index Terms*—deep learning, object detection, YOLO, computer vision**

I. Introduction

Identifying objects in images or video requires a model that balances speed with recognition quality. This thesis investigates real-time object detection with deep learning. 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 author reviews deep learning and object-detection approaches and implements a YOLO-based detection experiment. The report describes data preparation, training or evaluation, and examples of detected animals or other objects. 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 source presents a working detection demonstration and reports favorable results on its limited sample. It also notes weaker classification in more realistic settings. The small reported evaluation does not justify a general claim of robust accuracy across scenes. 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 available test material is limited and does not establish broad generalization, long-term camera performance, or reproducibility across new datasets. Scene conditions may differ from training examples. A later study could use a larger independently labeled set, disclose class-level errors, and compare latency and accuracy under varied lighting and backgrounds. 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 real-time object detection with deep learning. The source presents a working detection demonstration and reports favorable results on its limited sample. It also notes weaker classification in more realistic settings. The small reported evaluation does not justify a general claim of robust accuracy across scenes. The available test material is limited and does not establish broad generalization, long-term camera performance, or reproducibility across new datasets. Scene conditions may differ from training examples. A later study could use a larger independently labeled set, disclose

class-level errors, and compare latency and accuracy under varied lighting and backgrounds. 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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