Review of: "CNN-Based Road Damage Detection"

Syahrul Fithry Senin[1]

1 Universiti Teknologi Mara

Potential competing interests: No potential competing interests to declare.

It is an interesting article; however, I do have some improvement points to be considered for your article.

ABSTRACT

-The abstract mentions "Gathering and preprocessing images," "constructing and instructing the CNN architecture," but lacks details on the data collection process, the size and diversity of the dataset, the specific preprocessing techniques used, and the structure of the CNN. Including such specifics would provide better insight into the robustness of the method.

-**Performance Metrics**:

- While it states an accuracy of "around 90%," it does not specify other important performance metrics such as precision, recall, F1-score, or the confusion matrix. These metrics are crucial for understanding the model's performance more comprehensively.

Validation and Testing:

- The abstract mentions evaluating the CNN's performance on a test set but does not elaborate on the nature of the test set, whether cross-validation was used, or how the test set was separated from the training set. Information on the validation process is essential to assess the reliability of the results.

INTRODUCTION

Lack of Clear Focus:

- The introduction covers many aspects but lacks a clear focus and flow. It jumps between discussing the impact of poor road conditions, the challenges of road damage detection, the advantages of CNNs, and details about specific techniques without a cohesive narrative.

Repetition and Redundancy:

- The text is repetitive, particularly regarding the challenges of detecting road damage and the advantages of CNNs. This redundancy makes the introduction unnecessarily long and less engaging.

Lack of Specificity:

- The introduction mentions "various road features" and "a variety of ways to obtain their own data" without specifying what these features and methods are. It also refers to "recent study" and "recent advancement in technology" without citing specific works or advancements.

Incomplete Explanation of CNN:

- While the introduction mentions CNNs and their advantages, it does not clearly explain how CNNs work or why they are particularly suitable for this task. A brief but clear explanation would help readers understand the relevance.

LITERATURE REVIEW

Missing Context and Relevance:

- The survey often fails to explain the context or significance of the studies in relation to the research question. For instance, it's not always clear how each study contributes to the understanding of road damage detection or how it relates to the proposed CNN-based approach.

Lack of Critical Analysis:

- The survey tends to summarize the studies without critically analyzing their strengths, weaknesses, or contributions. A literature survey should not only present previous work but also evaluate it in the context of the current research.

Incomplete References:

- References are mentioned in a way that makes it hard to cross-check or understand without proper citation format. It's important to ensure all references are clearly cited and can be easily looked up by readers.

Lack of Integration with Current Research:

- The literature survey should integrate the discussed studies with the current research topic more effectively. It should highlight how the current research builds on or diverges from previous work.
-

METHODOLOGY

Insufficient Explanation of Data Augmentation:

- While data augmentation techniques such as contrast transformation, brightness correction, and Gaussian blur are mentioned, there is no explanation of why these specific techniques were chosen, how they were implemented, or their impact on the dataset and model performance.

Unclear Description of Experimentation:

- The statement "Our experiments suggest that our technique can achieve a Mean F1-Score" is vague. It does not specify what the Mean F1-Score was, how it was calculated, or provide any context on the performance relative to other methods or benchmarks.

Inadequate Detail on Implementation:

- The description of the YOLOv5 implementation in a robot is brief and lacks technical details. It does not explain the hardware or software setup, how the model is integrated into the robot, or the specific steps taken for real-time analysis and communication with road administrators.

RESULTS AND DISCUSSION

Insufficient Detail on Dataset:

- The dataset description is vague. There is no information on how the images were collected, any preprocessing steps taken, or the distribution of damage types within each classification. Additionally, it is unclear how the dataset was split into training, validation, and testing sets.

Unclear Explanation of Accuracy and Loss:

- The section on accuracy and loss is not well-explained. It mentions that accuracy and loss were predicted based on validation, but it does not provide specific values or explain how these metrics were calculated. The relationship between epochs, learning rate, and loss minimization is mentioned but not clearly articulated.

Poor Interpretation of F1 Score:

- The discussion of the F1 score is confusing and incomplete. An F1 score of 0.156 is mentioned, which is unusually low, suggesting poor model performance. However, there is no explanation of why the score is low, what might have caused it, or how it compares to other models or benchmarks.

Incomplete Discussion of Results:

- The discussion of results is superficial. There is no detailed analysis of the model's performance, potential reasons for errors, or any insights gained from the results. The section should explore why certain results were obtained and what implications they have for future research.

CONCLUSIONS AND FUTURE RESEARCH

Lack of Critical Analysis:

- The conclusion does not critically assess the limitations of the current study. It would benefit from acknowledging

specific challenges or areas where the system did not perform as expected.

Overly Optimistic Tone Without Justification:

- The statement that the proposed method has "tremendous application potential" is not substantiated with detailed examples or comparative analysis with existing methods. It appears overly optimistic without sufficient justification.

Insufficient Detail in Future Scope:

- The future scope section is vague and lacks concrete plans or steps. It mentions new acquisition campaigns and adding new models but does not specify how these will be conducted or what specific improvements are expected.

Unclear Objectives for Future Work:

- The future work section lists several ideas without a clear, cohesive objective. It lacks a structured plan for how these ideas will be implemented or what specific goals they aim to achieve.

Absence of Metrics or Benchmarks:

- There is no mention of specific metrics or benchmarks that will be used to evaluate the success of future improvements. This makes it difficult to assess the feasibility and potential impact of the proposed changes.