

Review of: "CNN-Based Road Damage Detection"

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Potential competing interests: No potential competing interests to declare.

1. The abstract provides a concise summary of the work, mentioning the use of CNN for road damage detection with an accuracy claim of around 90%. However, it lacks details on the specific contributions of the study and does not mention the methodology's novelty or compare it to existing approaches.
2. The introduction clearly identifies the problem of road damage detection and its importance for road safety and maintenance. While it outlines the need for CNN-based models, it could be enhanced by including a brief overview of the challenges faced by existing methods, thereby establishing a stronger rationale for the proposed approach.
3. There are many redundant statements in the introduction. I suggest that the authors thoroughly review and rewrite this section. Also, the full name of the abbreviation should be used only at the first mention. There are many instances where "convolutional neural network" is used in full while already abbreviated.
4. The literature review discusses various approaches to road damage detection, ranging from simple image processing to complex deep learning methods. The review could be improved by directly comparing these methods, highlighting their limitations, and stating how the proposed CNN model addresses these issues, for example, in the first and third paragraphs of the introduction.
5. I suggest that the authors should properly cite the names of the authors.
6. The methodology could benefit from more technical details regarding the model architecture, training process, and parameter selection. Additionally, the discussion on the robot system and its hardware components seems to veer away from the paper's core focus on CNN-based detection.
7. The statement in paragraph 1 of section 3 "Our experiments suggest that our technique can achieve a Mean F1-Score" is quite vague. I suggest that the authors explain how they arrive at this conclusion.
8. "This algorithm is implemented in a robot that is tested on roads, from". I suggest that they provide further details on the implementation of this process.
9. "Transfer learning will be used to train the YOLOv5 algorithm....." I suggest that the authors provide further details on the implementation and the use of transfer learning in their experiment.
10. The dataset description/classification in table 1 is not very clear. There is no mention of the size of the training set. Also, what constitutes "Damaged roads"?

11. Last paragraph of page 6, "On a stream of live footage from a camera positioned on a moving vehicle." Why then the need for a robot?
12. In section 4.1, "For testing in each case, there was a set number of pictures given, and from that, a few were validated based on the accuracy and the loss were predicted." I suggest that the author be clearer in their data splits and avoid the use of the words 'picture' and 'photograph'.
13. I suggest that authors give details of the hyperparameters and selection method.
14. What is the purpose of Fig. 6?
15. It seems the size of the potholes shown in Fig. 5 and Fig. 8. is very large, wide, deep. I think the robot will probably get stuck in the potholes. Are any measures put in place to prevent this from happening?
16. The results section needs to be improved significantly. I suggest that the author explain their findings and give an in-depth analysis of their results.

In general:

Clarity and Structure: The paper seems to follow a logical structure but often lacks depth in the technical description, which is vital for reproducibility and understanding of the work.

Novelty: The novelty of the approach is not strongly emphasized, and there is no clear differentiation from existing work.

Validation: The experimental setup and validation methods could be better detailed, particularly regarding the datasets used and the justification for the choice of YOLOv5.

Discussion of Results: The discussion would benefit from a more in-depth analysis of the results, considering factors like varying road conditions, lighting, and potential biases in the dataset.

Statistical Analysis: Inclusion of statistical tests to verify the significance of the results would enhance the paper's credibility.

Practical Implications: While the practical applications are mentioned, a discussion on how this system could be integrated into current road maintenance workflows would be valuable.