Informatics and Knowledge Management Graduate Program
Rua Vergueiro, 235/249, Liberdade Zip Code: 01504-001
São Paulo/SP, Brazil
Tel.: +55(11) 3385-9078

São Paulo, October 6, 2025.

Dear Organizers of **CILAMCE2025**,

We would like to express our sincere gratitude to you and the reviewers for the valuable feedback and insightful comments on our work entitled **"*Automated Detection of Small Water Accumulations in Aerial Images Acquired by Drones: A Genetic Algorithm-Based Method*"**.

We did our utmost to respond to the reviewers' feedback and improve the overall quality of the work. Please, find below our detailed responses to the comments of the reviewers.

Yours sincerely,



Sidnei Alves de Araújo, Ph.D.
Associate Professor at Informatics and Knowledge Management Graduate Program, UNINOVE,
Corresponding author, e-mail: saraujo@uni9.pro.br

Responses to the reviewers' comments

This article presents a novel method for automatically detecting small water accumulations in aerial images captured by drones, addressing a significant research gap in the use of computer vision for combating mosquito breeding sites. Genetic Algorithm (GA) is used to create a customized water index by combining spectral bands from a multispectral camera. This topic is very important in practice.

Authors: *Thank you very much for the constructive comments and careful evaluation of our manuscript*

The main limitations of the submission are:
1) The dataset used for training and validation is very specific and limited, consisting of only 109 images of containers arranged in simulated ground scenarios, which may not be representative of diverse real-world conditions. Can you provide results with other, larger, datasets?

Authors: *We appreciate the reviewer's observation regarding the specificity and limited size of our dataset. Indeed, the current dataset comprises 109 images of containers captured in simulated and controlled terrestrial scenarios, which may not fully capture the variability found in real-world environments.*

As part of our ongoing work, we are collecting and curating additional image datasets under more diverse environmental conditions, including different lighting types, background clutter, vegetation types, and container materials and shapes. However, due to time constraints, these additional datasets are not yet available for conducting experiments.

To strengthen our current results, we mentioned in the revised manuscript (sections 4 and 5) the limitations of the current dataset and their potential impact on generalizability. We also clarified at the end of the Introduction section that our goal in this study was to establish a proof-of-concept for the proposed method, which can now be validated with larger and more heterogeneous datasets in future studies.

2) The algorithm relies on a fixed threshold for binarization (τ=0.5) and a minimum fraction to classify a region as "Water" (α=0.5), which may not be optimal for all scenarios and could be a source of classification errors. The authors argue that this is future work, but I think this tuning can be performed in this work.

Authors: *Thank you for your valuable suggestion. We agree that the fixed parameters α and τ may not be optimal in all scenarios and could affect classification performance. In response to your comment, we conducted additional experiments to assess the influence of these parameters on the performance of the proposed method. The results along with a brief discussion have been included in Section 4 of the revised manuscript. These findings helped us better understand the sensitivity of the method and support future efforts toward adaptive parameter tuning.*

3) The details of GA's encoding, crossover, and mutation are not clear. Please, improve the description of these elements.

Authors: *Thank you for pointing this out. In the revised manuscript, we have improved the description of the chromosome encoding in Section 3.2. We also provided information on the configuration parameters (population, crossover, and mutation) used in our implementation of GA.*

4) The detection of objects (or Water) is widely explored in the literature and deep learning approaches, such as YoLo and UNet. Thus, comparisons must be performed with these or other approaches. In computational intelligence, performance evaluation is usually comparative. As a result, affirmatives as “demonstrate the feasibility of the method for enhancing the effectiveness of computer vision systems” are not supported.

Authors: *Thank you for raising this important point. While we acknowledge that deep learning-based approaches such as YOLO, U-Net, and their variants are widely used in the literature for object and water detection tasks, we would like to clarify a fundamental distinction between these approaches and our method.*

Deep learning models typically identify scenes or objects that exhibit visual characteristics suggestive of the presence of water, such as textures, reflections, or contextual cues. However, they do not explicitly incorporate the spectral signature of water, which is the central aspect leveraged by our method. Our approach focuses on generating a spectral index, derived from selected spectral bands and algebraic operations, that correlates with the actual physical and optical properties of water in aerial imagery.

Furthermore, our method produces an interpretable indicator that can be easily visualized, thresholded, and understood by non-experts, such as field technicians or public health officials. This level of transparency and usability is difficult to achieve with complex deep learning models, which typically operate as black-box classifiers and require extensive computational resources, annotated datasets, and technical expertise to deploy and maintain.

Given these conceptual and practical differences, we believe that a direct comparison between our method and deep learning-based object detection approaches would be inappropriate, especially considering that the current study focused on generating and evaluating spectral indices under controlled conditions.

We have revised the manuscript (Section 4) to explicitly clarify this methodological distinction, thereby justifying the lack of direct comparisons between our approach and existing deep learning-based methods.

5) The best expression obtained is presented in the results, but no discussion is performed. It would be much better to discuss the resulting expression. Does it make sense?

Authors: *We appreciate the reviewer’s suggestion. We have added a brief discussion of the structure of the final expression, highlighting the spectral bands involved.*

6) The parameters used by GA are not presented. For instance, how many independent runs were performed? What is the population size? And so on...
Also, it would be much better to provide the codes publicly to make future investigations/comparisons easy.

Authors: *We have provided in Section 3.2 information on the configuration parameters (population, crossover, and mutation) adopted in our implementation of GA. Regarding the public availability of the codes, as explained before, this study represents an initial proof of concept, and the research is still ongoing. Additional experiments involving a more diverse image dataset covering a broader range of environmental conditions are still required to validate and refine the proposed method. Once this extended evaluation is completed, we plan to make both the source code and the annotated image dataset publicly available to support reproducibility and enable future comparisons.*