# Qeios

Peer Review

# Review of: "Towards End-to-End Neuromorphic Voxel-based 3D Object Reconstruction Without Physical Priors"

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The manuscript is very clear and well-structured, presents relevant novelties for event cameras, and remains accessible to a broad computer vision/graphics audience. It constitutes a valuable contribution that would merit publication in a specialized journal. Below are some points of improvement:

(1) I would recommend further explaining/clarifying/arguing the use of mIoU and F-Score for threshold optimization, as well as explaining how the optimal threshold is determined.

(2) It is important to state explicitly from the beginning that the method has so far only been tested on simulated event camera data, and future work should address its applicability to real data (for instance, by exploring domain adaptation approaches).

(3) While the manuscript nicely covers the relevant 3D event camera literature, it should also provide a fair and broader perspective on other 3D reconstruction approaches in the introduction. These include ToF-based cameras (both pulsed LiDAR and continuous-wave amplitude-modulated (CWAM) systems), interferometric techniques (possibly employing multiple wavelengths for rough surface objects), reflection-based strategies (e.g., photometric stereo, deflectometry, shape from polarization), active/passive triangulation methods, or depth-from-defocus methods. Each of these techniques presents distinct advantages and drawbacks. Discussing their respective trade-offs and potential benefits of 3D reconstruction with event cameras would improve the paper's introduction.

(4) Have the authors investigated different kernel sizes for the Sobel operator?

(5) Regarding the deep learning approach, the paper should discuss the choice of a relatively small batch size and limited number of epochs. Is convergence reliably achieved? A training history graph

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would be helpful.

(6) It would also be useful to clearly state that data augmentation (with invariant transformations like rotation, reflection, etc.) was employed. IMPORTANT: Please clarify if the data augmentation was done after the data is split into training/testing/validation datasets.

(7) A further point is to be mindful when stating: "We believe that if both methods were compared under the same extremely rapid scanning conditions, traditional methods will suffer from motion blur, but our method will perform better, which we plan to test as future work." This is not an appropriate scientific statement and should be rewritten and maybe introduced in another location of the manuscript, e.g., in a discussion section, describing the limitations and potential future works.

(8) Finally, please correct minor typos (e.g., "karnel" instead of "kernel" and the symbol "~" in Equation III.A.e).

## Declarations

**Potential competing interests:** No potential competing interests to declare.