

Edge sketches for multi-modal image registration based on Blake-Zisserman type energy

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Abstract

In this work, we are interested in deformable registration models for multi-modality images. We introduce a new similarity term for image registration which is based on the geometric information (edges and thin structures) extracted from the images using the Blake-Zisserman's energy. The later is well suited for detecting discontinuities at different scales, i.e., of first and second order. We start by giving a theoretical analysis of the proposed model. Then, we use the Gauss-Newton method and multilevel technique to speed up the numerical computations for the solution of this model. Finally, we present some numerical results of the new approach and we compare them with those obtained by some existing methods. The experiments illustrate the efficiency and effectiveness of the proposed model.

References

- [1] Theljani, Anis, and Ke Chen. "An augmented lagrangian method for solving a new variational model based on gradients similarity measures and high order regularization for multimodality registration." *Inverse Problems and Imaging* (2019).
- [2] Theljani, Anis, and Zakaria Belhachmi. "A discrete approximation of Blake and Zisserman energy in image denoising with optimal choice of regularization parameters." *Mathematical Methods in the Applied Sciences* 44.5 (2021): 3857-3871.