

Gradient Based Registration and Fusion of Multi-Modal Images

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One of the remaining challenges in image registration arises for multi-modal images taken from different imaging devices and/or modalities. Starting in 1995, mutual information has shown to be a successful distance measure for multi-modal image registration, therefore, it is considered to be the state-of-the-art approach to multi-modal image registration. However, mutual information has a number of well-known drawbacks. Its main disadvantage is that it is known to be highly non-convex and has typically many local minima.

This observation motivate us to seek a different image similarity measure which is better suited for optimization but as well capable to handle multi-modal images. In this work we investigate an alternative distance measure which is based on normalized gradients. As we show, the alternative approach is deterministic, much simpler, easier to interpret, fast and straightforward to implement, faster to compute, and also much more suitable to optimization.