Discontinuity preserving convex image registration model for MRI of the lung

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Imaging the structure and function of the human lungs is of importance for early detection of lung diseases. With the new development of steady state free precession (SSFP) imaging concepts in combination with dedicated image registration methods for fast functional and morphological MRI, it is expected that we are able to study the lung functions. We propose a novel method for image registration of the lung MRI sequences by using a convex optical flow model. The model is based on combined local and global optical flow method and regularized by an anisotropic total variation (TV) norm. The anisotropy derived from the structure tensor in order to take into account local variations at each point and to preserve the discontinuities of the motion fields. Qualitative and quantitative evaluations are done to show the robustness of the method.

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