Research Article

Registration of Brain MRI/PET Images Based on Adaptive Combination of Intensity and Gradient Field Mutual Information

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Abstract

Traditional mutual information (MI) function aligns two multimodality images with intensity information, lacking spatial information, so that it usually presents many local maxima that can lead to inaccurate registration. Our paper proposes an algorithm of adaptive combination of intensity and gradient field mutual information (ACMI). Gradient code maps (GCM) are constructed by coding gradient field information of corresponding original images. The gradient field MI, calculated from GCMs, can provide complementary properties to intensity MI. ACMI combines intensity MI and gradient field MI with a nonlinear weight function, which can automatically adjust the proportion between two types MI in combination to improve registration. Experimental results demonstrate that ACMI outperforms the traditional MI and it is much less sensitive to reduced resolution or overlap of images.

Abstract

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