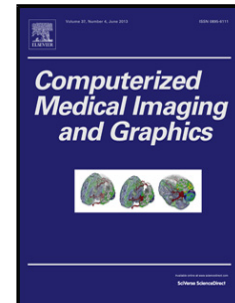


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heartBEATS: A Hybrid Energy Approach for Real-Time B-spline Explicit Active Tracking of Surfaces

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Abstract

In this manuscript a novel method is presented for left ventricle (LV) tracking in three-dimensional ultrasound data using a hybrid approach combining segmentation and tracking-based clues. This is accomplished by coupling an affine motion model to an existing LV segmentation framework and introducing an energy term that penalizes the deviation to the affine motion estimated using a global Lucas-Kanade algorithm. The hybrid nature of the proposed solution can be seen as using the estimated affine motion to enhance the temporal coherence of the segmented surfaces, by enforcing the tracking of consistent patterns, while the underlying segmentation algorithm allows to locally refine the estimated global motion. The proposed method was tested on a dataset composed of 24 4D ultrasound sequences from both healthy volunteers and diseased patients. The proposed hybrid tracking platform offers a competitive solution for fast assessment of relevant LV volumetric indices, by combining the robustness of affine motion tracking with the low computational burden of the underlying segmentation algorithm.

Keywords: real-time image segmentation, B-spline, left ventricle segmentation and tracking

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