New Global Formulation for a Bilateral based Stereo Matching Algorithm

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Abstract

In this paper, a new hybrid local-global stereo matching algorithm (BFGc) is proposed. BFGc makes the maximum benefit from both the introduced local and the global approaches representing the main two stage of the algorithm. Globally, a new energy formulation of the stereo problem in segment domain is proposed which basically depends on the reliability of the disparity estimates results from the adopted local approach, unlike what is typical in global methods. For increasing reliability of the local approach, a new gradient masks is supporting the adopted similarity measure and Bilateral filter, with its edge preserving sense, is adopted for more proper disparity assignment. In segment domain, a plan fitting technique is introduced which aims at inferring all valid planes in disparity space and producing a good initialization for the global optimization space which aims at assigning memberships to the these planes to all pixels in the reference image. The experimental results on the Middlebury dataset demonstrate that our approach stands as a strong candidate with the modern stereo matching algorithms.
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Stereo matching  Self-adapting similarity measure  Color segmentation  Graph cuts