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K-nearest neighborhood based integration of time-of-flight cameras and passive stereo for high-accuracy depth maps

基于K最近邻域搜寻的ToF深度和被动立体深度融合算法研究

Key words: Depth map, Passive stereo, Time-of-flight camera, Fusion

关键词：深度图；被动立体；ToF深度摄像机；融合

- Both time-of-flight (ToF) cameras and passive stereo can provide depth information for their corresponding captured real scenes, but they have innate limitations. ToF cameras and passive stereo are intrinsically complementary for certain tasks. It is desirable to appropriately leverage all the available information by ToF cameras and passive stereo.

- Although some fusion methods have been presented recently, they fail to consider ToF reliability detection and ToF based improvement of passive stereo. As a result, this study proposes an approach to integrating ToF cameras and passive stereo to obtain high-accuracy depth maps.

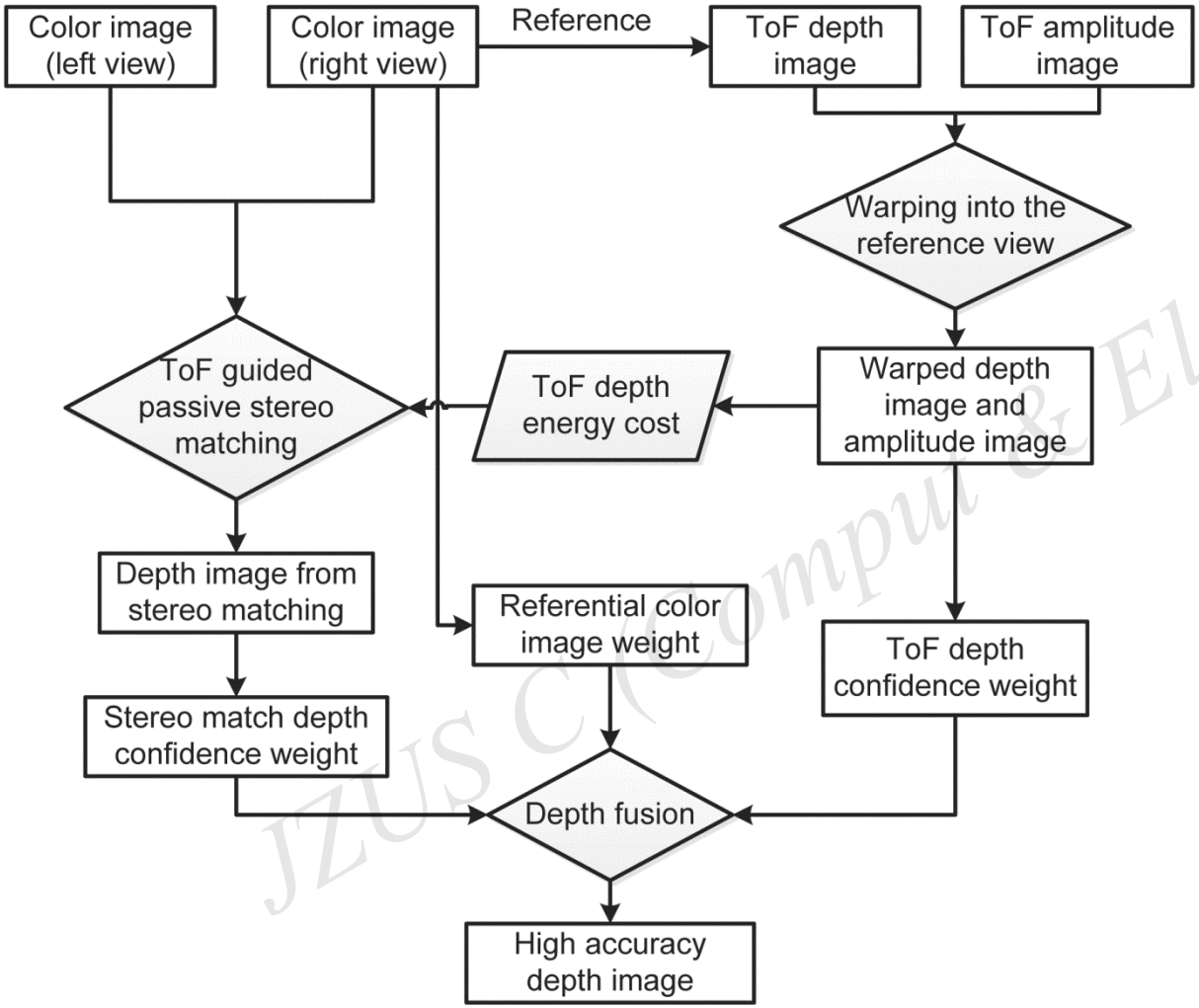
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In this paper we propose a robust approach to obtaining high-accuracy depth maps by the integration of passive stereo and ToF cameras. The proposed approach can exploit two color images and a ToF depth image to obtain a high-resolution depth map.

The main contributions are as follows:

- An energy cost function is devised to utilize data from ToF cameras to boost the stereo matching of passive stereo.
- A fusion method is used to combine the depth information from both ToF cameras and passive stereo to obtain high accuracy depth maps. The experiments show that the proposed approach achieves improved results with high accuracy and robustness.

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Algorithmic framework of the proposed approach

The algorithm contains mainly two parts, ToF guided passive stereo matching and depth fusion