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An Efficient Photogrammetric Stereo Matching Method for High-Resolution Images

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Abstract

Stereo matching of high-resolution images is a great challenge in photogrammetry. The main difficulty is the enormous processing workload that involves substantial computing time and memory consumption. In recent years, the semi-global matching (SGM) method has been a promising approach for solving stereo problems in different data sets. However, the time complexity and memory demand of SGM are proportional to the scale of the images involved, which leads to very high consumption when dealing with large images. To solve it, this paper presents an efficient hierarchical matching strategy based on the SGM algorithm using single instruction multiple data instructions and structured parallelism in the central processing unit. The proposed method can significantly reduce the computational time and memory required for large scale stereo matching. The three-dimensional (3D) surface is reconstructed by triangulating and fusing redundant reconstruction information from multi-view matching results. Finally, three high-resolution aerial data sets are used to evaluate our improvement. Furthermore, precise airborne laser scanner data of

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