论文

基于硬件加速的实时二值图像连通域标记算法

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A Hardware Acceleration Based Algorithm for Real-time Binary Image Connected-component Labeling

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摘要	参考文献	相关文章

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摘要 针对光学成像制导武器系统对图像处理的实时性要求，该文提出了一种基于硬件加速的2次扫描连通域标记算法。算法结合基于像素和基于游程扫描算法的优点，以像素为基本的扫描单元，以线段为基本的标号单元，在第1次扫描过程中建立临时标号的树形拓扑结构，并输出线段作为结果。第2次扫描对线段进行标号替换完成连通域标记。通过在FPGA+DSP平台中进行实验验证明，该文算法的硬件加速实现占用资源少，能够达到较高的性能和执行效率，保证了系统的实时性，具有较高的实用价值。

关键词： 图像处理   连通域   实时性   三层树   硬件加速

Abstract： Due to the requirement for real-time image processing in optical imaging homing weapon systems, this paper proposes a hardware acceleration based connected-component labeling algorithm, which is a real time and two-pass algorithm. The algorithm integrates the merit of pixel-based and the run-based algorithm, which sets pixel as scan unit and line as label unit. Tree-shape topology is constructed in the first scan process, and lines are exported as the results. Then the labels are replaced in the second scan process to complete the connected-component labeling. Experiments on DSP+FPGA platform demonstrate that the hardware acceleration implementation of algorithm reaches a higher performance and efficiency with less resources consumption, and meet the demand of real-time processing.

Keywords： Image processing   Connected-component   Real-time   Three-layer tree   Hardware acceleration

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引用本文:

赵菲, 张路, 张志勇, 卢焕章.基于硬件加速的实时二值图像连通域标记算法[J] 电子与信息学报, 2011,V33(5): 1069-1075

Zhao Fei, Zhang Lu, Zhang Zhi-Yong, Lu Huan-Zhang.A Hardware Acceleration Based Algorithm for Real-time Binary Image Connected-component Labeling[J] , 2011,V33(5): 1069-1075

链接本文:

http://jeit.ie.ac.cn/CN/10.3724/SP.J.1146.2010.00793   或   http://jeit.ie.ac.cn/CN/Y2011/V33/I5/1069