

面向高分辨率彩色图像的线段检测算法

罗午阳^{1,2}, 程岳^{1,2}, 李亚晖^{1,2}, 文鹏程^{1,2}

(1 中航工业 西安航空计算技术研究所, 陕西 西安 710068; 2 机载弹载计算机航空科技重点实验室, 陕西 西安 710068)

摘要: 当前主流的线段检测算法大多利用了像素点的梯度方向特征, 但它们普遍存在过分段(over-segmentation)、长线段与低对比度线段容易被漏检的问题, 面对高分辨率彩色图像时此类问题尤其严重. 本文提出了一种基于目前性能最为突出的线段检测器 LSD(Line segment detector)的扩展改进算法. 该算法充分利用了原始图像的多通道、多尺度特性, 并结合具有鲁棒性的基于尺度特征的线段筛选方法以及多通道多尺度线段融合方法, 得到了更符合视觉认知的检测结果. 实验结果表明, 本文算法显著降低了长线段和低对比度线段被漏检的可能, 明显消除了过分段现象.

关键词: 线段检测; 高分辨率彩色图像; 多通道; 多尺度

Line Segment Detection Algorithms Towards

High-resolution Color Image

LUO Wu-yang^{1,2}, CHENG Yue^{1,2}, LI Ya-hui^{1,2}, WEN Peng-cheng^{1,2}

(1 Xi'an Aeronautics Computing Technique Research Institute, AVIC, Xi'an 710068, China;

2 Aviation Key Laboratory of Science and Technology on Airborne and Missile-borne Computer, Xi'an 710068, China)

Abstract: Currently, the mainstream of line segment detection algorithm mostly utilizes the pixel's gradient orientations feature, but these algorithms exist problems of over-segmentation and being prone to miss long segment and low contrast segment commonly, especially confronting high-resolution color image. In order to solve these problems, this paper proposed a modified extending algorithm based on LSD, the current excellent method. This algorithm makes the best of original high-resolution color image's multichannels and multiscale characteristics. Then it combines robust line segments filtering method based on scale features and multichannels-multiscale merging method. Our algorithm obtains the detection results closer to vision perceptually. Experimental results show that our algorithm substantially descending the miss rate of long segment and low contrast segment, and obviously eliminating the over-segmentation phenomenon.

Key words: line segment detection; high-resolution color image; multichannels; multiscale

作者简介:

罗午阳 男, (1992-), 硕士研究生. 研究方向为计算机视觉、图形图像处理、机载增强现实系统. E-mail: luowu_yavic@163.com.

程岳 男, (1985-), 博士. 高级工程师. 研究方向为图形图像处理、机载增强现实系统.

李亚晖 男, (1976-), 博士. 研究员. 研究方向为嵌入式操作系统、计算机网络、信息安全.

文鹏程 男, (1981-), 博士, 高级工程师. 研究方向为计算机视觉、图形图像处理、模式识别、智能控制.