论文与报告

使用广义正交概念的K-RANSAC椭圆提取

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摘要
开发了一个使用广义正交概念的K-RANSAC椭圆提取算法. 该算法通过使用广义正交概念, 成功地把圆的所有性质推广到椭圆; 通过仿射变换把水平-垂直种子点对一般化为任意种子点对情况; 通过对边缘点集的归一化运算, 有效地正则化了提取椭圆的边缘点集的病态性; 并通过直接估计椭圆参数的广义本征分析技术, 进一步提高椭圆的可检测性和拟合精度. 理论分析和实验结果表明, 所开发的椭圆提取算法具有鲁棒性强、适用范围广、精度高、速度快等优点.
关键词 计算机视觉 椭圆提取 K-RANSAC 广义正交 仿射变换 广义本征分析
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A New Method for Ellipse Detection Using K-RANSAC Based on Generalized Orthogonality Principle

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Abstract
A K-RANSAC ellipse detection algorithm is developed in this paper. By using the generalized orthogonality principle, all the properties of a circle is successfully generalized to the case of an ellipse. Then, by means of the affine transformation from a pair of arbitrary seed points to a pair of horizontal-vertical seed points, the algorithm can be extended to any case of the seed point pair. With normalization of the digital edge set, the ill-posed problem is effectively regularized. The generalized eigen analysis is employed to directly and effectively estimate the ellipse parameter vector. The detectability and fitting accuracy are significantly improved. Theoretical analysis and experimental results show that the proposed ellipse detection algorithm has the advantages of high robustness, wide applicability, high accuracy and good efficiency.
Key words Computer vision ellipse detection K-RANSAC generalized orthogonality affine transformation generalized eigen analysis

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