

论文

利用局部直线段模糊投票的低SNR海天线提取方法

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摘要:

提出了一种采用“假设-检验”策略的海天线提取新方法。在假设阶段,提出了一种新的直线段Hough变换检测疑似海天线。首先,以局部直线段为整体估计直线参数,理论推导证明此时估计误差方差远小于各边缘点独立估计时误差方差的平均值。其次,针对残余估计误差,设计了局部直线段模糊投票策略,实现全局直线段的投票聚类。最后,检测峰值点形成疑似海天线假设。在检验阶段,提出了三类新特征描述海天线与海杂波的属性差异,并采用SVM分类器识别海天线。该方法提取低信噪比海天线准确,识别正确率高,仿真和实测数据的实验结果验证了所提方法的有效性。

关键词: 海天线提取;Hough变换;直线段Hough变换

Low-SNR Sea-sky-line Extraction using Fuzzy Voting by Local Line Segment

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Abstract:

This paper proposes a novel sea-sky-line extraction method using the “hypothesize-and-verify” paradigm. In the hypothesizing step, a novel line segment Hough transform is proposed to detect some likely sea-sky-line. Firstly, the local line segment is used to estimate line parameters. The theoretical deduction proves that the estimating error variance is much less than the average of estimating error variances of all edge points, which are estimated independently. Secondly, votes are cast in the parameter space fuzzily by local line segments to obtain global line segment clustering. Finally, peaks are detected to generate likely sea-sky-line hypotheses. In the verifying step, three kinds of new features are proposed to describe the difference between sea-sky-line and sea clutter. And a SVM classifier is used to recognize the sea-sky-line. The proposed approach can extract the low-SNR sea-sky-line correctly and has high correct recognition rate. Simulation results and experimental results demonstrate the effectiveness of the proposed approach.

Keywords: sea-sky-line extraction Hough transform line segment Hough transform

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