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自适应强杂波抑制与点状动目标检测

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Adaptive Strong Clutter Suppression and Moving Point Target Detection

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摘要

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摘要 研究了基于自适应图像杂波抑制的微弱点状动目标检测技术。首先利用四叉树算法,将原始的非平稳图像分割成多个准平稳的图像子块,然后对各子块进行LS自适应背景杂波估计与抑制,从而获得准高斯白噪声背景;再利用目标运动连续性假设,将目标在相邻多帧上的位置状态模型化为高阶马尔可夫数据链,建立轨迹状态空间;根据该模型采用多帧沿轨迹非线性集成算法进行检测。既克服了传统的三维匹配算法造成搜索次数巨大的弱点,同时也避免了二维投影检测带来的信噪比下降。理论分析和大量仿真实验证明了其有效性。

关键词: 信息处理技术 微弱点状动目标检测 四叉树分割 马尔可夫模型 非线性集成

Abstract: A technology based on adaptive image clutter suppression for detecting dim point moving target is investigated. The quad-tree algorithm is used for segmenting a non-stationary original image to some sub-blocks, which are quasi-stationary data. Then a LS adaptive filter is adopted in these blocks to estimate and suppress clutter, which leads to quasi GWN background obtained. Thus the hypothesis of movement continuity is proposed to model target positions in sequential frames with high-order markov chains and construct the trajectories state space. According to the model a multi-frame detection algorithm of nonlinear integration along tracks is adopted. Consequently it abstains from the disadvantage of excessive searching operations due to using traditional three-dimensional matching algorithm. And it also avoids the SNR fall that three-to-two-dimension projection detection can bring forth. Theoretic analysis and many simulations can prove its validity.

Keywords: information processing technology dim point moving target detection quad-tree segmenting Markov model nonlinear integration

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