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Xiangyue Zhang, Qinghai Ding, Haibo Luo, Bin Hui, Zheng Chang, Junchao Zhang

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Infrared small target detection based on directional zero-crossing measure

Xiangyue Zhang[a,b,c,d,*], Qinghai Ding[e], Haibo Luo[a,b,c], Bin Hui[a,b,c], Zheng Chang[a,b,c], Junchao Zhang[a,b,c,d]

[a] *Shenyang Institute of Automation, Chinese Academy of Sciences, Shenyang110016,China*
[b] *Key Laboratory of Opto-Electronic Information Processing, CAS, Shenyang,110016,China*
[c] *The Key Lab of Image Understanding and Computer Vision, Liaoning Province,Shenyang110016,China*
[d] *University of Chinese Academy of Sciences, Beijing100049,China*
[e] *Space star technology co,LTD,Beijing100086,China*

Abstract

Infrared small target detection under complex background and low signal-to-clutter ratio (SCR) condition is of great significance to the development on precision guidance and infrared surveillance. In order to detect targets precisely and extract targets from intricate clutters effectively, a detection method based on zero-crossing saliency(ZCS) map is proposed. The original map is first decomposed into different first-order directional derivative(FODD) maps by using FODD filters. Then the ZCS map is obtained by fusing all directional zero-crossing points. At last, an adaptive threshold is adopted to segment targets from the ZCS map. Experimental results on a series of images show that our method is effective and robust for detection under complex backgrounds. Moreover, compared with other five state-of-the-art methods, our method achieves better performance in terms of detection rate, SCR gain and background suppression factor.

Keywords: Infrared image, small target detection, facet model, zero-crossing point, FODD filter

*Corresponding author
Email address: zhangxiangyue@sia.cn (Xiangyue Zhang)