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ON-BOARD FAST-MOVING TARGET TRACKING ON REMOTE SENSING IMAGES FOR  
MICRO-NANO SATELLITES

**Abstract**

Remote sensing satellite is an important way to achieve earth observation. However, the traditional remote sensing process of detection, downlink transmission and then processing is difficult to meet the timeliness requirements of emergency information acquisition. Besides, due to the constraints of orbital dynamics and satellite fuel, a single remote sensing satellite cannot achieve large-scale or global regional monitoring. Micro-nano satellites have the advantages of low cost, short development cycle and ability to form a network. The remote sensing satellite constellation based on micro-nano satellites is an important means to construct the future global and all-sky earth observation system. Thus the on-orbit intelligent information processing based on micro-nano satellites becomes a key technology that need to be solved urgently.

In this paper, a tracking-by-detection algorithm is proposed for on-board fast-moving target tracking on the visible spectral remote sensing images of micro-nano satellite. First, a lightweight deep convolutional neural network is proposed for target detection such as ships and aircrafts. Then a multi-target motion prediction model incorporating geospatial information is built for fast-moving target tracking. The algorithm is deployed on an embedded AI computer which is a COTS component. And we verify the algorithm using remote sensing images from commercial micro-nano remote sensing satellite. The experimental results verify the effective of the algorithm. The scheme in this paper has a good application prospect in micro-nano satellites with limited power and computing resources.