

SPACE DEBRIS SYMPOSIUM (A6)
Interactive Presentations (IP)

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AUTOMATIC DETECTION ALGORITHM FOR SPACE DEBRIS

Abstract

Optical survey is the main technique for detecting space debris, especially for MEO (Medium Earth Orbit) and GEO (Geosynchronous Earth Orbit) ones. Due to the high frame rate in observation, space debris surveys produce large CCD image databases, generally the sizes are beyond the scope of manual investigation. Therefore, the development of an automated object detection method with high efficiency and accuracy is of vital importance in data reduction. In this paper, we present a new technique to detect and measure space debris automatically from consecutive CCD images. First the mathematical morphology transformation is adopted to apply global thresholding and image binaryzation, then the connected fields of background stellar are identified and cleared based upon apriori information, and the connected fields of objects are correlated with an innovative neighborhood matching algorithm, at last the precise positions of objects are obtained using a specific centering method. The idea of our algorithm is flexible and easily implementable. The whole pipeline is tested in a trial survey of space debris with multiple optical telescopes, and by comparing the detections from real data with the simulated results, the detection completeness and reliability of our method are evaluated. The results show that the proposed method is useful for moving object detection in large sky surveys image reduction, and it is especially efficient for observing space debris but can be also applied to data reduction of near Earth objects and transient sources in astronomy.