

An Image Segmentation Algorithm for Gradient Target Based on Mean-Shift and Dictionary Learning

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Abstract : In electromagnetic imaging, because of the diffraction limited system, the pixel values could change slowly near the edge of the image targets and they also change with the location in the same target. Using traditional digital image segmentation methods to segment electromagnetic gradient images could result in lots of errors because of this change in pixel values. To address this issue, this paper proposes a novel image segmentation and extraction algorithm based on Mean-Shift and dictionary learning. Firstly, the preliminary segmentation results from adaptive bandwidth Mean-Shift algorithm are expanded, merged and extracted. Then the overlap rate of the extracted image block is detected before determining a segmentation region with a single complete target. Last, the gradient edge of the extracted targets is recovered and reconstructed by using a dictionary-learning algorithm, while the final segmentation results are obtained which are very close to the gradient target in the original image. Both the experimental results and the simulated results show that the segmentation results are very accurate. The Dice coefficients are improved by 70% to 80% compared with the Mean-Shift only method.

Keywords : gradient image, segmentation and extract, mean-shift algorithm, dictionary learning

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