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Joint salient feature and convolutional neural network for ship detection in remote sensing images

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Due to the interference of clouds, sea waves, islands and other uncertain conditions on sea surface in satellite images, the majority of ship detection algorithms show poor performance in object detection and recognition. This paper proposes a method based on joint visual salient feature and convolutional neural network. First, the saliency map of image can be calculated by Phase spectrum of Fourier Transform (PFT), which is based on analysis of frequency domain. PFT can effectively suppress the interference of clouds and sea waves, but the distinction between background and ship is not notable. To solve this problem, adaptive logarithmic transformation is used to enhance the saliency map. Then, the gray morphological operation is adapted to eliminate noise areas and fill small holes. An adaptive image segmentation algorithm is used to extract all the salient area as the candidates. Finally, with a small number of ship samples and the idea of transferring learning to a simple convolutional neural network model can be trained. All candidate areas will be predicted by the model and the ships will be exactly detected and recognized. The experiments results show that our algorithm can effectively eliminate the interference of various factors such as cloud and islands and has the advantage on dealing with various kinds and scales of ships.

Biography

Zhihui Gong is currently a full Professor at Department of Photogrammetry and Remote Sensing, Zhengzhou Institute of Surveying and Mapping. His main research interests include digital photogrammetry, remote sensing and image processing.

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