

Normalization of Ambient Background Intensity in High-Resolution Sonar Imagery and its Impact on Mine Detection and Classification.

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Abstract: In high-resolution sonar imagery, large variations in the intensity of the ambient background are caused by variations in sea bottom reflectance and irregular illumination of the sea floor caused by sonar platform motion. These variations in the background are often difficult to reliably distinguish from regions of actual target highlight and shadow, especially when the quality of the target signature is fair to poor. Contributing to this problem is the fact that the spatial frequencies of the varying background are often in the same spatial bandwidth as the targets. Consequently, image-processing methods that attempt to segment image regions, associated with target highlight (or shadow), are often fooled by bright (or dark) target-size patches of background. This typically results in an increase of the number of false alarms.

This paper describes several new image normalization methods that attempt to remove the variations of the ambient bottom while minimizing the distortion of the target signature. Results are presented that show the impact of the image normalization on reducing false alarms and preserving a high probability of mine detection and classification.

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