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Efficient Classification of Marine Debris using SVM with Noise Removal and Feature Extraction Techniques with Improved Performances

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Abstract: *Marine debris is a significant environmental issue, necessitating the development of precise and efficient technologies for classifying and reducing its impact. This research tries to address the issues of image noise in ocean trash classification using four alternative filters the Gaussian, Bilateral, Mean, and Alpha-Trimmed Mean (ATM) filters for noise reduction and SVM for classification. The accuracy of categorization algorithms can be considerably impacted by the presence of noise in photos of maritime debris. In this study, we suggest a two-pronged strategy: To effectively decrease noise and improve the quality of the input photos, we first apply filters. These filters were chosen with care to protect significant details while eliminating extraneous noise. Second, we classify the debris into various categories based on its visual attributes using SVM, a powerful ML technique. The ATM filter significantly reduces noise and improves the clarity of photographs of ocean trash, according to the results of our experiments. This work proposes a novel approach for classifying marine debris using advanced machine learning algorithms. For improved classification accuracy, we suggest combining Support Vector Machines (SVM) with Adaptive Thresholding Mean (ATM) filtering and Histogram of Oriented Gradients (HOG) feature extraction. According to this research, the ATM filter is a promising option for noise reduction in ocean trash imaging, potentially increasing the precision of subsequent classification algorithms and assisting in efficient environmental monitoring and marine ecosystem conservation efforts. The language used for execution is Python.*

Keywords: Marine Debris, SVM Classification, Noise Removal, Gaussian Filter, Mean Filter, Bilateral Filter, ATM Filter, HOG Feature Extraction, ATM+HOG Integration, PSNR Evaluation, SSIM Assessment, MSE Metric

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