

LAND TARGET DETECTION IN REMOTE SENSING IMAGES: METHODS AND APPLICATIONS

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Abstract

Land target detection in remote sensing images has become an essential research domain due to its significant role in environmental monitoring, urban development, defense surveillance, and disaster management. The increasing availability of high-resolution satellite imagery demands efficient and accurate detection techniques. This paper presents a comprehensive study of land target detection approaches, including traditional image processing methods and advanced machine learning and deep learning techniques. Modern algorithms such as Convolutional Neural Networks (CNNs), YOLO, and Faster R-CNN have significantly enhanced detection accuracy and speed. The study concludes that integrating artificial intelligence with remote sensing significantly improves detection performance.

Keywords

Remote sensing, land target detection, deep learning, CNN, YOLO, image processing

1. Introduction

Remote sensing technology enables the acquisition of information about the Earth's surface without direct contact. Land target detection identifies objects such as buildings, roads, vegetation, and vehicles. Recent advancements in deep learning have improved detection accuracy and efficiency.

2. Literature Review

Early methods used thresholding and segmentation but were limited by noise. Machine learning improved performance but required manual feature extraction. Deep learning models like CNNs, YOLO, and Faster R-CNN provide superior results in complex scenarios.

3. Methodology

The methodology includes data collection, preprocessing, feature extraction, model selection, training, and evaluation. Deep learning models automatically extract features and improve detection performance.

4. Results and Discussion

Deep learning models outperform traditional methods. YOLO provides faster detection, while Faster R-CNN offers higher accuracy. Challenges include resolution variability and environmental conditions.

5. Conclusion

Deep learning-based approaches significantly improve land target detection. Future research should focus on efficiency, real-time processing, and multi-sensor integration.

6. Future Work

Future work includes UAV-based detection, multi-sensor data integration, and lightweight models for real-time applications.

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