From space to swamp: AI method classifies mangrove species with unprecedented accuracy

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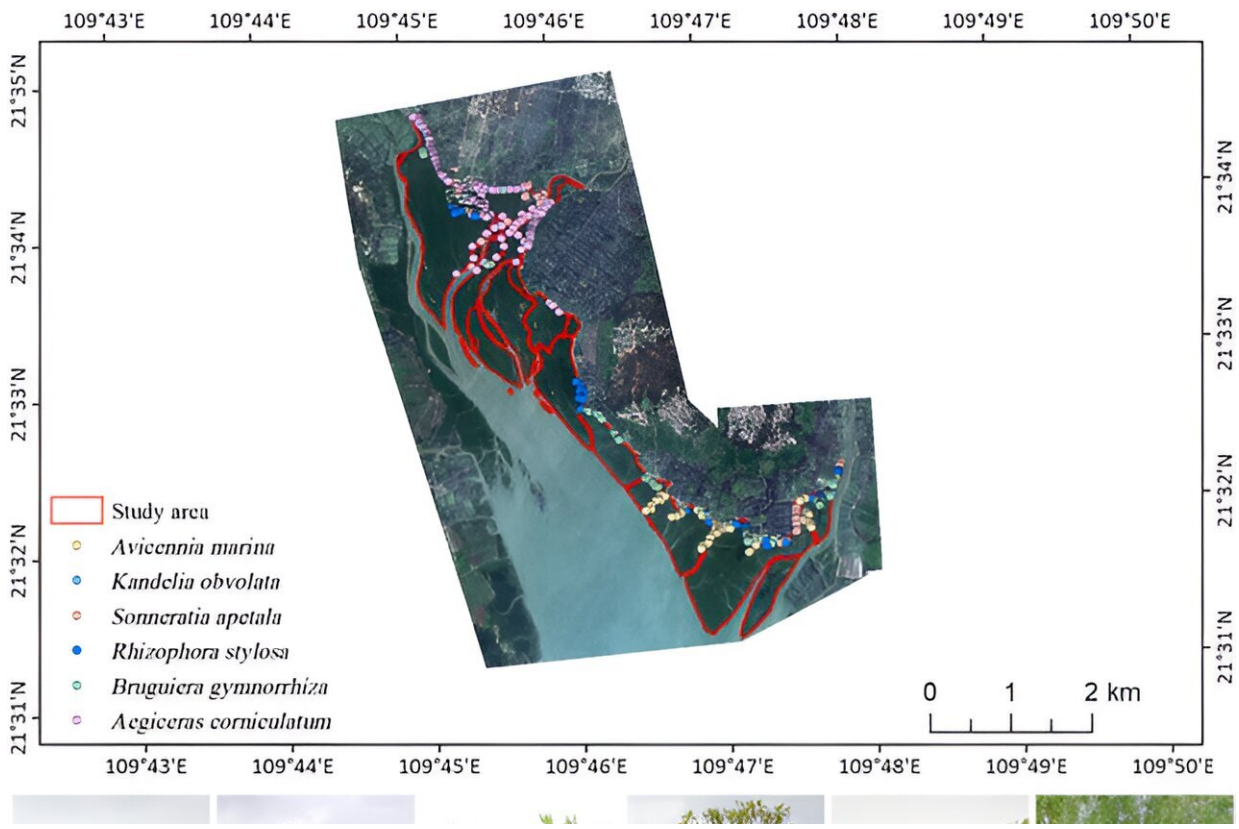

Location of study area. Credit: *Journal of Remote Sensing* (2024). DOI: 10.34133/remotesensing.0146

Mangroves are crucial for biodiversity, climate change mitigation, and

coastal protection but face threats from climate change and human activities. Traditional monitoring methods fall short in accurately capturing their complex features.

The integration of advanced machine learning algorithms with multisource remote sensing data offers a promising solution. Based on these challenges, it is essential to conduct in-depth research to develop more precise and effective techniques for mangrove species classification, which can significantly enhance conservation and restoration efforts.

Researchers from the Chinese Academy of Sciences have developed a novel framework for mangrove species classification using an XGBoost ensemble learning algorithm, as published in the *Journal of Remote Sensing*, on 6 Jun 2024. The study, which combines multisource remote sensing data, offers a significant leap in the precision of mangrove species mapping.

The study examined the Zhanjiang Mangrove National Nature Reserve in China, using data from WorldView-2, OrbitaHyperSpectral, and ALOS-2 satellites. Researchers extracted 151 remote sensing features and designed 18 classification schemes to analyze the data. By combining these features with the XGBoost algorithm and recursive feature elimination, they achieved an impressive classification accuracy of 94.02%.

The integration of multispectral, hyperspectral, and synthetic aperture radar data proved highly effective in distinguishing six different mangrove species. This approach demonstrated that the combined data sources significantly improved classification results compared to single-source data.

The study highlights the potential of advanced remote sensing techniques

and machine learning algorithms to enhance ecological monitoring and species classification, providing a robust framework for future research and practical applications in mangrove conservation.

Dr. Junjie Wang, corresponding author of the study, emphasizes the potential impact of this research, stating, "Our findings not only advance the field of mangrove species classification but also contribute to the broader application of AI in ecological conservation, providing a robust tool for environmental scientists and policymakers."

The application of this AI framework extends beyond species classification, offering insights into mangrove health, ecosystem dynamics, and aiding in the assessment of degradation and restoration efforts. The implications of this research are far-reaching, supporting sustainable development and conservation initiatives on a global scale.

More information: Jianing Zhen et al, Performance of XGBoost Ensemble Learning Algorithm for Mangrove Species Classification with Multisource Spaceborne Remote Sensing Data, *Journal of Remote Sensing* (2024). DOI: 10.34133/remotesensing.0146

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