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Projects / Local Chapter Challenge

Mapping Seagrass Meadows with Satellite Imagery and Computer Vision

Project Completed!

Background

Seagrasses form vital marine meadows in shallow waters, supporting biodiversity, stabilizing sediments, and absorbing carbon. However, Posidonia oceanica meadows in the Mediterranean are in decline due to climate change, urban development, and human activities. This loss threatens critical ecosystems and their services, including coastal economies and carbon absorption. Despite their importance, a comprehensive distribution map of these meadows is lacking, hindering efforts to address their regression.

Objective

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The project aims to create accessible, efficient methods for mapping seagrass meadows using satellite imagery and computer vision. This involves building a pixel-level classification and segmentation model to map seagrass distribution, with a focus on the Mediterranean, particularly Italian waters. The results will support long-term monitoring, restoration, and conservation efforts.

Approach

The project employed the following steps:

1. **Data Collection and Preprocessing**: Gathered satellite imagery and public database information on seagrass presence. Cleaned and preprocessed data for analysis.
2. **Model Development**: Built a pixel-level classification model using computer vision techniques to identify seagrass regions.
3. **Comparison**: Compared the model's outcomes with established habitat suitability models, which predict species presence based on environmental conditions.
4. **Deployment**: Designed a public dashboard for data visualization, enabling accessible insights for conservation efforts.

Results and Impact

The project successfully developed a robust model for mapping seagrass meadows with high accuracy. It provided a comprehensive map of P. oceanica distribution in the Mediterranean, highlighting areas requiring urgent conservation. By comparing the model with habitat suitability data, researchers identified optimal zones for restoration and replanting. The public dashboard offers an interactive platform for monitoring, empowering stakeholders and policymakers to take informed action. This innovation enhances conservation strategies and supports global efforts to combat climate change.

Future Implications

The methodology and results lay the groundwork for expanded monitoring of marine ecosystems worldwide. The project's success in integrating satellite imagery and computer vision can inspire further research, including adaptation to other seagrass species and habitats. These findings also inform policy development, guiding sustainable practices and restoration initiatives crucial for marine biodiversity and climate resilience.

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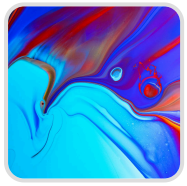

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