Detection of Coastal Features from Satellite Imagery using Computer Vision

UCF CRCV REU - Project 29

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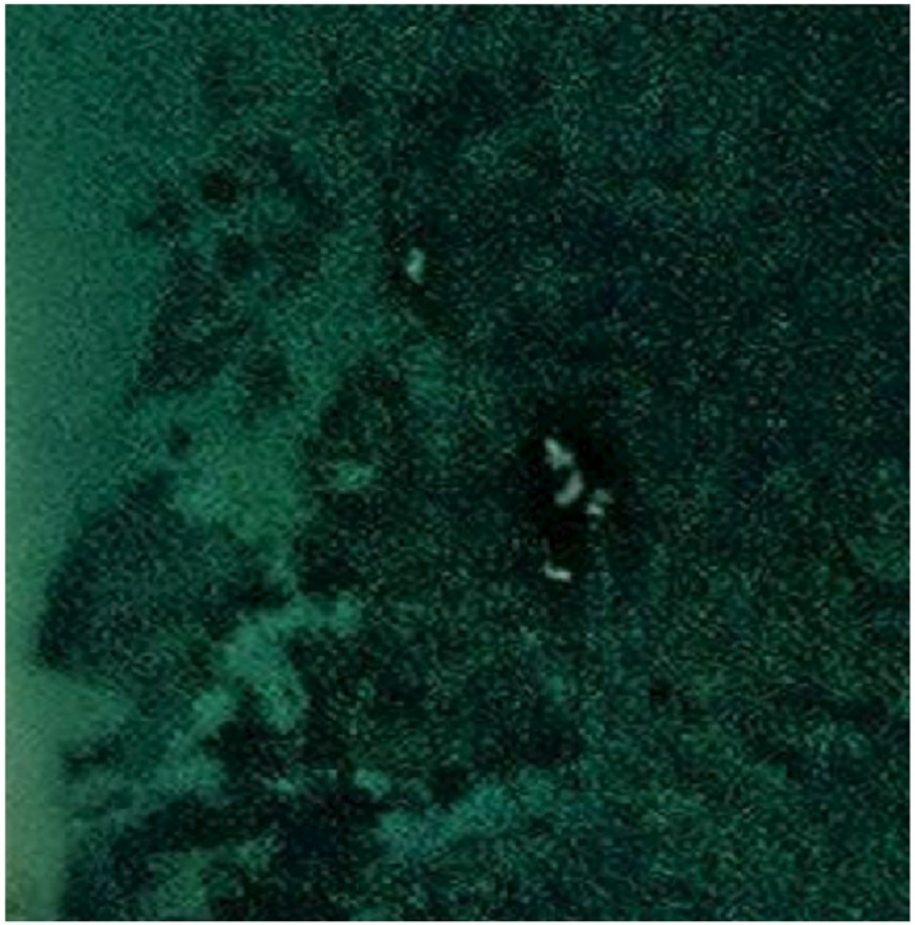
Enabling AI to interpret satellite imagery with near-human accuracy



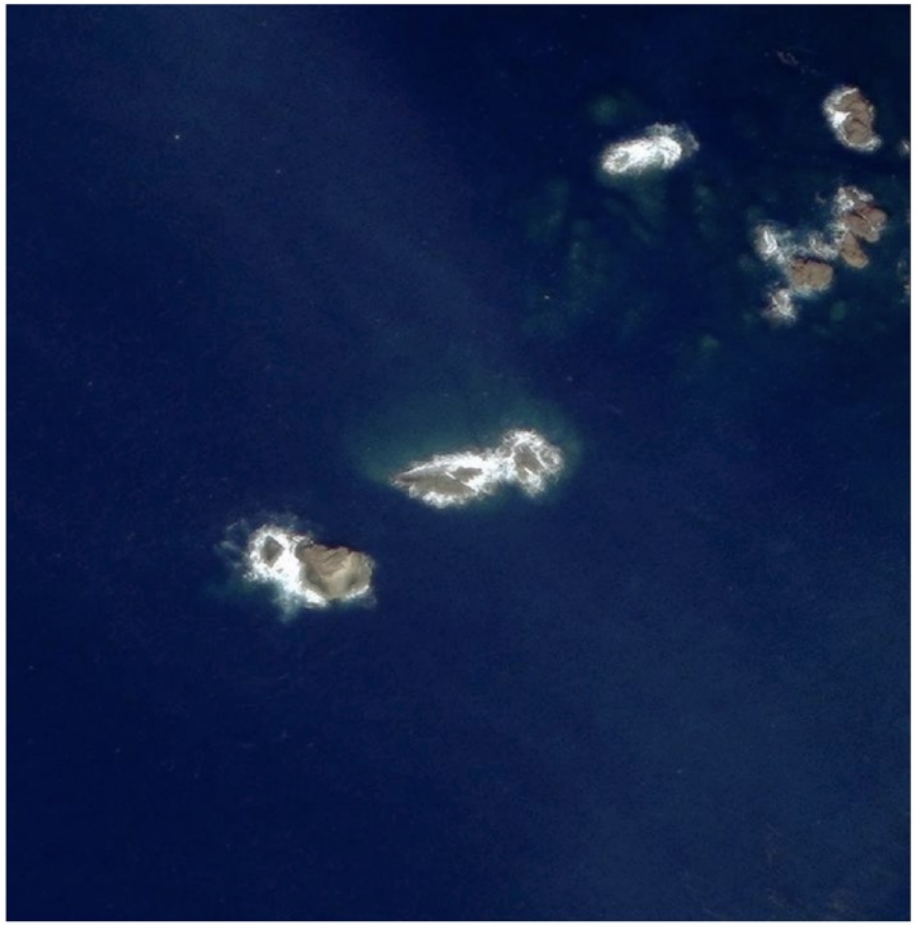
Supports maritime logistics & national safety systems

Goal: Build a computer vision pipeline to automatically detect and segment submerged and semi-submerged maritime hazards from remote sensing imagery

Submerged



Semi-Submerged



Methodology

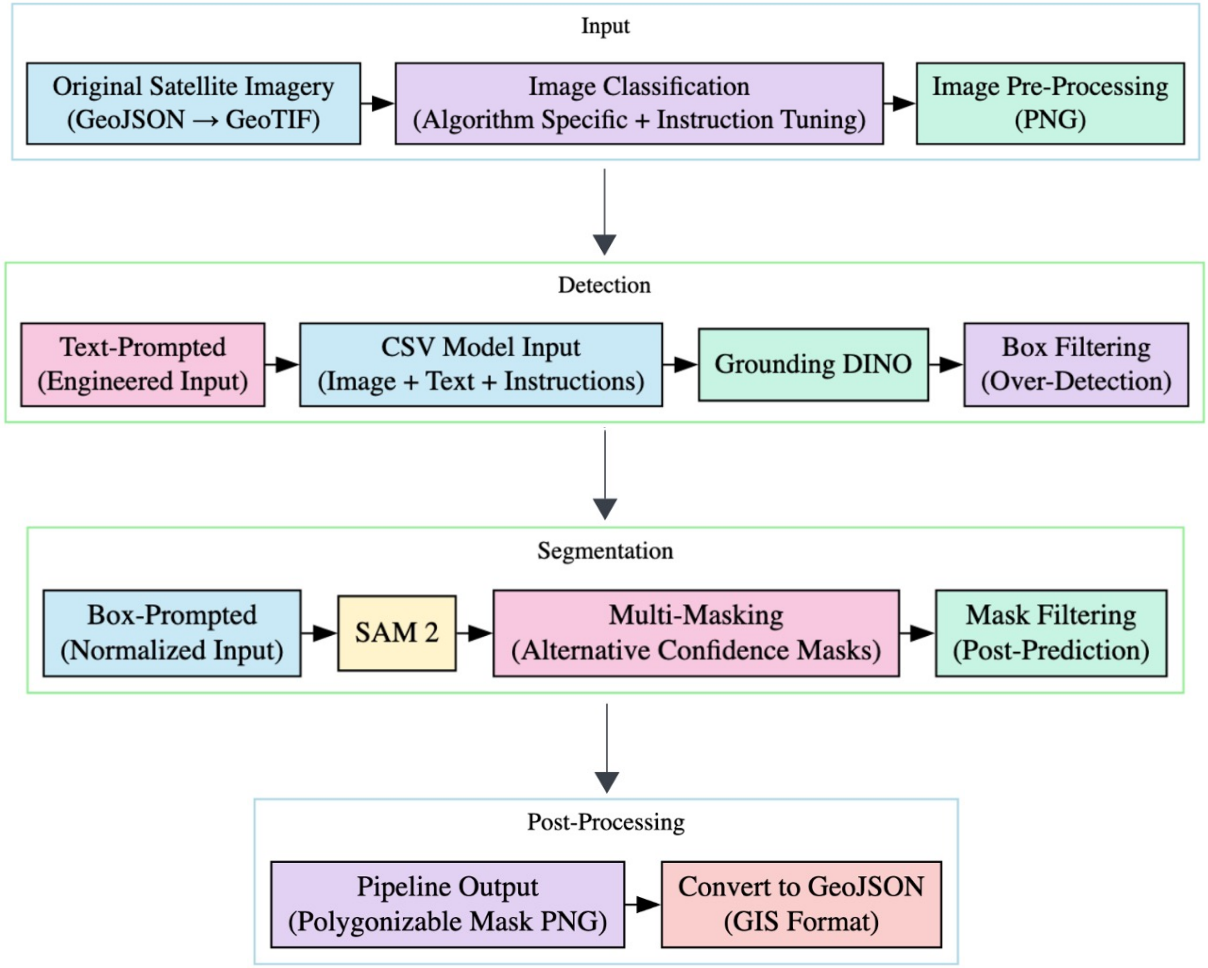
Modular Two-Stage Approach:

- **Grounding DINO:** Open-vocabulary, zero-shot detection.
- **SAM 2:** Converts detections boxes into accurate instance masks.

Optimization Techniques:

- Prompt Engineering
- Dynamic Threshold Tuning
- Best-of-N Mask Selection

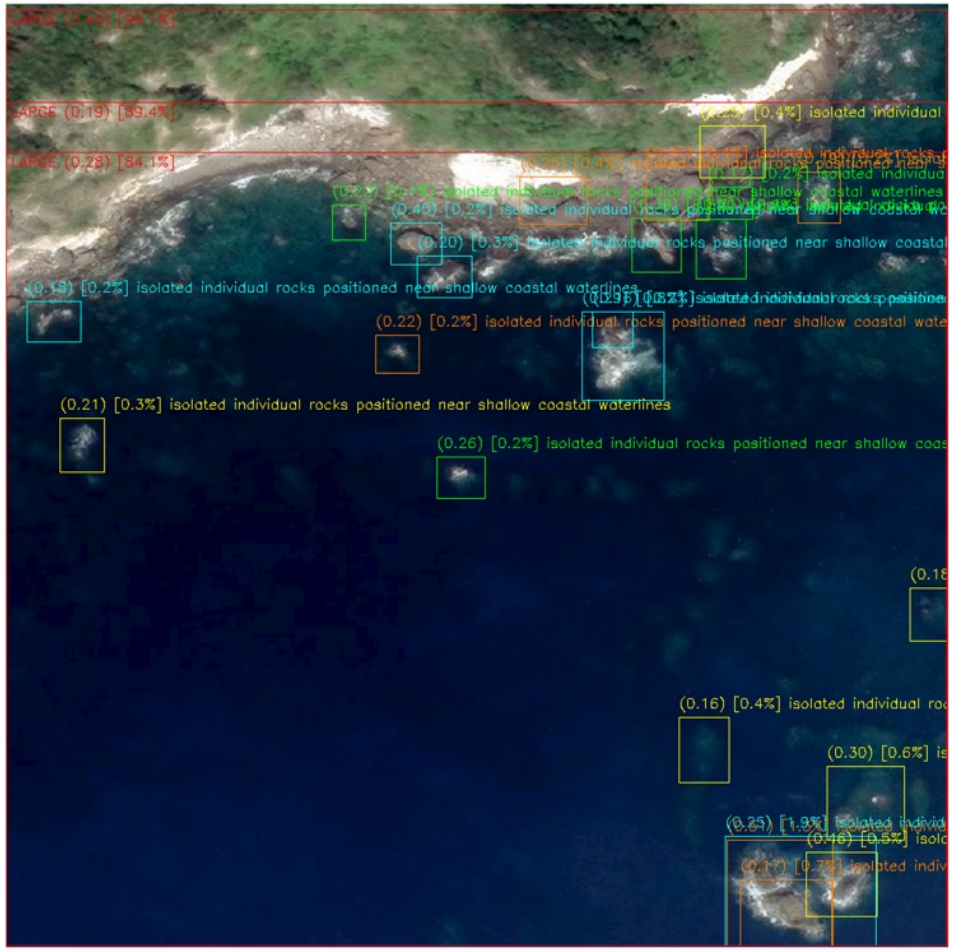
Vision Model Flow



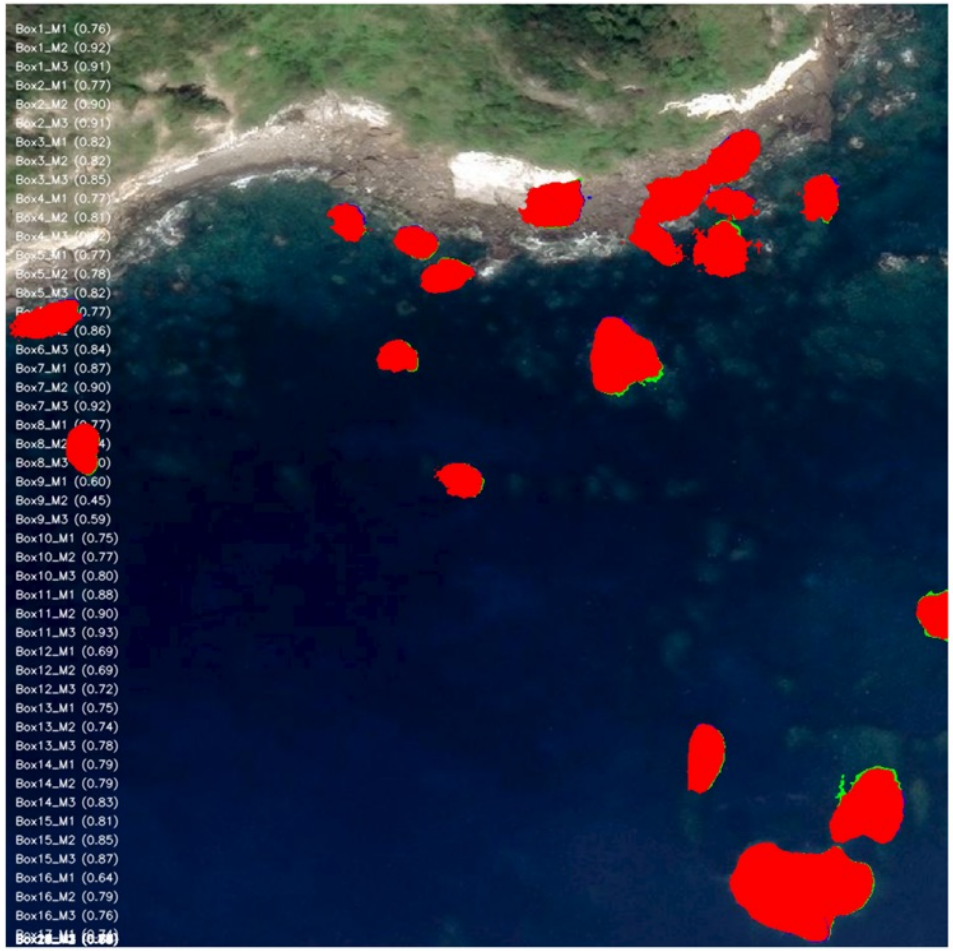
Original Image



Grounding DINO



SAM 2



Results

	F1-Score	mIoU	Precision	Recall	J&F-Score
Grounding DINO (Detection)	83.69%	98.32%	76.61%	92.23%	N/A
SAM 2 (Segmentation)	89.73%	84.48%	92.04%	87.52%	87.11%

Thank You