UCF CRCV REU – Week 4

By: Felipe Monsalvo

Understanding Diagrams using Computer Vision

UCF CRCV REU - Project 29

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REU Student: Felipe Monsalvo

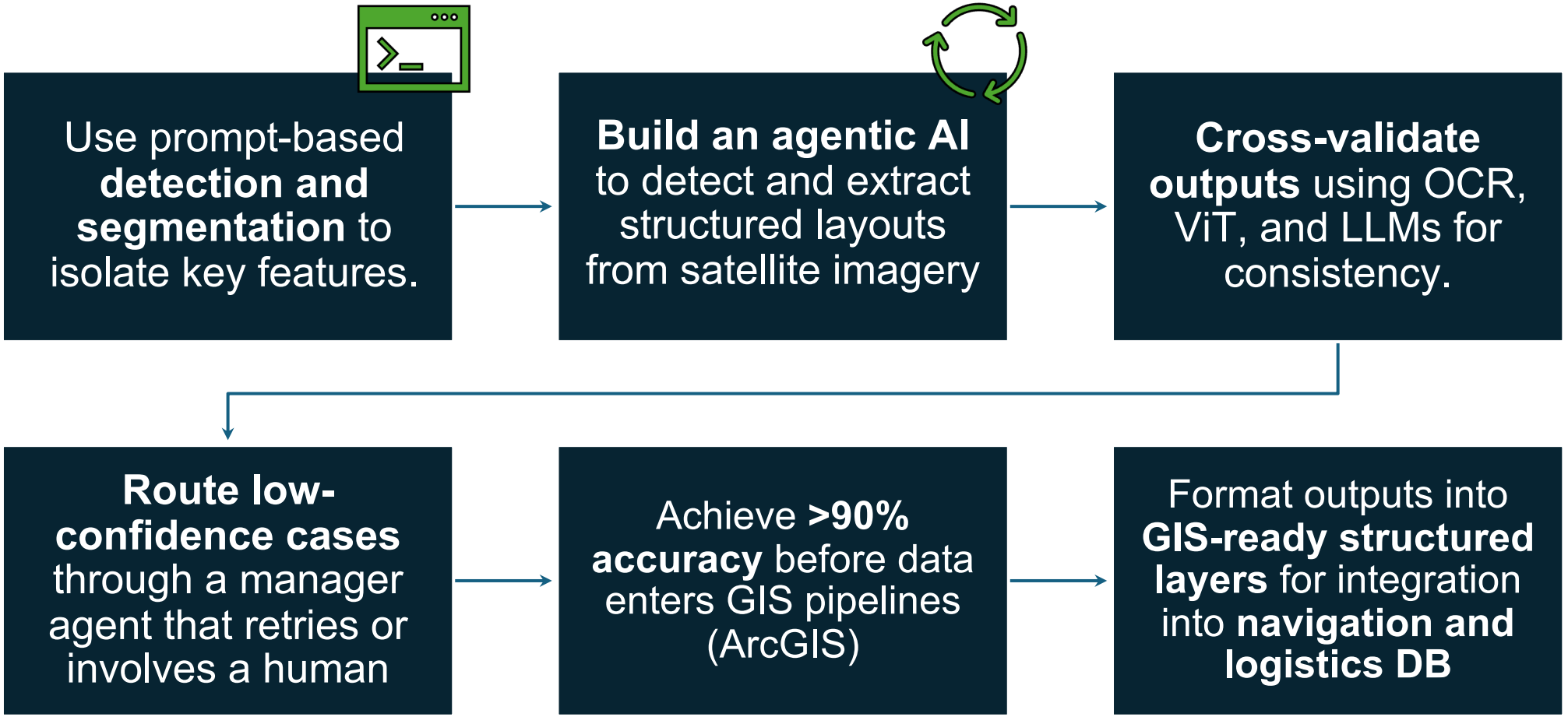


Enabling AI to interpret map diagrams with near-human accuracy



Supports maritime logistics & national safety systems

Project Scope – Goals of the Agentic AI System

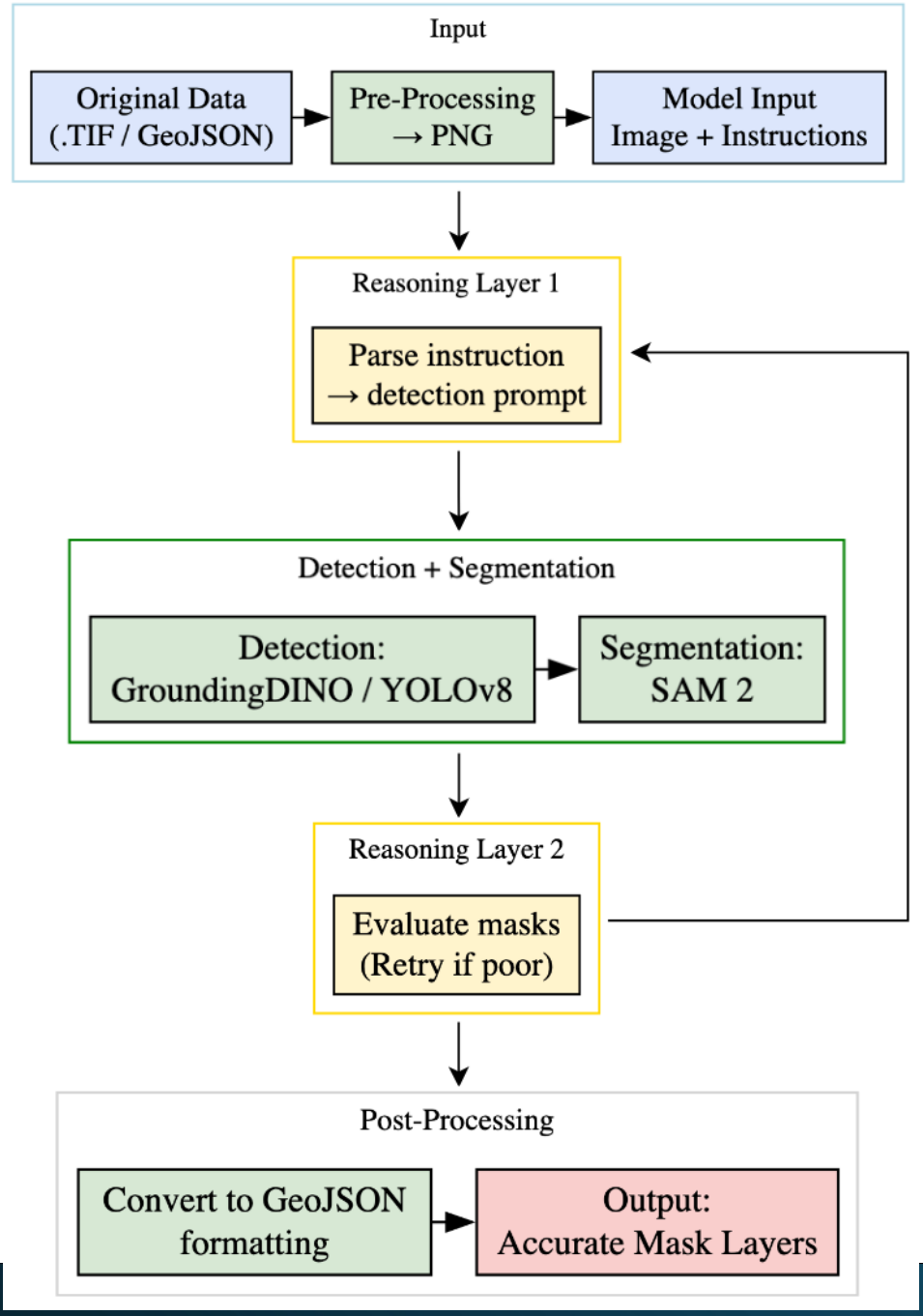


Completed – Focus Areas & Weekly Deliverables

- Set up SAM 1 and SAM 2 (Local Windows + Linux Docker).
- Ran manual box and point prompts on imagery.
- Compared segmentation quality of SAM 1 vs SAM 2
- SAM 2 box mask detail and SAM 1 broad point prompt response.
- Worked on flow for agentic Structure

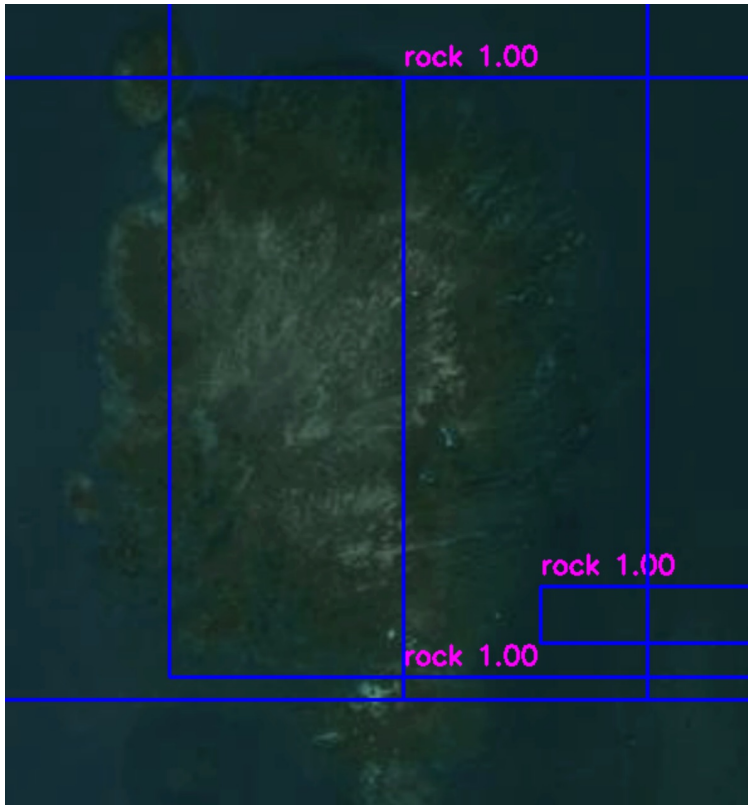
Agentic Vision Pipeline Flow

- Text instructions are parsed into prompts for detection models.
- Detectors (e.g., GroundingDINO, YOLOv8) generate bounding boxes.
- SAM 2 refines these into detailed segmentation masks.
- A reasoning layer evaluates mask quality and retries if needed.
- Final masks are formatted into GIS-compatible outputs.



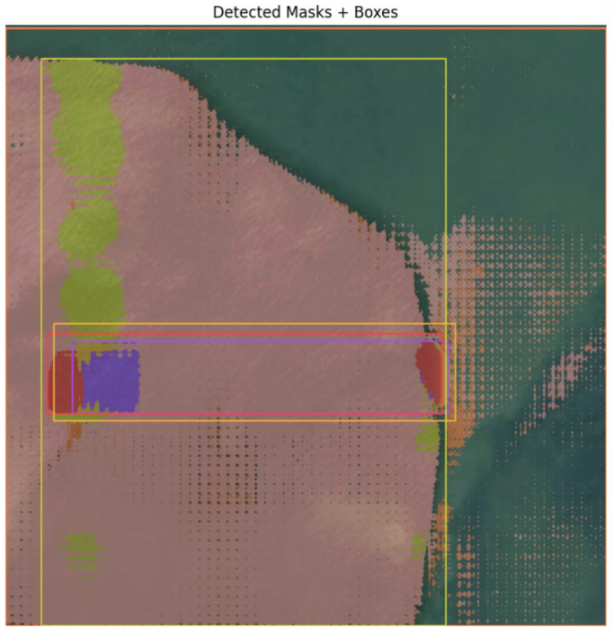
Last Week's Results



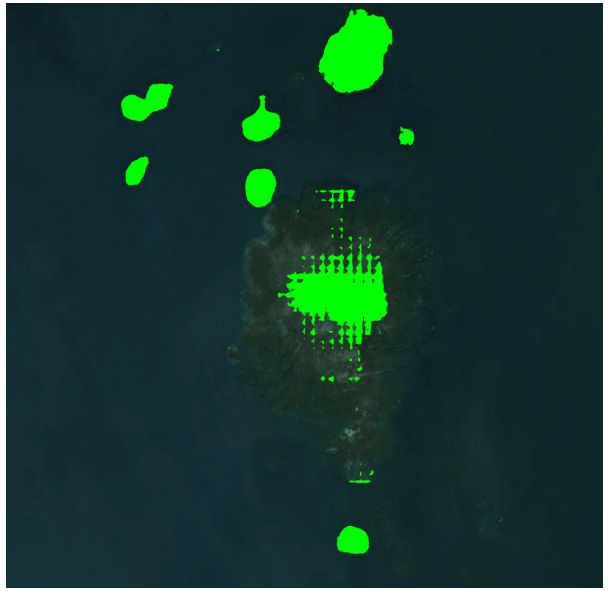




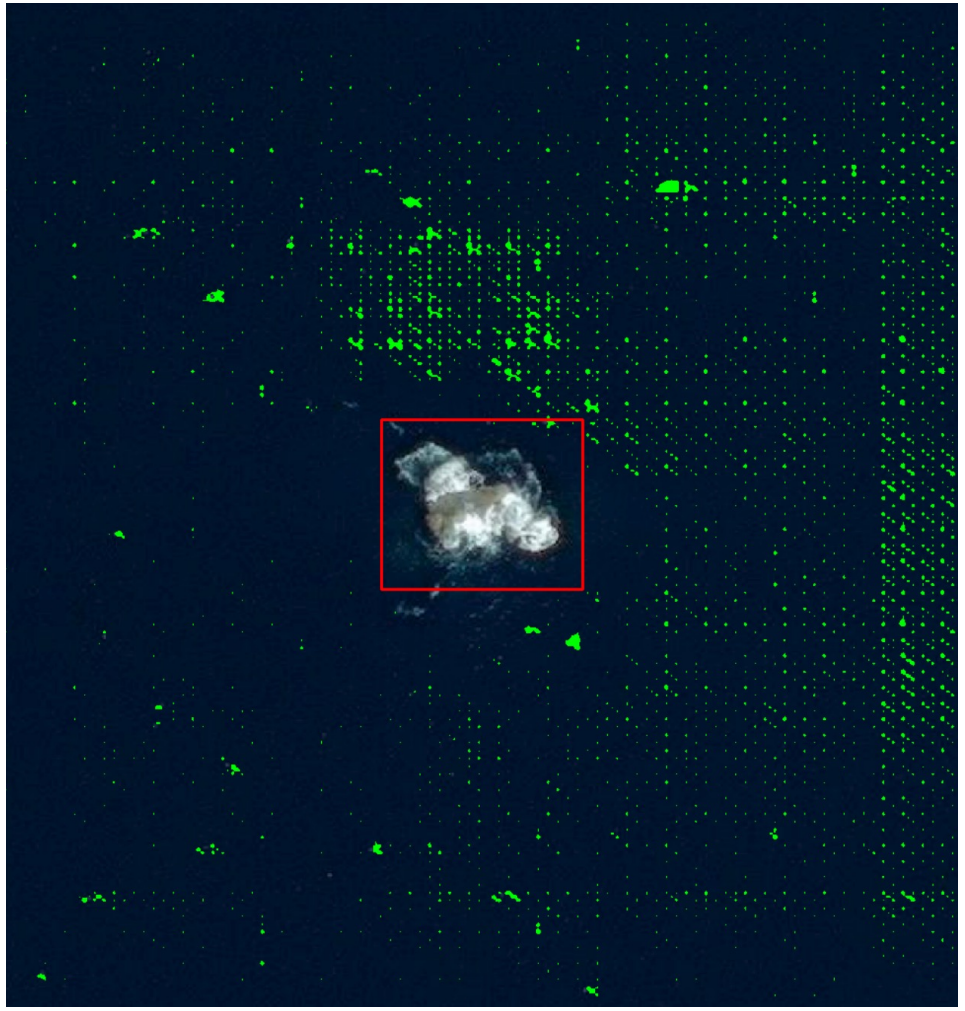








Past Results



In Progress – Results

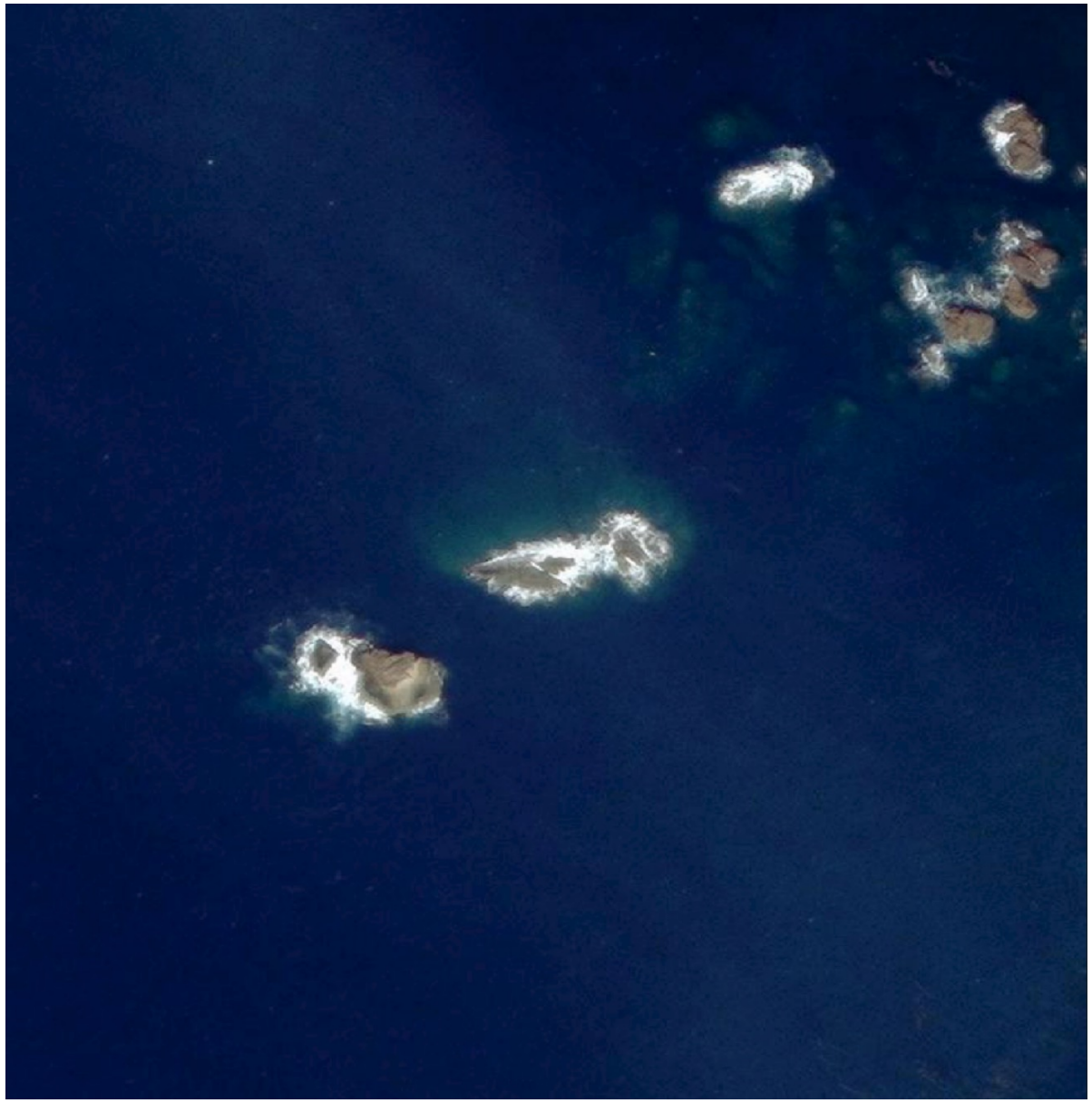
SAM 2 (Segmentation)

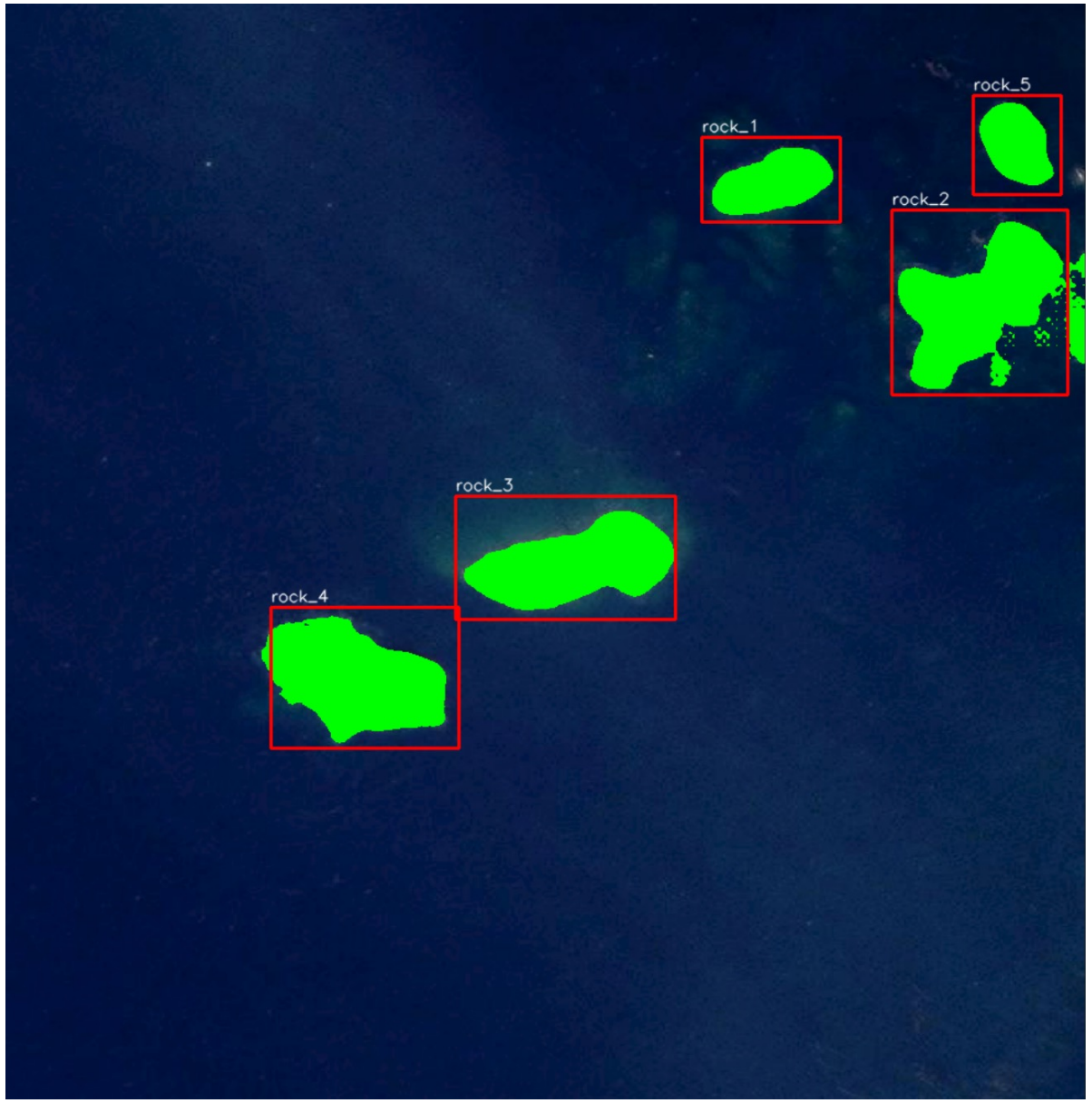
- Fully configured SAM 2 for segmentation tasks
- Used manual box prompts on prompt-defined segmentation
- Accurate multi-masking on clear images (solid contrast)
- Clear edge detail and silhouette separation

Next this week:

- Configure detection locally
- Build comparison with obscure images (land, water vehicles, etc)
- Evaluate image augmentation

Current Results





Schedule

Scheduled Start	Scheduled Finish	Actual Finish	Status	Tasks	Notes
6/2	6/2	6/2	Completed	Kickoff Meetings with Sponsor. Data Agreement.	Met with Leidos engineers to see their code and data.
6/3	6/11	6/9	Completed	Write project plan outlining agentic architecture, data flow, and risk factors for validation accuracy and ambiguity handling. Survey and select open-source CV models (Grounding-DINO, YOLO, SAM, etc).	Copy submitted to Dr Lobo
6/6	6/11	6/11	Completed	Started training on Grounded SAM 2 Model using synthetic data and real NOAA satellite inputs. Began setting up local machine's virtual environment with GroundingDINO for better boxed detection accuracy.	Model research and environment setup
6/11	6/15	6/15	Completed	Train and refine segmentation models using provided data and satellite inputs. Consider image augmentation and symbol permutation. Attend CVPR and participate in workshops/talks.	SAM 2 fully running and good starting results
6/18	6/25		To Do	Integrate detection model to generate initial boxes for SAM 2; prompts guide detection, and segmented masks refine output for downstream tasks.	
6/26	7/2		To Do	Map outputs to geolocation post-processed data suitable for input to national databases.	
7/6	7/16		To Do	Achieve standalone ViT model performance > 90% correct classification and geolocation before full system integration.	
7/17	7/21		To Do	Embed introductory cartology text into the model's reasoning context using OCR/NLP summarization or document embedding.	
7/22	7/25		To Do	Test system rigorously and document performance through metrics (accuracy, F1-score, confusion matrix).	
7/30	7/30		To Do	Final Report due by midnight	

Thank You