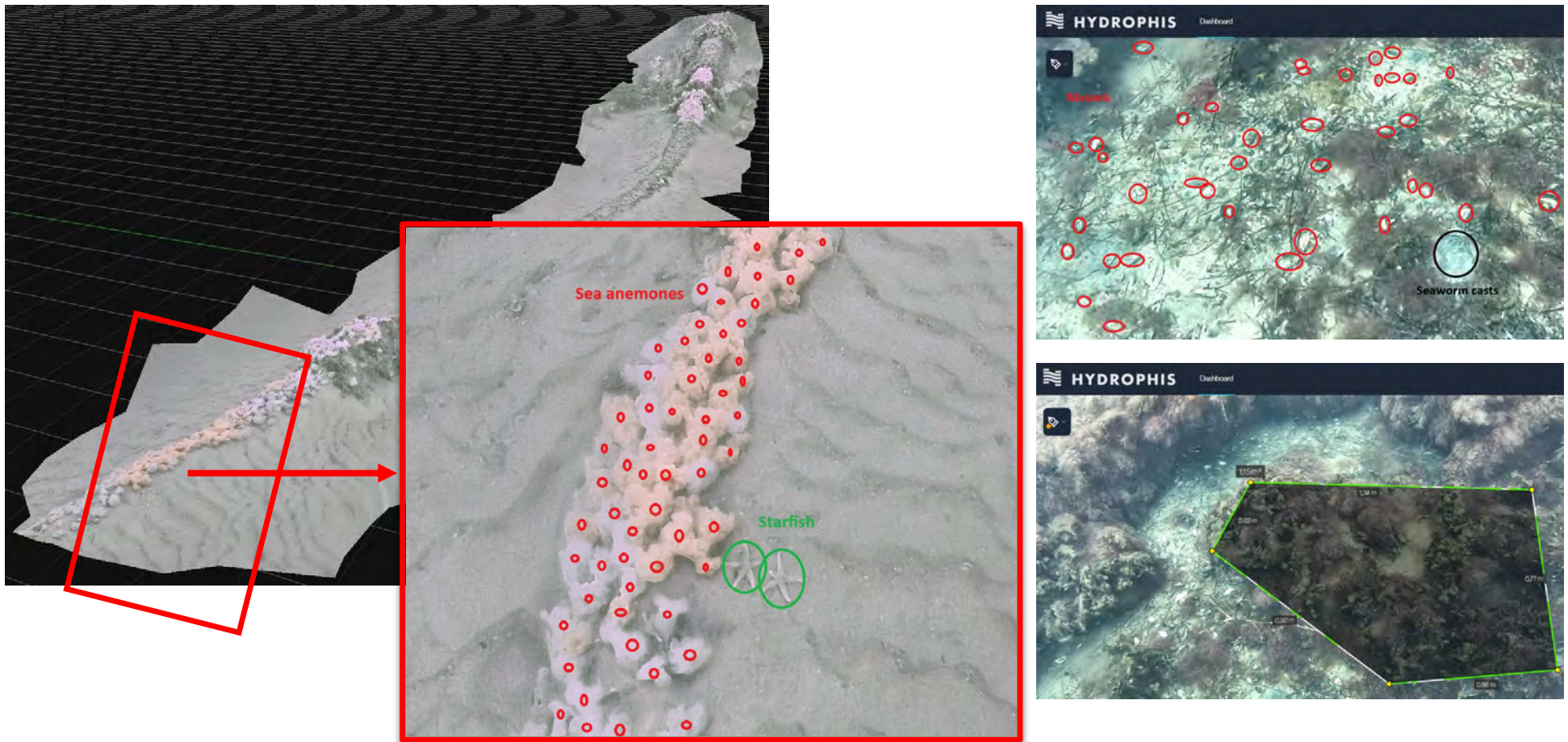


Feature recognition in 3D models of the seafloor



Project Description:

The project aims to develop and train neural network models for automated detection and classification of seafloor features within high-resolution 3D reconstructions generated using underwater photogrammetry. By leveraging 3D point clouds and mesh representations rather than traditional 2D imagery, the project seeks to demonstrate that computer vision algorithms can achieve higher accuracy and robustness in recognizing geological and biological features under challenging underwater conditions. The resulting workflow will contribute to advancing digital ocean mapping and autonomous environmental monitoring technologies.

Learning Objectives:

- Understand the principles of underwater photogrammetry and 3D model reconstruction.
- Learn to process and prepare 3D point cloud and mesh data for machine learning applications.
- Gain experience in developing and training neural networks for 3D feature detection and classification.
- Compare performance between 2D and 3D computer vision methods in underwater environments.
- Develop skills in evaluating and visualizing detection results using standard digital tools.

Competences:

- Background in computer vision, marine science, or data science.
- Familiarity with 3D modeling and photogrammetry software (e.g., Agisoft Metashape, COLMAP, MeshLab).
- Experience with machine learning frameworks (e.g., PyTorch) and 3D data processing libraries.
- Knowledge of neural network architectures for 3D data (e.g., PointNet, 3D CNNs, or graph-based models).
- Ability to work with large datasets and perform quantitative evaluations of algorithmic performance.