AI monitoring of life on the seabed

Developing automated multi-modal monitoring strategies of vulnerable marine ecosystems (VMEs)

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details:

Background and motivation

I am an interdisciplinary marine scientist working at the nexus of benthic (seabed) ecology and computer vision. How can computer science and technology best support exploration, understanding and protection of benthic communities? During my PhD I developed **machine learning** (ML) methods to automatically identify deep-sea benthic habitats in imagery. Now I am looking to improve and extend this work by developing solutions that leverage ecological knowledge.

Project description

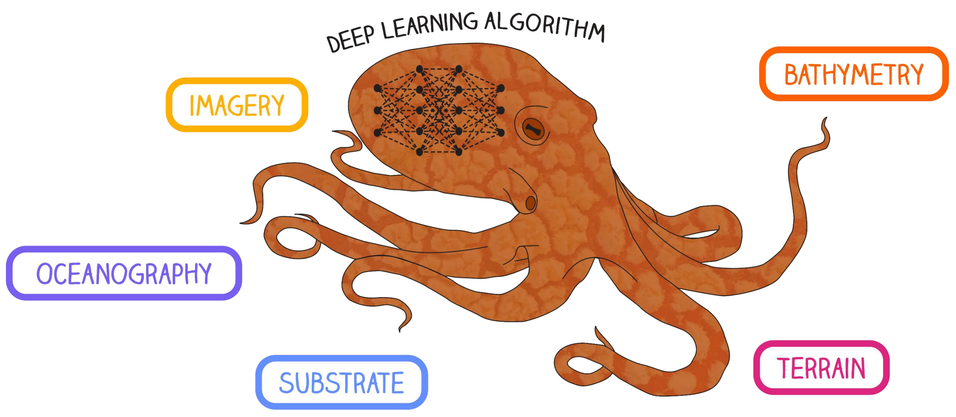
This project aims to explore and develop ML approaches that combine both **seabed images** and associated **environmental data** to improve automated monitoring of **vulnerable marine ecosystems** (VMEs) on the seabed.

Aims (and/or milestones)

- Establish baseline for VME image classification
- Explore **multimodal learning** with environmental data
- Investigate model explainability in relation to ecology
- Investigate stability and generalizability of methods

Main questions

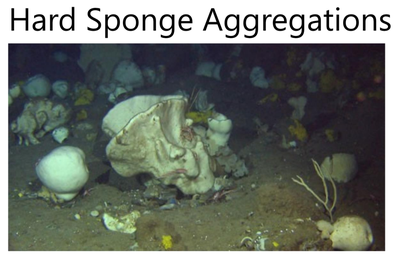
- Can identification of VMEs from imagery be improved with environmental data that drives their distributions?
- How important is the data resolution?
- Does this work well across various VMEs and imaging platforms such as Remotely Operated Vehicles (ROV) and drop-cameras?



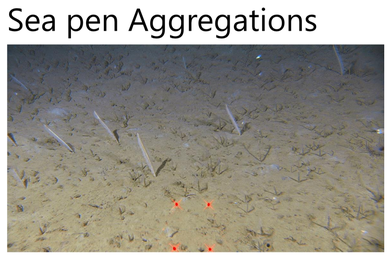
Are you running a cruise with seabed imaging?
I'd love to explore testing algorithms at sea to support your image surveys.

VME indicators:

Hard Sponge Aggregations

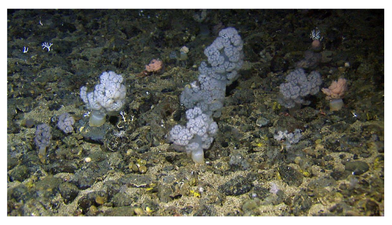


Sea pen Aggregations



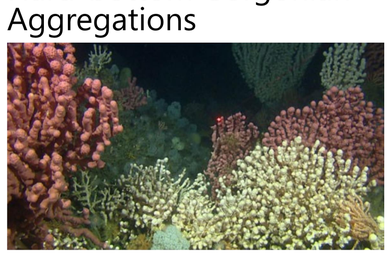
Soft Sponge Aggregations

Cauliflower Coral Fields



Coral Reefs

Hard-bottom Gorgonian Aggregations



Images from the Mareano project

Marine sustainability

Anthropogenic pressures on VMEs are increasing! It is critical that extensive and accurate maps of the seafloor are created to establish baselines and support monitoring of impacts and recovery. Developing ML approaches is essential to this endeavor, to quickly and consistently localize, quantify and describe VMEs from imagery.

Scan me

Highlighted results (and/or activities)

This project has recently started, however for some preliminary results on image classification:

Conferences:

Marine Imaging Workshop, Monterey Bay, California Oct 24.
Presented and Lead discussions on "Integrating Artificial Intelligence", "Future-proofing marine imaging" and "Effective use of citizen science".

Supervisory team

Supervisor: Pekka Parviainen, Dept. Informatics, UIB

Project partners:
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SCAN ME

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