

Drop your ideas in here. Sticky notes are fourth tab down on the toolbar to the left. We can aggregate (or not) as we go.

Integration of optics and acoustics. Solutions for dirty water.

Collecting imagery within the offshore wind energy areas

Geolocated habitat-imagery portal. Coupled to AI.

online portal for imagery storage, collaboration, processing with AI models (i.e., WildMe or similar)

Optics sampling solutions for underserved regions. Caribbean and South Pacific Territories. Tech and AI products.

To address image processing AI needs across NMFS, provide support for AI/data sci staffing (model development/maintenance, tool development, data management, etc)

Optical tools to support and augment acoustic backscatter classification

Long term deployment optical systems (still interval or triggered over weeks/months) for use with opportunistic platforms such as moorings

Low cost platforms for obtaining imagery

full implementation of VIAME as scalable, cloud- and account-based software as a service. Full VIAME functionality within CoralNet-style, account-based UI.

Development of pipelines from AUV/ROV image acquisition through to ML-assisted annotation and segmentation.

VIAME modernization and integration with explainable AI, other annotator, and image pre-processing algorithms. (See details in text box)

Optical recording systems with edge AI sufficient for target detection to reduce need to store and telemeter optical data lacking targets of interest

cross-center aerial imaging payload for PRD surveys, integrated AI & compatible with VIAME processing

Leverage existing industry development trajectories

measurement-capable , micro-scale optical systems achieving <25lb dry weight.

VIAME modernization and integration with explainable AI toolkit.

- Make VIAME better and more useful in terms of producing output ready for publication.
- Enable easy to use evaluation metrics reports and ability to "track model performance through time" (see: Prior et al. 2023).
- Enable gui to explore and edit model parameters for customization. E.g. "Each model package has a set of configurations and pipeline files available that can be modified to optimize performance. To facilitate reproduction of these methods, the following paragraphs
- describe the model nomenclature and text designations within the configuration files that can be selected or altered for different application purposes" (Prior et al. 2023).
- Enable gui to select base model architecture, e.g. "resnet" or "resnext" 50 and 101" (Prior et al. 2023).
- Generate publishable textual and visual reports of trained model architecture, parameterization and hyperparameters.
- Enable easy import of other pretrained models (from model zoos, e.g.) to use as a backbone for model training.
- Integrate the explainable AI toolkit (XAITK) and with VIAME and DIVE for users to visualize saliency maps for multi-resolution explanation of deep networks, perform Visual Question Answering (VQA), and more.
- Enable image adjustments via DIVE gui (as is demonstrated by the contrast slider).
- Enable image preprocessing (e.g. seawater color corrections using the published Sea-Thru algorithm; Akkaynak et al. 2019) via ingestion of python code snippets dropped into DIVE gui.
- Enable direct connection between (or seamless integration of) other annotation systems, e.g. Tator, with VIAME.
- Codeless customization of DIVE gui.
- Enable VIAME with an image dataset management system (e.g. for automatically splitting large sets of images into train/test, documenting and tracking image set sources with models over time; again, consider Prior et al. 2023).
- Long-term contract for VIAME support and development.
- Training programs and reassignment/LANTERN opportunities for NOAA personnel to learn, use, customize, and advance VIAME.
- Enterprise/agency level Cloud implementation of VIAME (expansion of <https://github.com/us-amlr/viame-web-noaa-gcp>, e.g)

Refs and links

Prior JH et al. (2023) Estimating precision and accuracy of automated video post-processing: A step towards implementation of AI/ML for optics-based fish sampling. Front. Mar. Sci. 10:1150651. doi: 10.3389/fmars.2023.1150651

XAITK

<https://xaitk.org>

<https://xaitk.org/capabilities/#saliency>

<https://xaitk.org/capabilities/#reinforcement-learning>

<https://xaitk.org/capabilities/SRI-sobert-vqa>

This repository provides a web interface to interact with the SOBERT VQA model which has the following features:

- Answers natural language questions about images
- Built on top of Transformer & image inpainting methods
- Explanation modalities

Akkaynak, D.; Treibitz, T. Sea-thru: A method for removing water from underwater images. In Proceedings of the 2019 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), Long Beach, CA, USA, 15–20 June 2019; pp. 1682–1691.

Tator

<https://www.tator.io/docs/user-guide/annotation>

<https://github.com/cvionai/tator>

Fantastic ideas so far! Lets keep it rolling.

Satellite imagery (& tag sensing) to track whales (and id spp. and indiv. by shape, markings, behaviors) and report their locations and tracks to vessels at sea to reduce strike risk.

Link the satellite imagery for whale tracking to passive acoustics data from constantly deployed UxS systems with onboard processing for automated detections and id.

Development of AI models to detect/identify events (rather than objects) in underwater video from animal-borne sensors. Applicable to multiple science centers.

well developed methods for benthic photogrammetry including AUV/ROV assets, full segmentation classifiers on edge, data portals, links to repeat imaging

Solutions for optical data storage and serving of images both internally and externally.

Thermal imaging units (<https://www.flir.com/products/m400/?vertical=maritime&segment=solutions>) on shipboard platforms to collect bird (predator) observation

IFCBs on all NOAA ships with trained survey techs to support them and data Pipelines for near real time processing of image libraries.

Raman Imaging Systems on UxS and moorings, for particle imaging and plankton classification, flow cytometry, and Raman spectroscopy

High ground resolution imagers (sub mm), capable of scaling without ground control points (e.g. stereo imaging, acoustic/optical integration, etc)

integration of Sub meter to cm-scale geolocation of imagery. Particularly important for automated repeat imaging

Shipboard particle size distribution for satellite calibration

AOPs (apparent optical properties) including remote sensing reflectances via radiometers for satellite validation

Optical plankton recorders with accompanying AI image recognition data pipeline on AUVs, gliders, and shipboard platforms

360 Stereo Drop Cams, capable of high-resolution video, coupled with automated, regionally specific classifiers for fish survey

UxS-based particle size distributions for satellite calibrations. Gliders with holographic imaging systems (already commercially available).

Along track IOP (inherent optical properties) inc absorption, attenuation for phyto comm comp algorithms and particulate organic carbon algorithms

**Can streamline Aug 1
Big Picture With
themes: Image/Optics
Acquisition, Image
Processing, Image
Annotation/classificati
on/segmentation,
Transformative
Feedback**

Remote/stationary
cameras with
satellite link for
animal and habitat
tracking

AOC platform
instrumentation:
Precision altitude
INS/IMU systems for
integration or
datalogged. Platform
data collection system
with documented API
and message format

critter cam - just
another housing for
habcam/glider cams
- need \$100k for
kitware event
detection model
development

