Ocean Exploration Video Challenge

The MATE ROV Competition is excited to partner with NOAA Ocean Exploration again this year to offer up this challenge to students from around the world!

NOAA Ocean Exploration Background

NOAA Ocean Exploration is dedicated to exploring the unknown ocean, unlocking its potential through scientific discovery, technological advancements, partnerships, and data delivery. We lead national efforts to fill gaps in our basic understanding of the marine environment, providing critical ocean data, information, and awareness needed to strengthen the economy, health, and security of the United States and the world. Through live video streams, online expedition coverage, training opportunities, and education and outreach programming, we enable scientists, resource managers, students, educators, members of the general public, and others to actively experience ocean exploration, broadening scientific participation, cultivating the next generation of ocean explorers, and engaging the public in exploration activities.

The data and information collected during expeditions and research supported by NOAA Ocean Exploration are publicly available, aiding stakeholders in identifying, understanding, and managing ocean resources for today and the future.

Data collection typically includes oceanographic and geophysical parameters, video, images, and other information, provided in various data formats. After missions, the office develops data products to disseminate expedition information to a wide audience.

Experts across ocean science disciplines participate in NOAA Ocean Exploration expeditions from around the world, annotating video from a remotely operated vehicle (ROV) in real time or via recordings. Many of the organisms seen during these expeditions are being observed in their natural habitat for the first time and may be completely new to science!

Video Challenge

Problem: The traditional process of annotating organisms in ROV dive video is time-consuming, often requiring extensive human involvement. The 2024 challenge aims to streamline this process by focusing on the annotation of a single class of organism. This challenge will test the ability of participants to develop an Artificial Intelligence (AI) model that can continuously track and annotate a specific organism throughout the video, maintaining an accurate bounding box for the entire duration the organism is visible.

Task: Participants are to develop an AI model capable of continuously tracking the spatial extent of the primary organism class in the video (in this case brittle stars). The source footage for this challenge will be a continuous tracking shot of the ocean floor, captured by cameras on an ROV submersible.

NOAA Ocean Exploration Challenge Video Clips: Participants will work with footage from a single continuous tracking shot of the ocean floor, captured by cameras on an ROV submersible. This footage provides a dynamic and challenging environment for the task of persistent organism tracking.
Link to Footage

Training Data: In the initial stages of model development, scientists frequently face the challenge of determining the appropriate composition of the training dataset. The dilemma lies in choosing between incorporating an extensive and diverse dataset with the expectation of efficient utilization by the model, or focusing on a dataset tailored specifically to the intended application of the model, thereby excluding potentially extraneous information. In other words, do you only train your model on data that is very similar to what the model is intended for, or do you include as much data as possible even if it is not seemingly relevant to the task. A resource for potential training data is available at Fathomnet.

Registration

Participants wishing to take part in the 2024 Ocean Exploration Video Challenge may register at 2024 MATE/NOAA Ocean Exploration Computer Coding Challenge Registration.

Submission Requirements

Teams undertaking the Ocean Exploration Video Challenge will have 14+ weeks to create and submit their program, providing an explanation of the program including user documentation, the resulting spreadsheet, and a video with bounding boxes. The program, explanation, spreadsheet, and video must be submitted here: 2024 MATE/NOAA Ocean Exploration Computer Coding Challenge Document Submission **no later than 11:59 PM, Hawaii time, August 25th, 2024.**

Expectations for submissions:
- The following naming convention should be used for your submissions: School or organization name_company name_ document type, 2024, where document type is either the program, model, explanation, or spreadsheet.
- Students' models will be tested on a set of video clips with the same underlying data distribution as these example clip.
- The spreadsheet must be submitted using the following .XLS template: 2024 Ocean Exploration Video Challenge Spreadsheet Template.
- The program explanation should include a user guide along with the explanation.
- The submitted video is expected to have annotations applied (bounding boxes/labels) and should be uploaded to YouTube or Vimeo with a link provided to that video.
- Code for model training must be documented and include a license/royalty free copy for use and evaluation by NOAA. Training code can be structured however contestants see fit, but should be well commented according to the PEP 8 standard.
- Model should be submitted as either .pt, .pth, TF2.x, or HDF5. If a different model format is used, instructions will need to be provided on how to apply the model to a video.
- Students may make use of pretrained models which they fine-tune, or train their models from scratch.
- Submissions will be reviewed and scored by an expert team from the MATE ROV competition and NOAA Ocean Exploration.

Announcement of Winners

The winning student teams will be announced in September. Overall scores and the top three teams in the competition will be posted on the MATE ROV Competition website. The winning team will receive prizes as well as a travel stipend to attend and present at the 2024 Underwater Intervention conference in New Orleans, LA, USA.