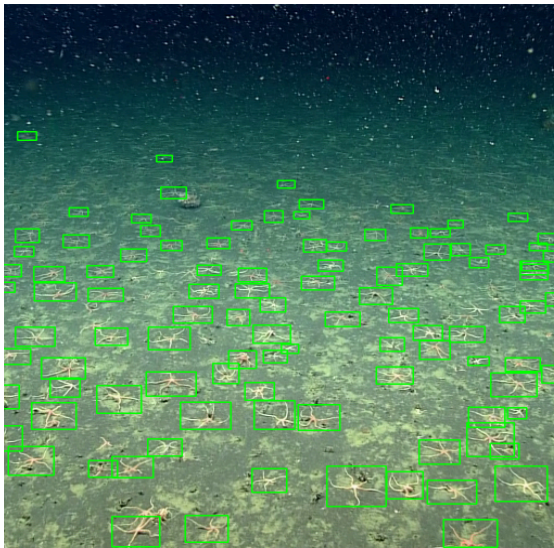# Sunk Robotics

Medford, MA - USA 02155

# 2024 - OER Competition

August 25, 2024

## How the model works

The You Only Look Once (YOLO) neural network infrastructure for Python was utilized in the AI annotation of brittle stars. The use of this technology has many benefits, making it ideal for everyone. Due to YOLO's easy customizability and strength in speed and performance tasks makes it ideal for custom identification operations like this.



### Training the model

The training of the custom YOLO model required only 3 annotated images of brittle stars. With this minimal information, the model was successfully able to identify 200 (+- 10) brittle stars per frame of the seafloor video when in use.

### Using the model

The model can be used with a simple Python script designed to draw bounding-boxes around the input image/ video feed. Similarly, bounding-box data can easily be saved in CSV format, a universal scheme supported on various platforms and systems creating a very universal system. The marked-up video feed can also be displayed on-screen to show to the end user.

### Model interface

Along with the adjustable variables within the code that can be modified according to the local filesystem, the interface supports a command-line interface (CLI) making it suitable for various operating systems and environments. To run the program, simply run:

```
program [input_video_path] [model_path] [annotated_video_path]
```

`input_video_path` is the path of the video to be processed, `model_path` is the path of the model, while `annotated_video_path` is the destination for the annotated video. Make sure you have Python 3.12, the latest version of OpenCV, and the latest version of ultralytics installed. The program will NOT run if you do not have these installed. For maximum accuracy and performance, make sure that the video to be processed is in mp4 format and is in 1080p resolution.