The process of training an object detection model using the MMDetection framework to detect different types of marine species in an aquarium, using Aquarium Dataset. The first step is downloading the Aquarium dataset.

For model selection, we chose Faster R-CNN from the MMDetection model zoo due to its effectiveness in detecting complex objects in cluttered environments, which aligns with the characteristics of our dataset containing various species. Then we modified the configuration file for Faster R-CNN to accommodate our dataset. Key changes included adjusting the number of classes based on the species present in the dataset, updating dataset paths for training, validation, and testing phases, and setting training parameters such as learning rate and batch size to optimize performance. The training process was conducted using MMDetection’s training script, where we documented a training duration of several hours and encountered challenges such as overfitting. These were addressed through early stopping and monitoring validation metrics. Model performance was evaluated using mean Average Precision(MAP) on a validation set, revealing satisfactory results that indicated effective learning.

To enhance model performance further, we proposed strategies such as data augmentation techniques (e.g., rotation and flipping) and hyperparameter tuning. We implemented data augmentation and observed improvements in MAP compared to the initial model performance. Finally, we ran inference on a set of test images using the trained model, visualizing results by overlaying bounding boxes on detected species. This model has potential applications in marine biology and aquarium management, such as monitoring biodiversity and aiding research efforts.