



FishDetector-R1:

Unified MLLM Framework with Reinforcement Fine-tuning for Weakly Supervised Fish Detection, Segmentation and Counting

Stage 1: Detect-to-Count

Text Prompt

identify all fish in this image

bbox_2d

keypoints

count



Multimodal LLM

Qwen2.5-VL

output token

<think>
</think>

<detection>
{"bbox_2d":..., "point_2d":...}
</detection>

<fish_count>
2
</fish_count>

RL Fine-tune

GRPO

advantage

A1 A2 ... AG

Reward Function

O1 O2 ... OG
rollout

Reward Design

+think>...</think> Rformat
<detection>...</detection>
<fish_count>...</fish_count>

point label



Rdetect

count number



Rcount

Stage 2: Segmentation



SAM 2
Meta

