

# Parameters tuning for fish tracking

## *Parameters*

Parameter	Meaning
max_cosine_distance	Threshold to determine the objects' similarity by ReID. The higher the value, the easier it is to assume it is the same object
nn_budget	a value that indicates how many previous frames of feature vectors should be retained for distance calculation for each track.
max_age	Maximal allowed age for a track (A_max parameter in deepSORT paper)
max_iou_dist	maximal IOU distance between bounding boxes
n_init	Number o consecutive detections to open a tracker

Verified detections – apply function that reject detections which are on the boundary or outside the ROI.

The model used for the detection algorithm are summarized in the following table:

Name	Details
model3_ROI_Mar1_2023.tflite	Model for new video with ROI, trained on 40 images over 10000 epochs
model5_ROI_Mar2_2023.tflite	Model for new video with ROI, trained on 40 images over 9000 epochs
model6_ROI_Mar2_2023.tflite	Model for new video with ROI, trained on 40 images over 15000 epochs
model7_ROI.tflite	Model for new video with ROI, trained on 40 images of clean container, over 9000 epochs

## Results

Directory with annotations: fish\_second\_from\_right

Model: model3\_ROI\_Mar1\_2023.tflite

max_cosine_distance	nn_budget	max_age	max_iou_dist	n_init	Number of trackers	Coverage for annotated track (thd=50 pixels)
0.4	None	12	0.5	4	174	241/816
0.4	None	12	0.5	3	267	282/816
0.9	None	12	0.5	3	264	293/816
0.9	1	12	0.5	3	266	293/816
	None		0.1			No detections
0.9	None	12	0.8	3	299	307/816
0.9	None	12	0.8	6	122	186/816

Model: model5\_ROI\_Mar2\_2023.tflite (40 images, 9000 iterations)

max_cosine_distance	nn_budget	max_age	max_iou_dist	n_init	Number of trackers	Coverage for annotated track (thd=50 pixels)
0.9	None	12	0.8	3	272	483/816
0.9	None	24	0.8	3	too-many irrelevant trackers	576/816
0.9	None	24	0.8	3	201	514/816 (63%)
0.9	None	24	0.8	3	164	526/816 (64%), verified detections

Model: model6\_ROI\_Mar2\_2023.tflite (40 images, 15000 iterations)

max_cosine_distance	nn_budget	max_age	max_iou_dist	n_init	Number of trackers	Coverage for annotated track (thd=50 pixels)
0.9	None	24	0.8	3	167	515/816 (63%) verified detections

## ***Test specific configurations on all annotations***

In this section we test a specific configuration on annotations of all fish that present in:  
.\data\video\VIDEO\_20230223\_133606599\_annotation

### Configuration details

max\_cosine\_distance: 0.9

nn\_budget: None

max\_age: 24

max\_iou\_dist: 0.8

n\_init: 3

verified detections

Network name: model5\_ROI\_Mar2\_2023.tflite (40 images, 9000 iterations)

	<b>Annotation directory</b>	<b>Relative Coverage for annotated track (thd=50 pixels)</b>
1	fish_bottom_right	0.38
2	fish_first_from_right	0.43
3	fish_first_left	0.37
4	fish_second_from_left	0.43
5	fish_second_from_right	0.51
6	fish_third_from_right	0.28

**Total number of tracks: 164**

**Probability of detection: 0.4**

**Probability of false alarm: 0.15**

### Configuration details

max\_cosine\_distance: 0.9

nn\_budget: None

max\_age: 24

max\_iou\_dist: 0.8

n\_init: 3

verified detections

Network name: model6\_ROI\_Mar2\_2023.tflite (40 images, 15000 iterations)

	<b>Annotation directory</b>	<b>Relative coverage for annotated track (thd=50 pixels)</b>
1	fish_bottom_right	0.39
2	fish_first_from_right	0.43
3	fish_first_left	0.38
4	fish_second_from_left	0.44
5	fish_second_from_right	0.53
6	fish_third_from_right	0.29

**Total number of tracks: 167**

**Probability of detection: 0.41**

**Probability of false alarm: 0.15**