

A New Application for Automated Video Identification of Marine Species (AVIMS)

Scottish Government Marine Directorate

Scottish Marine and Freshwater Science Vol 14 No 7

M. Mackiewicz, G. French and M. Fisher

Annex 2 – AVIMS Tutorial Slides



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A New Application For Automated Video Identification Of Marine Species (AVIMS)

Annex 2 – AVIMS Tutorial Slides

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Abstract

In the course of its environmental monitoring activities, the Scottish Government's Marine Directorate collects a large amount of underwater video to, for example, obtain information on the numbers of fish in rivers or on species living on the seabed. Manual analysis of this footage is laborious and costly, but Machine Learning algorithms can now be used to automate such image analysis. The Marine Directorate commissioned the University of East Anglia to develop a web-based application to allow staff to create, train and execute machine learning-based (semi-)automated analysis of video footage without a need to interact with the underlying computer code. The application was tested using three diverse sets of video footage and found to be usable by staff without computer science or coding experience. The tool was able to detect and count sea pens in footage from towed underwater vehicles, salmon smolts at sea in underwater footage from towed fishing gear and adult salmon and sea trout in footage from underwater or overhead cameras at fixed locations on rivers. Improving the accuracy of the models at detecting and counting organisms of interest will require the use of larger annotated datasets in further training of the algorithms, but the current application provides a basis for further developing these.

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Abbreviations

AVIMS	Automated Video Identification of Marine Species
CNN	Convolutud Neural Network
GPU	Graphics Processing Unit
GUI	Graphical User Interface
mAP	Mean Average Precision
OS	Operating System

AVIMS tutorial

Geoff French

University of East Anglia

September 2021

Overview

Overview

- AVIMS
- Machine learning intro
- Using AVIMS
 - Step 1a: Upload footage
 - Step 1b: Select frames for annotation
 - Step 2: Labelling schema: what objects/creates are we interested in?
 - Step 3: Annotate objects in training images
 - Step 4: Build a training dataset
 - Step 5: Train an object detection model
 - Step 6: Analyse videos
 - Circular work-flow

AVIMS

AVIMS

- AVIMS is an automated video analysis tool for detecting and counting various creatures or objects of interest in videos

AVIMS

- Detect then track
 - A creature or object of interest is detected in a video frame
 - If it is detected in a nearby location in subsequent frames it can be tracked
 - Tracking objects across frames supports quantification
 - The objects can be classified, e.g. by species, etc.



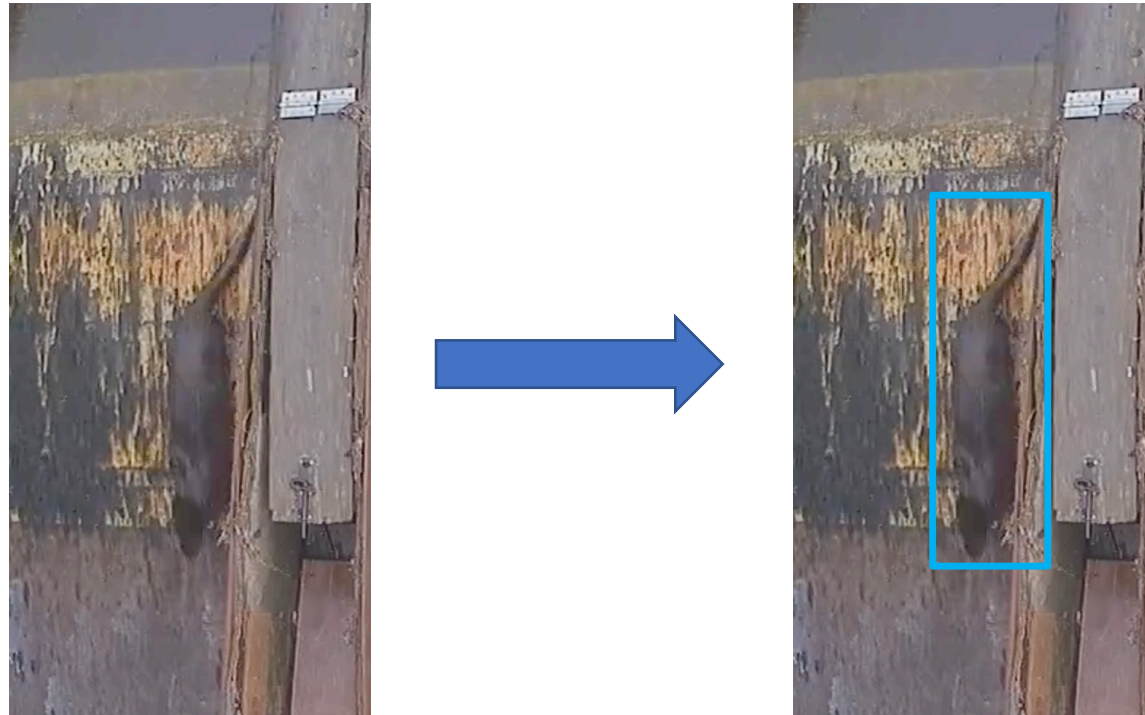
AVIMS

- AVIMS uses machine learning
- This requires the user (you 😊) to manually annotate images, identifying objects of interest so that the system can be taught what to look for
- Once trained, the system can be let loose on videos you want analysed

Machine learning intro

Machine learning intro

- A machine learning *model* is trained so that given *input* samples, it will predict correct *outputs*



Training an ML model

- Construct a dataset consisting of:
 - Input samples
 - Manually prepared ground truths; one for each input
- These are handed to the training software that trains the model to predict the outputs given the inputs
- Then we set the model loose on samples, e.g. images/video that we want analyzed!
 - Well, that's the theory anyway...

Machine learning – generalization

- Generalization refers to the ability of the model to generate correct predictions given input samples it hasn't seen before
- Machine learning models often *overfit* their training data
 - They often generate very good predictions for samples in the training set
 - Performance on as-of-yet unseen samples is usually lower
 - It would be advantageous to know how well our model will perform on unseen samples...

Machine learning – train/test split

- We take a dataset of samples with corresponding ground truths and split it into a *training set* and *test set*
- The model is trained using the *training set*
- The samples in the *test set* are held out
- After training, the performance of the model is measured using the *test set*
- In theory, this should give you an idea of how well it will perform in practice...

Machine learning – train/test split

- In practice, how well *test set* accuracy matches the accuracy obtained in the real world depends on how the *test set* was chosen!
- You need to ensure that the distribution of the samples in the *test set* matches that of the samples the model will be applied to in practice
- If the samples in the *test set* are too similar to those in the *training set* we will get a poor estimate of performance

Machine learning – train/test split

- How should we split our data? It depends on the use case.
- We will discuss three options
 - Split by site / camera
 - E.g. use site A, B, C, D, E, F for training, G & H for test
 - Split by video
 - E.g. use videos (all from the same camera) 1, 2, 3, 4 for training, 5 & 6 for test
 - Split by image/frame
 - E.g. select frames from within a video and randomly split between train and test

Machine learning – train/test split – split by camera

TRAIN



All images are from different cameras

TEST



Machine learning – train/test split – split by camera

- Measures the ability of the model to generalize to new sites/viewpoints
 - Probably what is wanted in many cases where you want to conduct surveys at new sites and use a model you trained earlier
- Very challenging from the perspective of the model!
- The training set will need to have images from a number of different cameras/viewpoints in order to have sufficient variety so that the viewpoints in the test set have training samples that are similar enough

Machine learning – train/test split – split by video

TRAIN



All images are from the same camera, but from different videos

TEST



Machine learning – train/test split – split by video

- Less challenging as the model does not have to generalize to new viewpoints
- Sometimes you only have one camera or differentiating between cameras doesn't make sense, e.g. when the camera is moving in an ocean floor survey
- If you can't get enough sites/cameras to get good enough performance, try annotating some frames from videos that are getting poor results

Machine learning – train/test split – split by frame/image

TRAIN



All images are from the same video, but from different but close-by frames

TEST



Machine learning – train/test split – split by frame/image

- Least challenging
 - Model performance will be good on close-by or similar frames, but poor on different videos or frames with different content, so watch out!
- If you have 1 long video and you want to annotate say 40 frames and have the model automatically analyse the rest

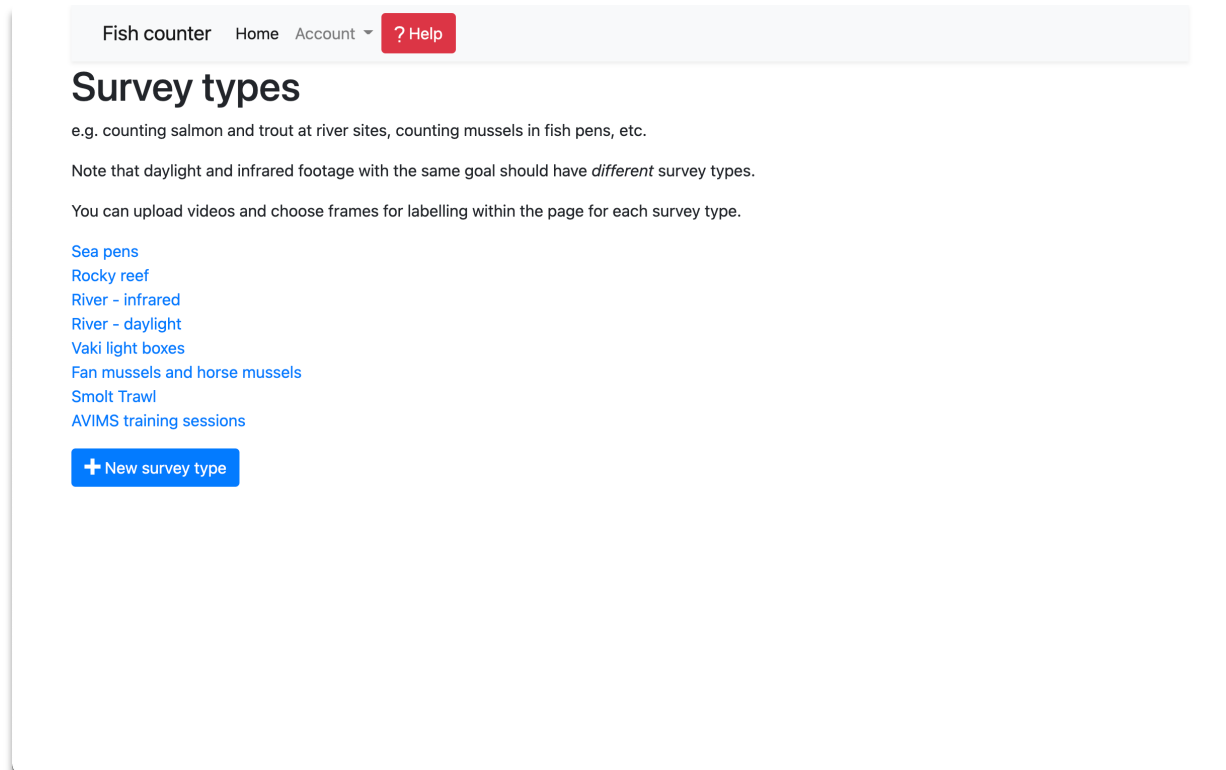
Machine learning – cyclic workflow

- In practice, we would:
 1. Select samples for our dataset
 2. Manually annotate them
 3. Split into train/test
 4. Train a model
 5. Evaluate its performance on novel samples/images/frames/videos/etc.
 6. If there are frames on which the model performs unacceptably poorly
 - a. Add them to the dataset
 - b. Go back to step 2 and manually annotate them and repeat the cycle until performance is good enough

Using AVIMS

Choose your survey type

- After logging in you need to choose the survey type you want to work on:



The screenshot shows a web application interface for managing survey types. At the top, there is a navigation bar with links for 'Fish counter', 'Home', 'Account', and a red 'Help' button. Below the navigation bar, the main heading is 'Survey types'. Underneath the heading, there is a brief description: 'e.g. counting salmon and trout at river sites, counting mussels in fish pens, etc.' followed by a note: 'Note that daylight and infrared footage with the same goal should have *different* survey types.' and a statement: 'You can upload videos and choose frames for labelling within the page for each survey type.' Below this text is a list of survey types: 'Sea pens', 'Rocky reef', 'River - infrared', 'River - daylight', 'Vaki light boxes', 'Fan mussels and horse mussels', 'Smolt Trawl', and 'AVIMS training sessions'. At the bottom of the list is a blue button with a plus sign and the text '+ New survey type'.

Choose your survey type

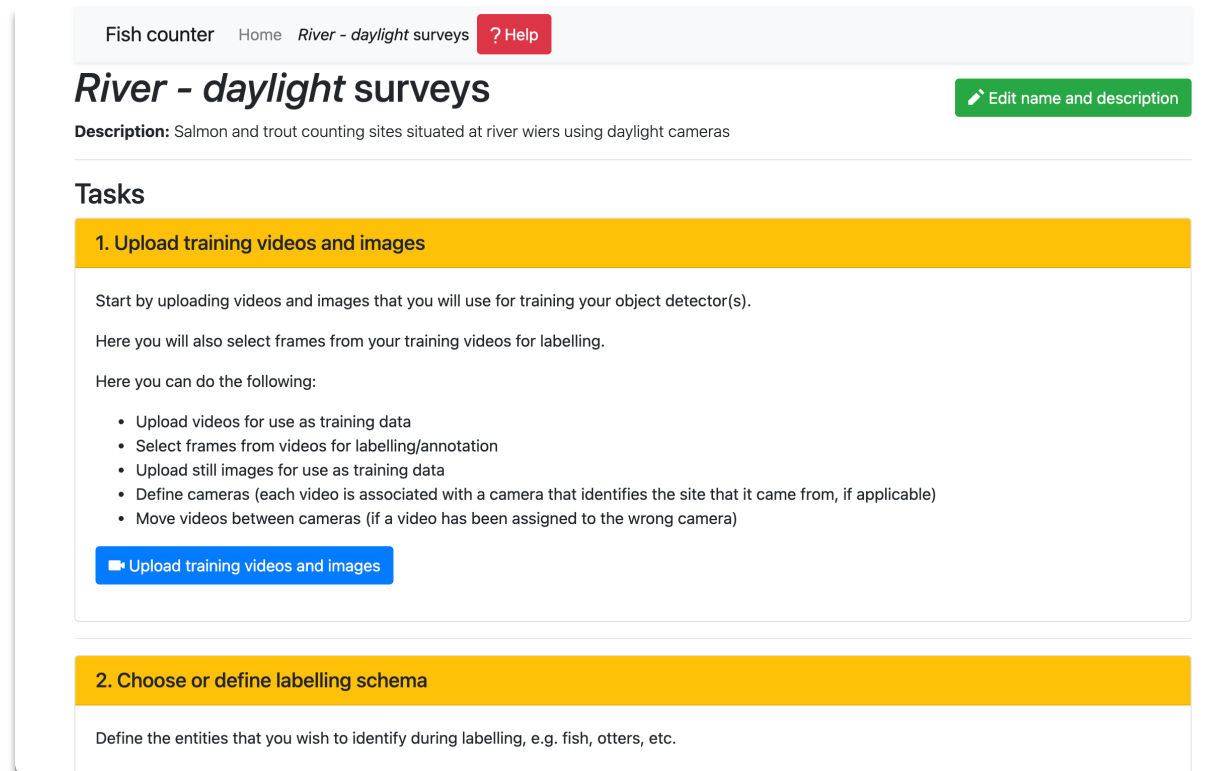
- A survey type:
 - Focuses on detecting a particular range of species or creatures of interest in common conditions/types of location
 - E.g. 'counting salmon and otters at river weir sites' should have a different survey type from the one used to 'count sea pens in underwater footage'
 - Contains footage with a common 'appearance', separating daylight from night-time infrared, underwater from above water
 - E.g. while sharing the common goal of counting salmon and otters at river weir sites, put the daylight and night-time infrared footage in different survey types
 - If we had underwater cameras at river weir sites too, they should go in a different survey type

Choose your survey type

- When to create a new survey type:
 - Create a new survey type when there isn't one that shares the same goals or the footage has a very different appearance than one of the existing ones.
 - Don't create different survey types for e.g. different years. Split this by different 'cameras' (more on this later)
- Why?
 - All of the data associated with a survey type will be used to train an object detection machine learning (ML) model. Best performance will be obtained by having this model focus on a specific problem and type of *visual appearance*, so group footage by these criteria

Choose your survey type

- After choosing or creating a survey type you should see this:



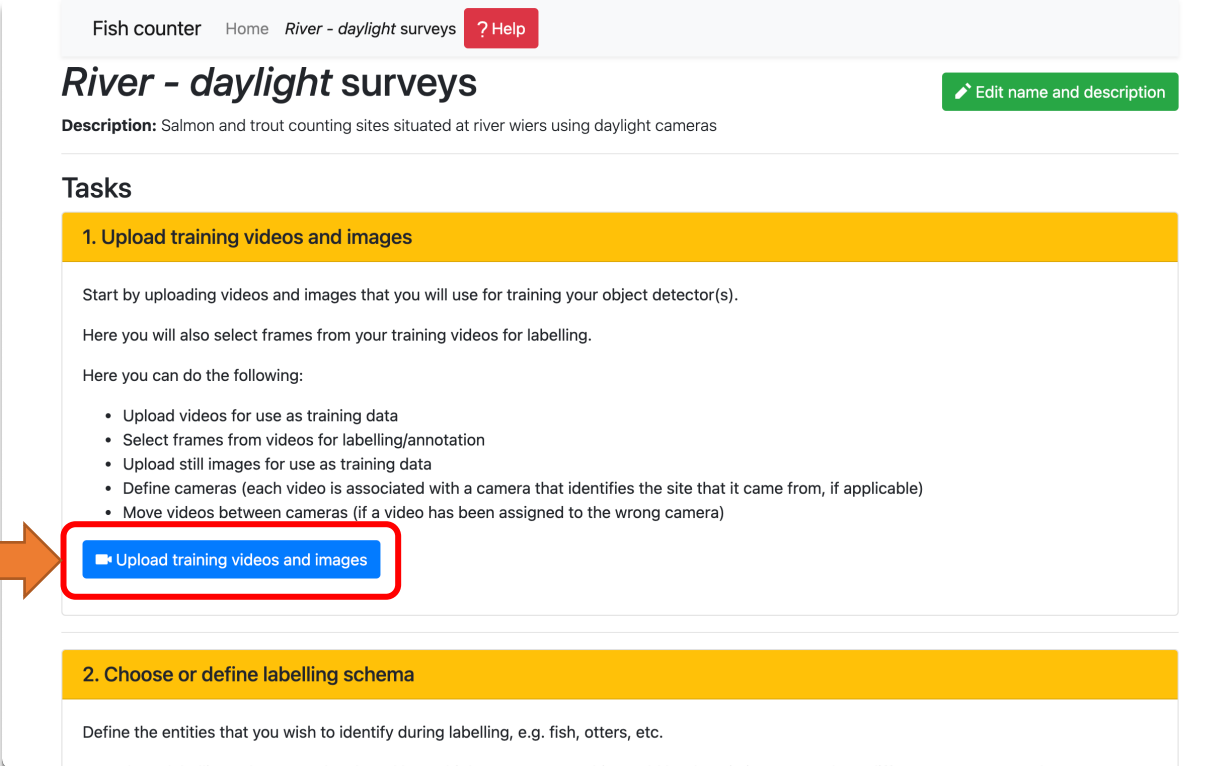
The screenshot shows a web interface for managing a survey. At the top, there is a navigation bar with links for 'Fish counter', 'Home', 'River - daylight surveys', and a red 'Help' button. Below the navigation bar, the title 'River - daylight surveys' is displayed in a large, bold font, with a green 'Edit name and description' button to its right. A description follows: 'Description: Salmon and trout counting sites situated at river wiers using daylight cameras'. The main content area is titled 'Tasks' and contains two numbered steps. Step 1, '1. Upload training videos and images', is highlighted with a yellow background. It includes instructions to upload videos and images for training an object detector, select frames for labelling, and a list of actions: 'Upload videos for use as training data', 'Select frames from videos for labelling/annotation', 'Upload still images for use as training data', 'Define cameras (each video is associated with a camera that identifies the site that it came from, if applicable)', and 'Move videos between cameras (if a video has been assigned to the wrong camera)'. A blue button labeled 'Upload training videos and images' is positioned below the list. Step 2, '2. Choose or define labelling schema', is also highlighted with a yellow background and includes the instruction to 'Define the entities that you wish to identify during labelling, e.g. fish, otters, etc.'.

Using AVIMS

1.a. Upload footage

1.a. Upload footage

- You need to upload some footage that will be used to train the ML model. From the survey type home, click:



Fish counter Home River - daylight surveys ? Help

River - daylight surveys

[Edit name and description](#)

Description: Salmon and trout counting sites situated at river wiers using daylight cameras

Tasks

1. Upload training videos and images

Start by uploading videos and images that you will use for training your object detector(s).

Here you will also select frames from your training videos for labelling.

Here you can do the following:

- Upload videos for use as training data
- Select frames from videos for labelling/annotation
- Upload still images for use as training data
- Define cameras (each video is associated with a camera that identifies the site that it came from, if applicable)
- Move videos between cameras (if a video has been assigned to the wrong camera)

[Upload training videos and images](#)

2. Choose or define labelling schema

Define the entities that you wish to identify during labelling, e.g. fish, otters, etc.

1.a. Upload footage

- The training videos page:

Footage divided
by camera



Fish counter Home River - daylight surveys Training videos ? Help

Training videos for *River - daylight* surveys

Salmon and trout counting sites situated at river wiers using daylight cameras

Camera Central [Edit camera](#)

Colour camera with the wier positioned centrally [Move videos](#) [Upload videos and stills](#)

Videos

	Original filename: 02. DI - 050619_045403_otter (down).mp4, Size: 801.8 KB Uploaded: March 11, 2021, 10:43 a.m. by admin Resolution: 1280 x 720, FPS: 10.0, Frame count: 40, Length: 0:00:04 Size: 687.0 KB (after re-encoding) Choose frames for labelling (11 chosen)	Download original file Download re-encoded file Play
	Original filename: 30. DL 131219_144903 fish Down.mp4, Size: 1020.3 KB Uploaded: March 11, 2021, 10:42 a.m. by admin Resolution: 1280 x 720, FPS: 10.0, Frame count: 50, Length: 0:00:05 Size: 865.7 KB (after re-encoding) Choose frames for labelling (11 chosen)	Download original file Download re-encoded file Play
	Original filename: 38. DL - 070519_195205_otter down.mp4, Size: 2.5 MB Uploaded: March 11, 2021, 10:43 a.m. by admin Resolution: 1280 x 720, FPS: 10.0, Frame count: 130, Length: 0:00:13	Download original file Download re-encoded file



Previously
uploaded videos

1.a. Upload footage

- In the ML intro we mentioned that footage from multiple sites or cameras can be assigned to be in the *training set* or *test set* depending on where it came from
- In this section of the site, you can create a *camera* for each camera/location/site from which footage was obtained

1.a. Upload footage

- In seabed surveys conducted using an underwater camera suspended below a vessel, it probably doesn't make sense to divide footage by the *specific device* that was used to record it
- It probably makes more sense to split by location, time of year, or year
- So make a different *camera* for each of these sources of footage.
 - Apologies for the incorrect terminology here; we selected these terms early in the project and they stuck.

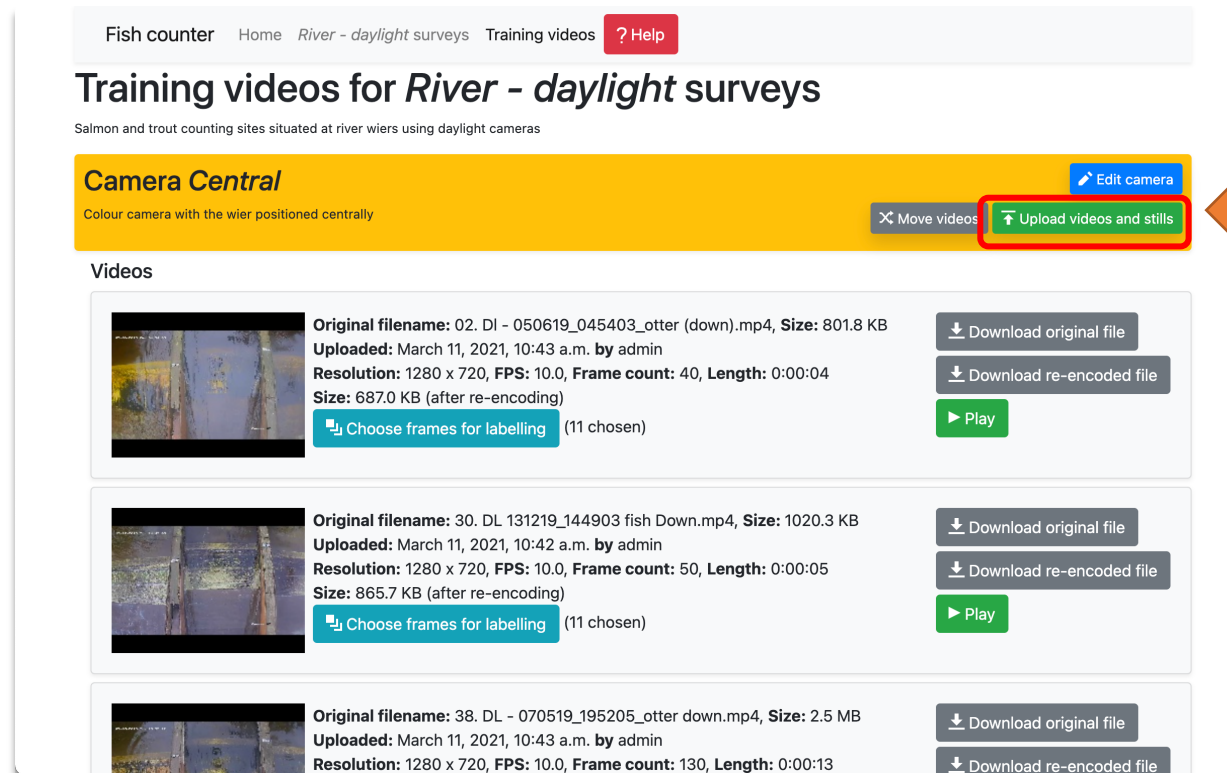
1.a. Upload footage

- If you need to create a new camera, scroll to the bottom of the upload page and click the *new camera* button:

The screenshot displays a video management interface. At the top, there are two video entries, each with a thumbnail, metadata (upload date, resolution, FPS, frame count, length, size), and action buttons (Download original file, Download re-encoded file, Play, and Choose frames for labelling). Below these is a yellow banner for a camera named 'Camera Left', with a description 'Colour camera viewing left side of wier' and buttons for 'Edit camera', 'Move videos', and 'Upload videos and stills'. Underneath the banner is a 'Videos' section containing one video entry with similar metadata and action buttons. At the bottom left, an orange arrow points to a blue button with a plus sign and the text '+ New camera', which is highlighted with a red border.

1.a. Upload footage

- Choose a camera and click the *upload videos and stills* button in its' yellow header



The screenshot shows a web interface for managing camera footage. At the top, there is a navigation bar with links for 'Fish counter', 'Home', 'River - daylight surveys', 'Training videos', and a 'Help' button. Below this is the main heading 'Training videos for River - daylight surveys' with a subtitle 'Salmon and trout counting sites situated at river wiers using daylight cameras'. A yellow banner for 'Camera Central' contains the text 'Colour camera with the wier positioned centrally' and an 'Edit camera' button. A red box highlights the 'Upload videos and stills' button, which is pointed to by an orange arrow from the right. Below the banner, a 'Videos' section lists three video files with their metadata and action buttons.

Video ID	Original filename	Size	Resolution	FPS	Frame count	Length	Actions
02	DI - 050619_045403_otter (down).mp4	801.8 KB	1280 x 720	10.0	40	0:00:04	Download original file, Download re-encoded file, Play, Choose frames for labelling (11 chosen)
30	DL 131219_144903 fish Down.mp4	1020.3 KB	1280 x 720	10.0	50	0:00:05	Download original file, Download re-encoded file, Play, Choose frames for labelling (11 chosen)
38	DL - 070519_195205_otter down.mp4	2.5 MB	1280 x 720	10.0	130	0:00:13	Download original file, Download re-encoded file

1.a. Upload footage

- Clicking *upload videos and stills* button takes you here. You can select files from your computer to upload. Choose either video files, or still images

Click here to open a dialog box for locating files on your computer

Fish counter Home River - daylight surveys Training videos Upload training videos for camera Central

Upload training videos for River - daylight — camera Central

Select files

Please select the files you wish to upload. You can either:

- Click the blue button and choose files (you can select multiple files)
- Drag the files from your computer and drop onto the grey box

Please note: it may take a while before large uploads appear in the video list.

Choose files to upload...

Drop files here

Previously uploaded files

File name	Upload date	Status
EQ-PM-s64_02_20161007131600_ts.mts	March 18, 2021 2:38 p.m.	Success: EQ-PM-s64_02_20161007131600_ts.mts

Or, drag and drop files from your computer to this area

1.a. Upload footage

- *NOTE*: if footage has been assigned/uploaded to the wrong camera; the *move videos* button will allow you to change cameras afterwards:

Fish counter Home River - daylight surveys Training videos ? Help

Training videos for River - daylight surveys

Salmon and trout counting sites situated at river wiers using daylight cameras

Camera Central
Colour camera with the wier positioned centrally

Edit camera

Move videos Upload videos and stills

Videos

	Original filename: 02. DL - 050619_045403_otter (down).mp4, Size: 801.8 KB Uploaded: March 11, 2021, 10:43 a.m. by admin Resolution: 1280 x 720, FPS: 10.0, Frame count: 40, Length: 0:00:04 Size: 687.0 KB (after re-encoding) Choose frames for labelling (11 chosen)	Download original file Download re-encoded file Play
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Using AVIMS

1.b. Select frames for labelling

1.b. Select frames for labelling

- From the training videos page, click the *choose frames for labelling* button adjacent to the video you want to select frames from:

Fish counter Home River - daylight surveys Training videos ? Help



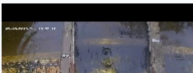
Training videos for *River - daylight surveys*

Salmon and trout counting sites situated at river wiers using daylight cameras

Camera Central [Edit camera](#)

Colour camera with the wier positioned centrally [Move videos](#) [Upload videos and stills](#)

Videos

	Original filename: 02. DL - 050619_045403_otter (down).mp4, Size: 801.8 KB Uploaded: March 11, 2021, 10:43 a.m. by admin Resolution: 1280 x 720, FPS: 10.0, Frame count: 40, Length: 0:00:04 Size: 667.0 KB (after re-encoding) Choose frames for labelling (11 chosen)	Download original file Download re-encoded file Play
	Original filename: 30. DL 131219_144903 fish Down.mp4, Size: 1020.3 KB Uploaded: March 11, 2021, 10:42 a.m. by admin Resolution: 1280 x 720, FPS: 10.0, Frame count: 50, Length: 0:00:05 Size: 865.7 KB (after re-encoding) Choose frames for labelling (11 chosen)	Download original file Download re-encoded file Play
	Original filename: 38. DL - 070519_195205_otter down.mp4, Size: 2.5 MB Uploaded: March 11, 2021, 10:43 a.m. by admin Resolution: 1280 x 720, FPS: 10.0, Frame count: 130, Length: 0:00:13	Download original file Download re-encoded file

1.b. Select frames for labelling

- Note the *(11 chosen)* to the right of the button; the number of frames chosen from this video. Choose frames from a variety of videos for best results.

Fish counter Home River - daylight surveys Training videos ? Help



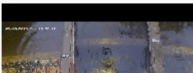
Training videos for *River - daylight surveys*

Salmon and trout counting sites situated at river wiers using daylight cameras

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Colour camera with the wier positioned centrally [Move videos](#) [Upload videos and stills](#)

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1.b. Select frames for labelling

Use the *frame chooser* to choose frames for labelling in step 3.

Pick frames that are as representative as possible of the footage you intend to analyze.

Fish counter Home Smolt Trawl surveys Training videos Choose frames ? Help

Video **FB5_0347.MPG**

Warning: you **must** click the save button to commit your changes **before** leaving this page, otherwise your changes will be lost.

11/05/19 05:01:06

Frame: 0 Time: 00:00:00 Toggle frame 158004 frames, duration: 1:45:20.160000

Chosen frames: 73248 118652 118654 118658 118659 118663 118664 118665 118666 118667 118671 145251 145255 145256 145259 145260 145262 155364 155366 155370 155375 155391

Changes Revert Save

These changes will be committed when you click the save button to the right.

Frames added: --

Frames removed: -- (note that only frames for which no labelling has been done can be removed)

1.b. Select frames for labelling

Rules of thumb:

- Choose frames such that as many examples of each kind of creature/objects of interest are visible
- Don't pick too many of the same individual creature/object
- Try to choose frames in which the appearances (pose, size, angle, colour, etc.) vary as much as possible

The screenshot shows a web-based video labelling interface. At the top, there is a navigation bar with links for 'Fish counter', 'Home', 'Smolt Trawl surveys', 'Training videos', 'Choose frames', and a red 'Help' button. Below the navigation bar, the video title 'Video FB5_0347.MPG' is displayed. A warning message states: 'Warning: you must click the save button to commit your changes before leaving this page, otherwise your changes will be lost.' The main video player shows a frame from the video with a timestamp of '11/05/19' and '05:01:06'. Below the video player, there is a 'Frame: 0' input field, a 'Time: 00:00:00' input field, and a 'Toggle frame' button. To the right of the video player, it says '158004 frames, duration: 1:45:20.160000'. Below the video player, there is a timeline with a progress bar and a list of 'Chosen frames' represented by yellow boxes with frame numbers: 73248, 118652, 118654, 118658, 118659, 118663, 118664, 118665, 118666, 118667, 118671, 145251, 145255, 145256, 145259, 145260, 145262, 155364, 155366, 155370, 155375, 155391. Below the timeline, there is a 'Changes' section with a 'Revert' button and a 'Save' button. The text below the buttons says: 'These changes will be committed when you click the save button to the right.' Below that, it says 'Frames added: --' and 'Frames removed: -- (note that only frames for which no labelling has been done can be removed)'. The interface is clean and modern, with a white background and blue accents.

1.b. Select frames for labelling

Frame chooser

- Image of current frame
- Change current frame
- Add/remove current frame from the list in (d)
- The list of selected frames
- The list of changes you have made by selecting/unselecting
- Buttons to save or cancel/revert

The screenshot shows the 'Fish counter' web application interface for selecting video frames. The page title is 'Video FB5_0347.MPG'. A warning message states: 'Warning: you must click the save button to commit your changes before leaving this page, otherwise your changes will be lost.' The main video player shows a frame with a timestamp of '11/05/19' and '05:01:06'. Below the video player is a timeline with a 'Frame: 0' and 'Time: 00:00:00' display, and a 'Toggle frame' button. A list of 'Chosen frames' is shown, including frame numbers 73248, 118652, 118654, 118658, 118659, 118663, 118664, 118665, 118666, 118667, 118671, 145251, 145255, and 145256. Below the list is a 'Changes' section with 'Revert' and 'Save' buttons. The 'Changes' section shows 'Frames added: --' and 'Frames removed: -- (note that only frames for which no labelling has been done can be removed)'. The interface is annotated with letters (a) through (f) corresponding to the list items in the text.

Fish counter Home Smolt Trawl surveys Training videos Choose frames ? Help

Video **FB5_0347.MPG**

Warning: you **must** click the save button to commit your changes **before** leaving this page, otherwise your changes will be lost.

11/05/19 05:01:06 (a)

Frame: 0 Time: 00:00:00 (b) Toggle frame (c) 158004 frames, duration: 1:45:20.160000

Chosen frames: 73248 118652 118654 118658 118659 118663 118664 118665 118666 118667 118671 145251 145255 145256
145259 145260 145262 155364 155366 155370 155375 155391 (d)

Changes (e) (f)
These changes will be committed when you click the save button to the right.
Frames added: --
Frames removed: -- (note that only frames for which no labelling has been done can be removed)

Revert Save

1.b. Select frames for labelling

Work-flow:

- **NOTE:** you must click the *save* button to save your changes once you are done; navigating back to the previous page will result in your changes to the selected frames being **lost!**

The screenshot shows the 'Fish counter' web application interface for video `FB5_0347.MPG`. The video player displays a scene with a date of 11/05/19 and a time of 05:01:06. Below the video is a timeline with a 'Frame: 0' and 'Time: 00:00:00' indicator, and a 'Toggle frame' button. A list of 'Chosen frames' is shown, including 73248, 118652, 118654, 118658, 118659, 118663, 118664, 118665, 118666, 118667, 118671, 145251, 145255, 145256, 145259, 145260, 145262, 155364, 155366, 155370, 155375, and 155391. The 'Changes' section shows 'Frames added: --' and 'Frames removed: -- (note that only frames for which no labelling has been done can be removed)'. A 'Revert' button and a 'Save' button are also visible.

(a) Video player showing a scene with a date of 11/05/19 and a time of 05:01:06.

(b) Timeline showing the current frame (0) and time (00:00:00).

(c) Toggle frame button.

(d) List of chosen frames.

(e) Changes section showing frames added and removed.

(f) Revert and Save buttons.

1.b. Select frames for labelling

Work-flow:

- Use the slider bar in (b) to sweep through the video and find creatures of interest
 - If the video is long, play it in a video player, find the time at which you see something you want to annotate then enter the time into the time entry box.
- Alternatively use the frame entry box

Fish counter Home Smolt Trawl surveys Training videos Choose frames ? Help

Video **FB5_0347.MPG**

Warning: you **must** click the save button to commit your changes **before** leaving this page, otherwise your changes will be lost.

11/05/19 05:01:06 (a)

Frame: 0 Time: 00:00:00 (b) Toggle frame (c) 158004 frames, duration: 1:45:20.160000

Chosen frames: 73248 118652 118654 118658 118659 118663 118664 118665 118666 118667 118671 145251 145255 145256
145259 145260 145262 155364 155366 155370 155375 155391 (d)

Changes (e) (f)
These changes will be committed when you click the save button to the right.
Frames added: --
Frames removed: -- (note that only frames for which no labelling has been done can be removed)

Revert Save

1.b. Select frames for labelling

Work-flow:

- Click the *toggle frame* button (c)
- A red mark will appear in the bar below the slider
- The frame will be added to the list of chosen frames in (d)
- It will also be listed next to *frames added* in (e)

Fish counter Home Smolt Trawl surveys Training videos Choose frames ? Help

Video **FB5_0347.MPG**

Warning: you **must** click the save button to commit your changes **before** leaving this page, otherwise your changes will be lost.

11/05/19 05:01:06 (a)

Frame: 0 Time: 00:00:00 (b) Toggle frame (c) 158004 frames, duration: 1:45:20.160000

Chosen frames: 73248 118652 118654 118658 118659 118663 118664 118665 118666 118667 118671 145251 145255 145256
145259 145260 145262 155364 155366 155370 155375 155391 (d)

Changes (f)
These changes will be committed when you click the save button to the right.
Frames added: --
Frames removed: -- (note that only frames for which no labelling has been done can be removed) (e)

Revert Save

1.b. Select frames for labelling

Work-flow:

- Frames that you *unselect* will be added to the list after *frames removed* in (e)

Fish counter Home Smolt Trawl surveys Training videos Choose frames ? Help

Video **FB5_0347.MPG**

Warning: you **must** click the save button to commit your changes **before** leaving this page, otherwise your changes will be lost.

11/05/19 05:01:06 (a)

Frame: 0 Time: 00:00:00 (b) Toggle frame (c) 158004 frames, duration: 1:45:20.160000

Chosen frames: 73248 118652 118654 118658 118659 118663 118664 118665 118666 118667 118671 145251 145255 145256
145259 145260 145262 155364 155366 155370 155375 155391

Changes (d)
These changes will be committed when you click the save button to the right.

Frames added: -- (e)
Frames removed: -- (note that only frames for which no labelling has been done can be removed) (f)

Revert Save

1.b. Select frames for labelling

Work-flow:

- If you are happy with your changes to the list of selected frames, click the *save* button in (f)
- If you wish to discard your changes, click *revert*

Fish counter Home Smolt Trawl surveys Training videos Choose frames ? Help

Video **FB5_0347.MPG**

Warning: you **must** click the save button to commit your changes **before** leaving this page, otherwise your changes will be lost.

11/05/19 05:01:06 (a)

Frame: 0 Time: 00:00:00 [Toggle frame] (c) 158004 frames, duration: 1:45:20.160000

(b)

Chosen frames: 73248 118652 118654 118658 118659 118663 118664 118665 118666 118667 118671 145251 145255 145256
145259 145260 145262 155364 155366 155370 155375 155391

Changes (d)
These changes will be committed when you click the save button to the right.

Frames added: -- (e)

Frames removed: -- (note that only frames for which no labelling has been done can be removed) (e)

[Revert] [Save] (f)

Using AVIMS

2. Labelling schema: what objects/creates are we interested in?

2. Labelling schema

- Section 2 of the survey page lets you change and edit schemas
- You can edit the schema chosen for the survey type by clicking the blue pen button.
- You can switch schemas by clicking the *choose another* button

The screenshot displays a web interface for configuring a survey. At the top, a list of instructions is provided: 'Upload videos for use as training data', 'Select frames from videos for labelling/annotation', 'Upload still images for use as training data', 'Define cameras (each video is associated with a camera that identifies the site that it came from, if applicable)', and 'Move videos between cameras (if a video has been assigned to the wrong camera)'. Below this list is a blue button labeled 'Upload training videos and images'. The main content area is divided into sections by yellow headers. The current section is '2. Choose or define labelling schema', which includes instructions to 'Define the entities that you wish to identify during labelling, e.g. fish, otters, etc.' and a note that 'a labelling schema can be shared by multiple survey types; this would be done in instances where different survey types share common objects or creatures of interest.' Underneath, the 'Chosen schema:' is set to 'River (overhead, IR)', with a blue pen icon to its left and a yellow button labeled 'Choose another' to its right. A grey button labeled 'Show/edit labelling schemas' is positioned below the schema name. The next section, '3. Label training images', contains instructions to 'Label the creatures of interest within training images.' and 'Annotate each creature/object of interest with an oriented ellipse. Change the class of the selected entity from the list of classes defined in the schema from section 3 above.'

- Upload videos for use as training data
- Select frames from videos for labelling/annotation
- Upload still images for use as training data
- Define cameras (each video is associated with a camera that identifies the site that it came from, if applicable)
- Move videos between cameras (if a video has been assigned to the wrong camera)

Upload training videos and images

2. Choose or define labelling schema

Define the entities that you wish to identify during labelling, e.g. fish, otters, etc.

Note that a labelling schema can be shared by multiple survey types; this would be done in instances where different survey types share common objects or creatures of interest.

Chosen schema: River (overhead, IR) — Choose another

Show/edit labelling schemas

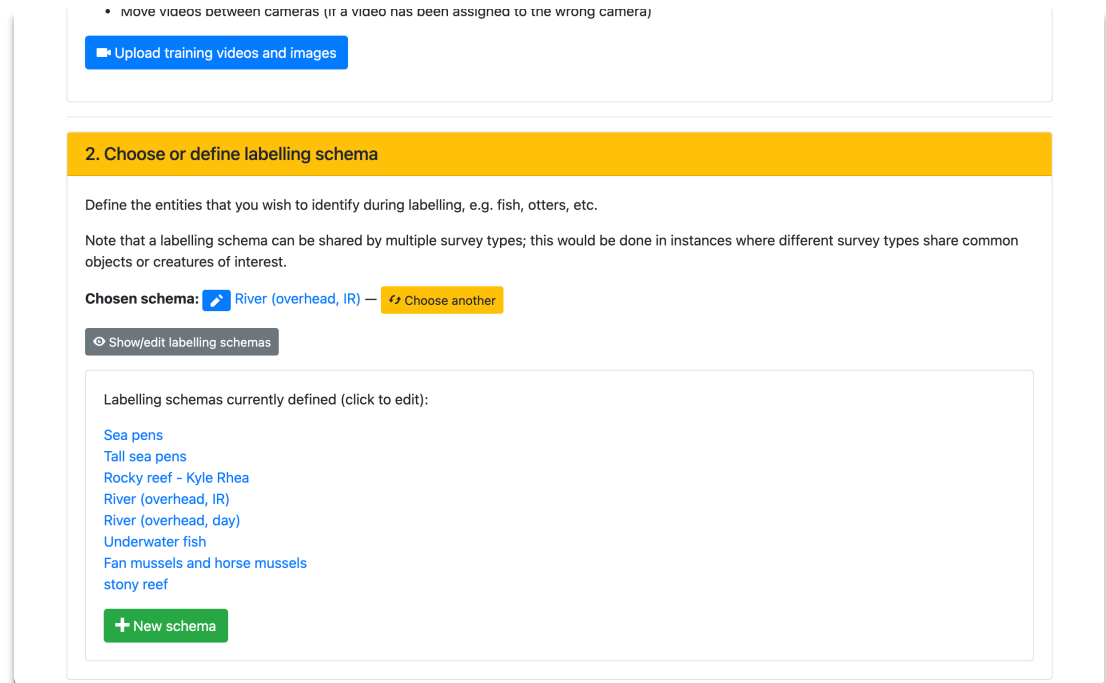
3. Label training images

Label the creatures of interest within training images.

Annotate each creature/object of interest with an oriented ellipse. Change the class of the selected entity from the list of classes defined in the schema from section 3 above.

2. Labelling schema

- Clicking the *show/edit labelling schemas* button shows all available schemas, along with the *new schema* button for creating new ones
- If an existing schema covers the all of creature/object types you are interested in, you can use it
 - Multiple survey types can share a single schema



• move videos between cameras (if a video has been assigned to the wrong camera)

Upload training videos and images

2. Choose or define labelling schema

Define the entities that you wish to identify during labelling, e.g. fish, otters, etc.

Note that a labelling schema can be shared by multiple survey types; this would be done in instances where different survey types share common objects or creatures of interest.

Chosen schema: [River \(overhead, IR\)](#) — [Choose another](#)

Show/edit labelling schemas

Labelling schemas currently defined (click to edit):

- [Sea pens](#)
- [Tall sea pens](#)
- [Rocky reef - Kyle Rhea](#)
- [River \(overhead, IR\)](#)
- [River \(overhead, day\)](#)
- [Underwater fish](#)
- [Fan mussels and horse mussels](#)
- [stony reef](#)

[+ New schema](#)

2. Labelling schema

The schema editor

- The list of types of creature/object defined by the schema are listed as *label classes* in the grey table towards the bottom of the image
- You can add as many label classes as you need to a schema

Fish counter Home Edit label classes in schema *Tall sea pens*

Edit label class in schema *Tall sea pens*

Edit schema name and description

Colour schemes

Different tasks can benefit from using different colour schemes to help differentiate different labels from one another. For example, a segmentation task could benefit from using different colours for broad categories, while a precise classification/identification task could benefit from using different colours for fine-grained categories within a broad category. Here you can create colour schemes that the users can choose within the labelling tool.

You can re-order the colour schemes by dragging the ≡ handles.

New

Name	Name in UI
≡ object_id	Object ID

Label classes by group

Label classes are divided into groups. Groups could correspond to broad categories of entity, while individual label classes correspond to more precise classifications. The *default colour* is the default colour that will be used to display the label if no colour schemes are provided. You can assign a colour for each colour scheme defined above.

You can re-order the groups and label classes by dragging the ≡ handles. Groups can only be deleted if they are empty.

≡ Group: Tall sea pens

New

Name	Name in UI	Default colour	Object ID
≡ tall_sea_pen	Funiculina quadrangula	#f0d10a	#808080
≡ fireworks_anomone	Pachycerianthus multispinus	#eb420a	#808080
≡ celtic_feather_star	Leptometra celtica	#29b158	#808080
≡ burrowed_mud	Burrowed mud	#cf12d3	#808080

New label group

2. Labelling schema

The schema editor

- In the *colour schemes* section, check if there is an entry in the table with the named *object_id* (as seen in the image)
 - If not, click the yellow *New* button and a form will appear. Enter *object_id* for the *name* field and *Object ID* for the *name in UI* field. Then click the green *Create* button that will have appeared in the form.

Fish counter Home Edit label classes in schema *Tall sea pens*

Edit label class in schema *Tall sea pens*

Edit schema name and description

Colour schemes

Different tasks can benefit from using difference colour schemes to help differentiate different labels from one another. For example, a segmentation task could benefit from using different colours for broad categories, while a precise classification/identification task could benefit from using different colours for fine-grained categories within a broad category. Here you can create colour schemes that the users can choose within the labelling tool.

You can re-order the colour schemes by dragging the ≡ handles.

New	Name	Name in UI	
	object_id	Object ID	🗑️

Label classes by group

Label classes are divided into groups. Groups could correspond to broad categories of entity, while individual label classes correspond to more precise classifications. The *default colour* is the default colour that will be used to display the label if no colour schemes are provided. You can assign a colour for each colour scheme defined above.

You can re-order the groups and label classes by dragging the ≡ handles. Groups can only be deleted if they are empty.

≡ Group: Tall sea pens 🗑️

New	Name	Name in UI	Default colour	Object ID	
	tall_sea_pen	Funiculina quadrangula	#f0d10a	#808080	🗑️
	fireworks_anomone	Pachycerianthus multispicatus	#eb420a	#808080	🗑️
	celtic_feather_star	Leptometra celtica	#29b158	#808080	🗑️
	burrowed_mud	Burrowed mud	#cf12d3	#808080	🗑️

New label group

2. Labelling schema

The schema editor

- Mostly you will be adding new label classes and groups in the *label classes by group* section with the lilac header.
 - If you don't see a grey *group* box (like the one titled *Tall sea pens* in the image), click the blue *New label group* button
 - In the form that appears, enter a name and click *create*

Fish counter Home Edit label classes in schema *Tall sea pens*

Edit label class in schema *Tall sea pens*

[Edit schema name and description](#)

Colour schemes

Different tasks can benefit from using different colour schemes to help differentiate different labels from one another. For example, a segmentation task could benefit from using different colours for broad categories, while a precise classification/identification task could benefit from using different colours for fine-grained categories within a broad category. Here you can create colour schemes that the users can choose within the labelling tool.

You can re-order the colour schemes by dragging the ≡ handles.

[New](#)

Name	Name in UI
object_id	Object ID

Label classes by group

Label classes are divided into groups. Groups could correspond to broad categories of entity, while individual label classes correspond to more precise classifications. The *default colour* is the default colour that will be used to display the label if no colour schemes are provided. You can assign a colour for each colour scheme defined above.

You can re-order the groups and label classes by dragging the ≡ handles. Groups can only be deleted if they are empty.

Group:

[New](#)

Name	Name in UI	Default colour	Object ID
tall_sea_pen	Funiculina quadrangula	#f0d10a	#808080
fireworks_anomone	Pachycerianthus multispinus	#eb420a	#808080
celtic_feather_star	Leptometra celtica	#29b158	#808080
burrowed_mud	Burrowed mud	#cf12d3	#808080

[New label group](#)

2. Labelling schema

The schema editor

- To add a label class to a group, click the green *New* button. A form will appear. Fill in the *name* and *name in UI* fields and click the *create* button.
- You can use these fields how you wish
- *Name in UI* is what you will see in your list of choices in the labelling tool that we will discuss later

Fish counter Home Edit label classes in schema *Tall sea pens*

Edit label class in schema *Tall sea pens*

[Edit schema name and description](#)

Colour schemes

Different tasks can benefit from using difference colour schemes to help differentiate different labels from one another. For example, a segmentation task could benefit from using different colours for broad categories, while a precise classification/identification task could benefit from using different colours for fine-grained categories within a broad category. Here you can create colour schemes that the users can choose within the labelling tool.

You can re-order the colour schemes by dragging the ≡ handles.

[New](#)

Name	Name in UI
≡ object_id	Object ID 🗑️

Label classes by group

Label classes are divided into groups. Groups could correspond to broad categories of entity, while individual label classes correspond to more precise classifications. The *default colour* is the default colour that will be used to display the label if no colour schemes are provided. You can assign a colour for each colour scheme defined above.

You can re-order the groups and label classes by dragging the ≡ handles. Groups can only be deleted if they are empty.

≡ Group: Tall sea pens [🗑️](#)

[New](#)

Name	Name in UI	Default colour	Object ID
≡ tall_sea_pen	Funiculina quadrangula	 #f0d10a	#808080 🗑️
≡ fireworks_anomone	Pachycerianthus multispicatus	 #eb420a	#808080 🗑️
≡ celtic_feather_star	Leptometra celtica	 #29b158	#808080 🗑️
≡ burrowed_mud	Burrowed mud	 #cf12d3	#808080 🗑️

[New label group](#)

2. Labelling schema

The schema editor

- The colours in the *default colour* and *Object ID* colour columns in the label classes table define the colours that will be used to distinguish different types of object in the labelling tool and for identifying object types in the videos resulting from analysis
 - Choose colours that are not too similar to one another

Fish counter Home Edit label classes in schema Tall sea pens

Edit label class in schema Tall sea pens

Edit schema name and description

Colour schemes

Different tasks can benefit from using different colour schemes to help differentiate different labels from one another. For example, a segmentation task could benefit from using different colours for broad categories, while a precise classification/identification task could benefit from using different colours for fine-grained categories within a broad category. Here you can create colour schemes that the users can choose within the labelling tool.

You can re-order the colour schemes by dragging the ≡ handles.

New

Name	Name in UI
≡ object_id	Object ID

Label classes by group

Label classes are divided into groups. Groups could correspond to broad categories of entity, while individual label classes correspond to more precise classifications. The *default colour* is the default colour that will be used to display the label if no colour schemes are provided. You can assign a colour for each colour scheme defined above.

You can re-order the groups and label classes by dragging the ≡ handles. Groups can only be deleted if they are empty.

≡ Group: Tall sea pens

New

Name	Name in UI	Default colour	Object ID
≡ tall_sea_pen	Funiculina quadrangula	#f0d10a	#808080
≡ fireworks_anomone	Pachycerianthus multiplex	#eb420a	#808080
≡ celtic_feather_star	Leptometra celtica	#29b158	#808080
≡ burrowed_mud	Burrowed mud	#cf12d3	#808080

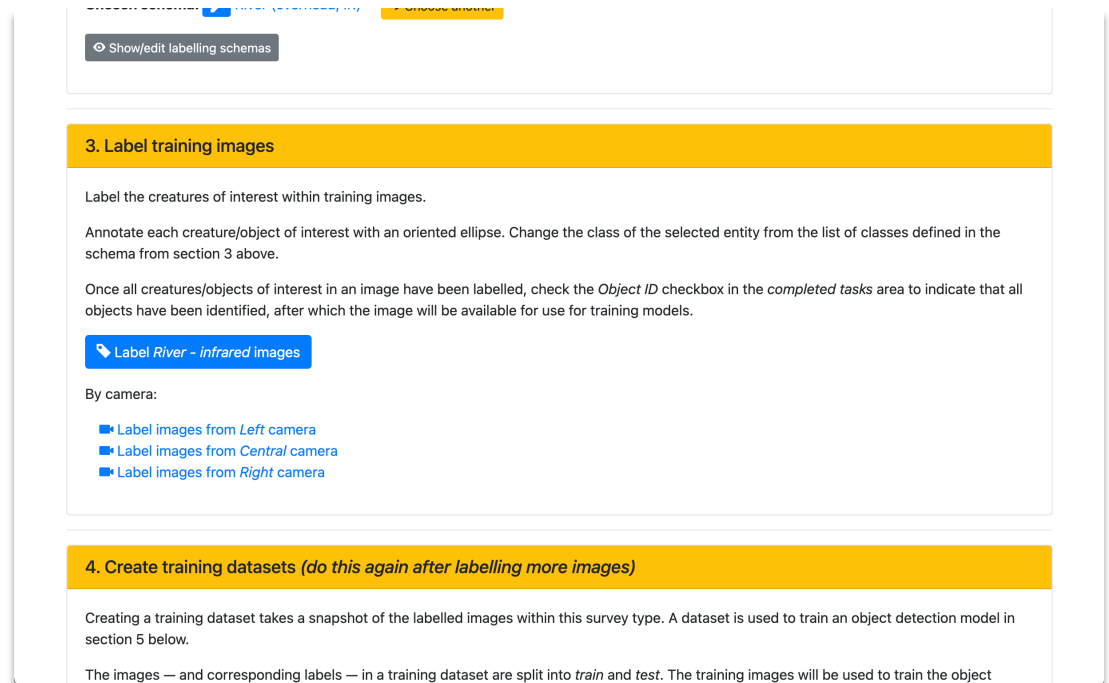
New label group

Using AVIMS

3. Annotate objects in training images

3. Annotate training images

- Section 3 of the survey page has buttons to take you to the annotation part of the site
- Section 3 will be grey and not usable if:
 - You have not uploaded and training videos
 - Or you have not selected any frames for labelling



The screenshot shows a web interface for labeling training images. At the top, there is a button labeled "Show/edit labelling schemas". Below this is a yellow header bar for "3. Label training images". The main content area contains instructions: "Label the creatures of interest within training images. Annotate each creature/object of interest with an oriented ellipse. Change the class of the selected entity from the list of classes defined in the schema from section 3 above. Once all creatures/objects of interest in an image have been labelled, check the *Object ID* checkbox in the *completed tasks* area to indicate that all objects have been identified, after which the image will be available for use for training models." Below the text is a blue button labeled "Label River - infrared images". Underneath, it says "By camera:" followed by three blue checkboxes: "Label images from Left camera", "Label images from Central camera", and "Label images from Right camera". At the bottom, there is another yellow header bar for "4. Create training datasets (do this again after labelling more images)". Below this, it explains: "Creating a training dataset takes a snapshot of the labelled images within this survey type. A dataset is used to train an object detection model in section 5 below. The images — and corresponding labels — in a training dataset are split into *train* and *test*. The training images will be used to train the object

3. Annotate training images

- You can choose to focus on all training images associated with the survey type (the blue button) or focus on images from each camera (the links below)
 - Clicking either the button or one of the links will take you to...

Show/edit labelling schemas

3. Label training images

Label the creatures of interest within training images.

Annotate each creature/object of interest with an oriented ellipse. Change the class of the selected entity from the list of classes defined in the schema from section 3 above.

Once all creatures/objects of interest in an image have been labelled, check the *Object ID* checkbox in the *completed tasks* area to indicate that all objects have been identified, after which the image will be available for use for training models.

[Label River - infrared images](#)

By camera:

- [Label images from Left camera](#)
- [Label images from Central camera](#)
- [Label images from Right camera](#)

4. Create training datasets *(do this again after labelling more images)*

Creating a training dataset takes a snapshot of the labelled images within this survey type. A dataset is used to train an object detection model in section 5 below.

The images — and corresponding labels — in a training dataset are split into *train* and *test*. The training images will be used to train the object

3. Annotate training images

The labelling page

- The buttons in (a) allow you to choose a subset of the images to label. You can choose images for which labelling has not been completed, or images for which no labelling has been done at all, or all images. You can also choose to focus on images from videos or stills.

Fish counter Home Sea pens surveys Label images

Labelling for *Sea pens* surveys

Sea pens

Using labelling schema *Sea pens* (to change this, edit the survey type [here](#))

Label images:

All images: [Labelled and unlabelled \(224\)](#) [Not marked as complete \(58\)](#) [With no labels \(64\)](#)

Images from videos: [Labelled and unlabelled \(217\)](#) [Not marked as complete \(58\)](#) [With no labels \(64\)](#)

Images from stills: [Labelled and unlabelled \(7\)](#) [Not marked as complete \(0\)](#) [With no labels \(0\)](#)

Summary

For the *Sea pens* surveys there are:

Source	# images	# with <i>Object ID</i> task complete	# with <i>Object ID</i> task not complete	# with labels	# with no labels
Any	224	166	58	160	64
Videos	217	159	58	153	64
Stills	7	7	0	7	0

Label statistics

[Fetch from server](#)

3. Annotate training images

The labelling page

- The summary in (b) gives a brief breakdown of the images
- Pressing the *fetch from server* button (c) under the *label statistics* heading will show you how many of each class of creature/object have been annotated, giving you an idea of which classes are more abundant and which need more instances.

Fish counter Home Sea pens surveys Label images

Labelling for *Sea pens* surveys

Sea pens

Using labelling schema *Sea pens* (to change this, edit the survey type [here](#))

Label images:

All images: Labelled and unlabelled (224) Not marked as complete (58) With no labels (64)

Images from videos: Labelled and unlabelled (217) Not marked as complete (58) With no labels (64)

Images from stills: Labelled and unlabelled (7) Not marked as complete (0) With no labels (0)

Summary

For the *Sea pens* surveys there are:

Source	# images	# with <i>Object ID</i> task complete	# with <i>Object ID</i> task not complete	# with labels	# with no labels
Any	224	166	58	160	64
Videos	217	159	58	153	64
Stills	7	7	0	7	0

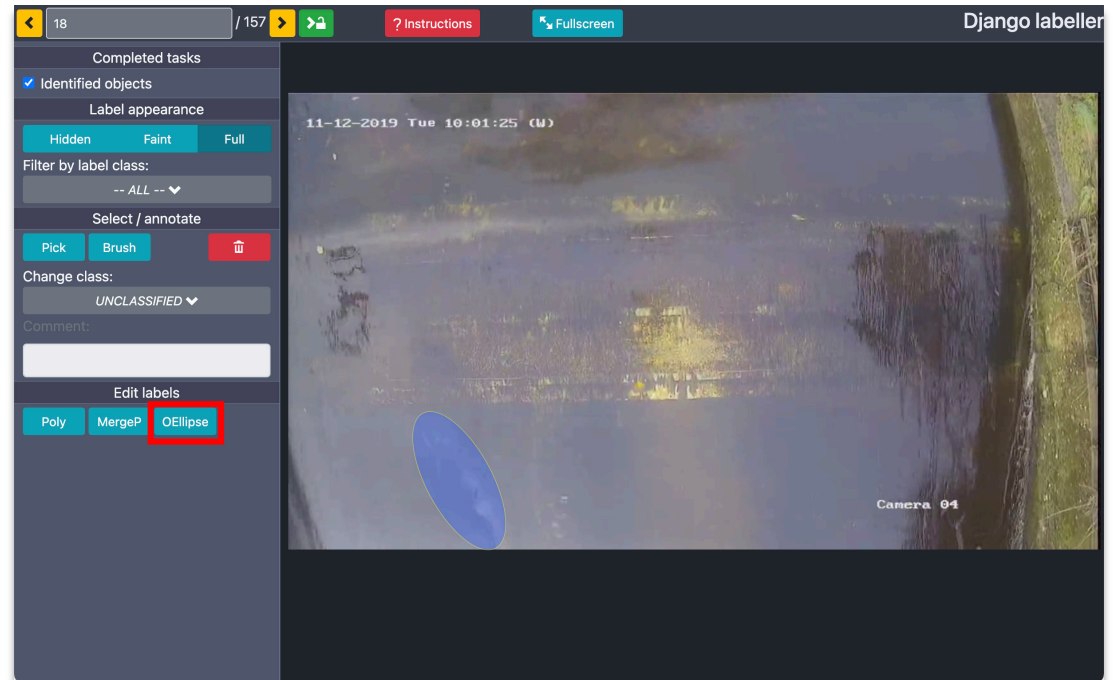
Label statistics

Fetch from server

3. Annotate training images

The labelling tool

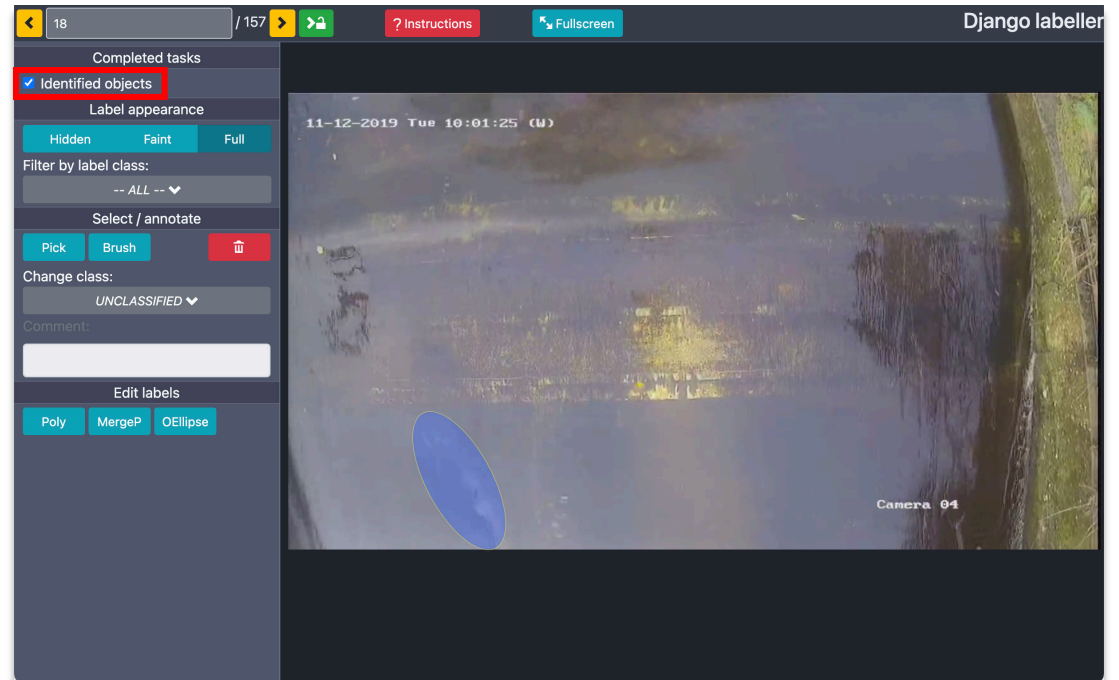
- The *instructions* button will give you detailed help on how to use the tool
- In general, draw oriented ellipses surrounding objects of interest (*OEllipse* button)
 - E.g. the ellipse covering the fish in the bottom left of the image
 - Try to get the ellipse to extend from tip to tail along the length of the creature



3. Annotate training images

The labelling tool

- Once all visible objects have been annotated, click the *identified objects* checkbox to indicate this.
 - If you don't do this, the image will not be used for training; all images **not yet** marked as *complete* will be **ignored**



Using AVIMS

4. Build a training dataset

4. Build a training dataset

- Section 4 of the survey page lists the datasets that have been created and when this was done, along with their names and descriptions
- Section 4 will be grey and not usable if:
 - You have not yet labelled any images

4. Create training datasets (do this again after labelling more images)

Creating a training dataset takes a snapshot of the labelled images within this survey type. A dataset is used to train an object detection model in section 5 below.

The images — and corresponding labels — in a training dataset are split into *train* and *test*. The training images will be used to train the object detection model, while the test images will be used to evaluate and quantify its performance.

Typically the samples/images in a training dataset are split between train and test randomly. We give you the option of controlling this more precisely if you wish. You can split by camera, video or by individual image. You can manually assign the individual images or all of the images from a given camera or video to either train or test.

NOTE: when/if you label some more images, you *need* to create a *new* training dataset to make use of them when training a new model. A training dataset stores a *fixed* snapshots of the labelled images at the time that the dataset was created.

Name	Description	Created
River infrared - split by image	Likely unrealistically accurate. Not representative of real life usage for short videos like this.	Aug. 15, 2021, 4:01 p.m. by g french
River infrared - split by video	Still challenging, representative of conditions in which one or more videos from each site/location can be annotated	Aug. 15, 2021, 4 p.m. by g french
River infrared - split by camera	Challenging machine learning conditions representative of deployment at new site or location	June 17, 2021, 5:15 p.m. by g french

[+ Create a new dataset](#)

4. Build a training dataset

- Creating a training dataset takes a snapshot of:
 - All of the training images that have been marked as complete
 - Their corresponding labels in the state they are in at the time

4. Create training datasets (do this again after labelling more images)

Creating a training dataset takes a snapshot of the labelled images within this survey type. A dataset is used to train an object detection model in section 5 below.

The images — and corresponding labels — in a training dataset are split into *train* and *test*. The training images will be used to train the object detection model, while the test images will be used to evaluate and quantify its performance.

Typically the samples/images in a training dataset are split between train and test randomly. We give you the option of controlling this more precisely if you wish. You can split by camera, video or by individual image. You can manually assign the individual images or all of the images from a given camera or video to either train or test.

NOTE: when/if you label some more images, you *need* to create a *new* training dataset to make use of them when training a new model. A training dataset stores a *fixed* snapshots of the labelled images at the time that the dataset was created.

Name	Description	Created
River infrared - split by image	Likely unrealistically accurate. Not representative of real life usage for short videos like this.	Aug. 15, 2021, 4:01 p.m. by g french
River infrared - split by video	Still challenging, representative of conditions in which one or more videos from each site/location can be annotated	Aug. 15, 2021, 4 p.m. by g french
River infrared - split by camera	Challenging machine learning conditions representative of deployment at new site or location	June 17, 2021, 5:15 p.m. by g french

[+ Create a new dataset](#)

4. Build a training dataset

- If you:
 - Select more video frames for labelling
 - Label more images
 - Change the labels in the images currently marked as complete (e.g. to fix mistakes)
- You will need to create a *new* training dataset to take advantage of them when training a model

4. Create training datasets (*do this again after labelling more images*)

Creating a training dataset takes a snapshot of the labelled images within this survey type. A dataset is used to train an object detection model in section 5 below.

The images — and corresponding labels — in a training dataset are split into *train* and *test*. The training images will be used to train the object detection model, while the test images will be used to evaluate and quantify its performance.

Typically the samples/images in a training dataset are split between train and test randomly. We give you the option of controlling this more precisely if you wish. You can split by camera, video or by individual image. You can manually assign the individual images or all of the images from a given camera or video to either train or test.

NOTE: when/if you label some more images, you *need* to create a *new* training dataset to make use of them when training a new model. A training dataset stores a *fixed* snapshots of the labelled images at the time that the dataset was created.

Name	Description	Created
River infrared - split by image	Likely unrealistically accurate. Not representative of real life usage for short videos like this.	Aug. 15, 2021, 4:01 p.m. by g french
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River infrared - split by camera	Challenging machine learning conditions representative of deployment at new site or location	June 17, 2021, 5:15 p.m. by g french

+ Create a new dataset

4. Build a training dataset

- Clicking one of the blue links will allow you to edit the name and description of the dataset
 - You will not be able to alter its contents as it is a fixed snapshot
- Create a new dataset by clicking the green *Create a new dataset* button

4. Create training datasets (do this again after labelling more images)

Creating a training dataset takes a snapshot of the labelled images within this survey type. A dataset is used to train an object detection model in section 5 below.

The images — and corresponding labels — in a training dataset are split into *train* and *test*. The training images will be used to train the object detection model, while the test images will be used to evaluate and quantify its performance.

Typically the samples/images in a training dataset are split between train and test randomly. We give you the option of controlling this more precisely if you wish. You can split by camera, video or by individual image. You can manually assign the individual images or all of the images from a given camera or video to either train or test.

NOTE: when/if you label some more images, you *need* to create a *new* training dataset to make use of them when training a new model. A training dataset stores a *fixed* snapshots of the labelled images at the time that the dataset was created.

Name	Description	Created
River infrared - split by image	Likely unrealistically accurate. Not representative of real life usage for short videos like this.	Aug. 15, 2021, 4:01 p.m. by g french
River infrared - split by video	Still challenging, representative of conditions in which one or more videos from each site/location can be annotated	Aug. 15, 2021, 4 p.m. by g french
River infrared - split by camera	Challenging machine learning conditions representative of deployment at new site or location	June 17, 2021, 5:15 p.m. by g french

[+ Create a new dataset](#)

4. Build a training dataset

Dataset builder (random; top)

- The dataset builder lets you split the data into *train* and test (see discussion in the ML intro)
- The fastest way of setting the splits is to have the machine split the data randomly

Fish counter Home River - infrared surveys Create dataset ? Help

Create dataset for *River - infrared surveys*

Objective: the objective is to split the available data into train and test splits. The model will be trained using the images and videos in the training split. Its performance will be evaluated on the images and videos in the test split.

Please click the *help* button above for more information.

NOTE: you must click the *Create dataset* button at the bottom to save your changes and create the dataset with the splits you have selected.

Split randomly (automatic)

Random seed (can be blank) Test proportion target (%)

Note: cameras or videos that have a grey lock symbol besides them below will *not* be affected / randomly assigned by clicking these buttons.

Manually edit splits

Cameras	Videos	Images	# imgs	Split		
	Left		22	<input type="button" value="Train"/>	<input type="button" value="Test"/>	<input type="button" value="✕"/>
			11. IR - ch01_20191112022303 Down fish .mp4	<input type="button" value="Train"/>	<input type="button" value="Test"/>	<input type="button" value="✕"/>

4. Build a training dataset

Dataset builder (random; top)

- The buttons in (b) will randomly assign the split by camera, video or individual image
 - E.g. clicking *Randomly split cameras* will assign the same split (train or test) to all of the images from videos from that camera
- Similarly for *Randomly split videos*

Fish counter Home River - infrared surveys Create dataset ? Help

Create dataset for *River - infrared surveys*

Objective: the objective is to split the available data into train and test splits. The model will be trained using the images and videos in the training split. Its performance will be evaluated on the images and videos in the test split.

Please click the *help* button above for more information.

NOTE: you must click the *Create dataset* button at the bottom to save you changes and create the dataset with the splits you have selected.

Split randomly (automatic)

Random seed (can be blank) Test proportion target (%)

Note: cameras or videos that have a grey lock symbol besides them below will not be affected / randomly assigned by clicking these buttons.

Manually edit splits

Cameras	Videos	Images	# imgs	Split
Left			22	<input type="button" value="Train"/> <input type="button" value="Test"/> <input type="button" value="lock"/>
	11. IR - ch01_20191112022303 Down fish .mp4		15	<input type="button" value="Train"/> <input type="button" value="Test"/> <input type="button" value="lock"/>

4. Build a training dataset

Dataset builder (random; top)

- When splitting randomly
 - You can determine the proportion of the data that will be assigned to the *test* split by changing the *Test proportion target* field in (a)
 - If the *Random seed* field (in (a)) is blank, a different split will be generated each time. Giving a value will control the random split that is used.

Fish counter Home River - infrared surveys Create dataset ? Help

Create dataset for *River - infrared surveys*

Objective: the objective is to split the available data into train and test splits. The model will be trained using the images and videos in the training split. Its performance will be evaluated on the images and videos in the test split.

Please click the *help* button above for more information.

NOTE: you must click the *Create dataset* button at the bottom to save you changes and create the dataset with the splits you have selected.

Split randomly (automatic)

Random seed (can be blank) Test proportion target (%)

(a)

(b)

Note: cameras or videos that have a grey lock symbol besides them below will not be affected / randomly assigned by clicking these buttons.

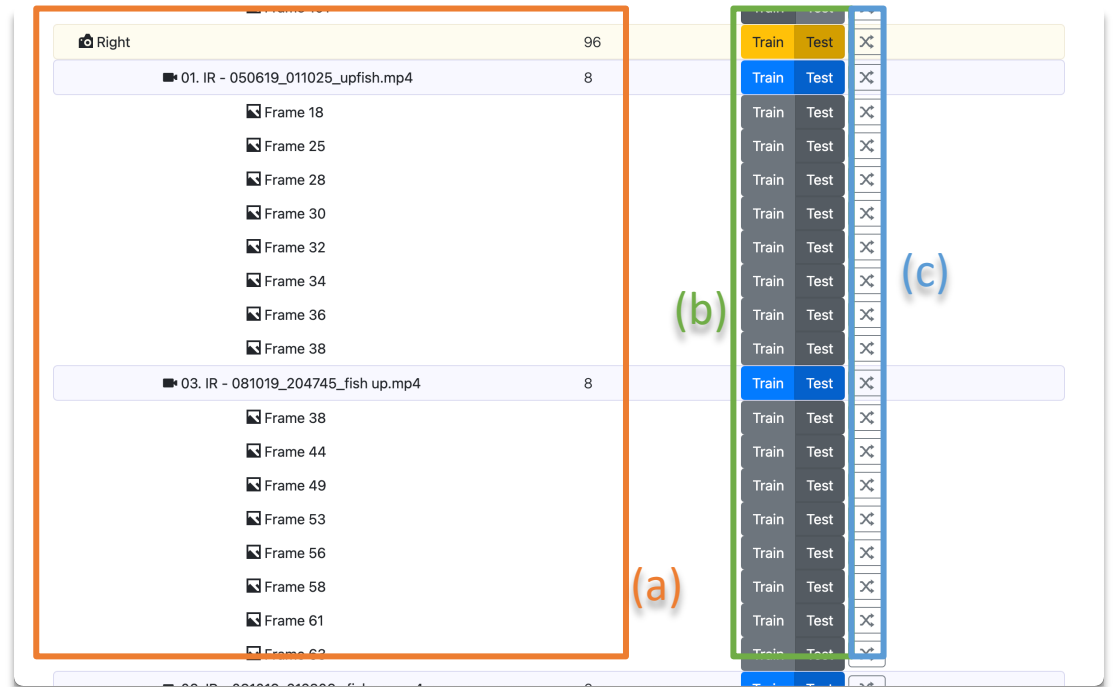
Manually edit splits

Cameras	Videos	Images	# imgs	Split
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	22	<input type="button" value="Train"/> <input type="button" value="Test"/> <input type="button" value="Refresh"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	15	<input type="button" value="Train"/> <input type="button" value="Test"/> <input type="button" value="Refresh"/>

4. Build a training dataset

Dataset builder (manual)

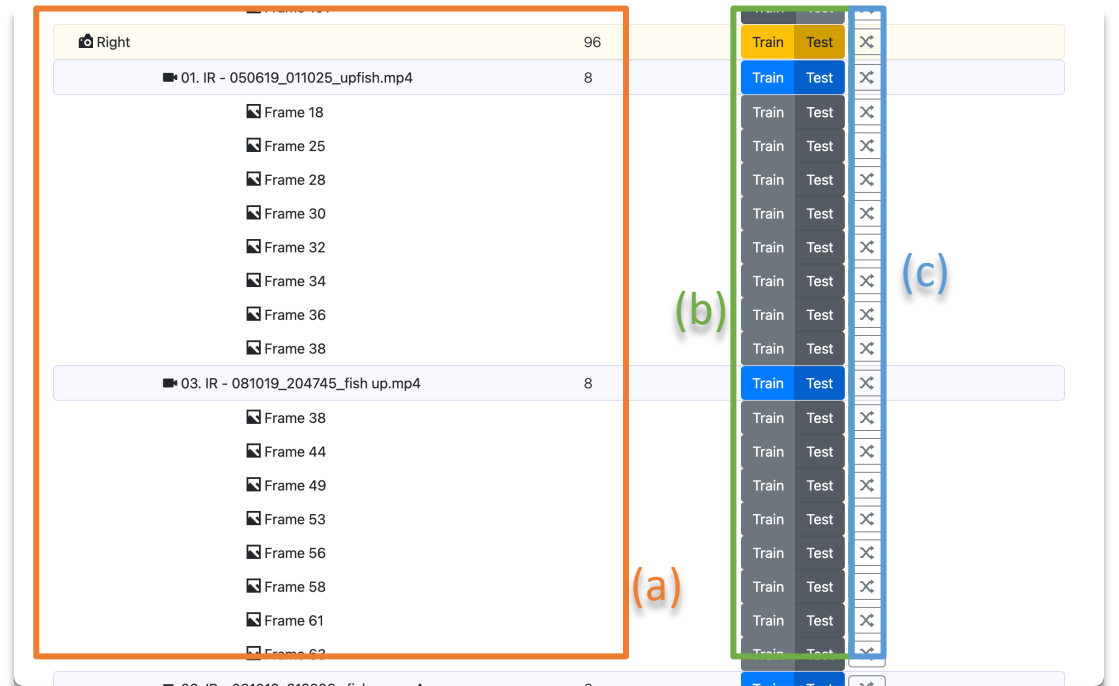
- Further down you will find manual controls for the splits for each image in the dataset
- The images in (a) are divided by camera and video



4. Build a training dataset

Dataset builder (manual)

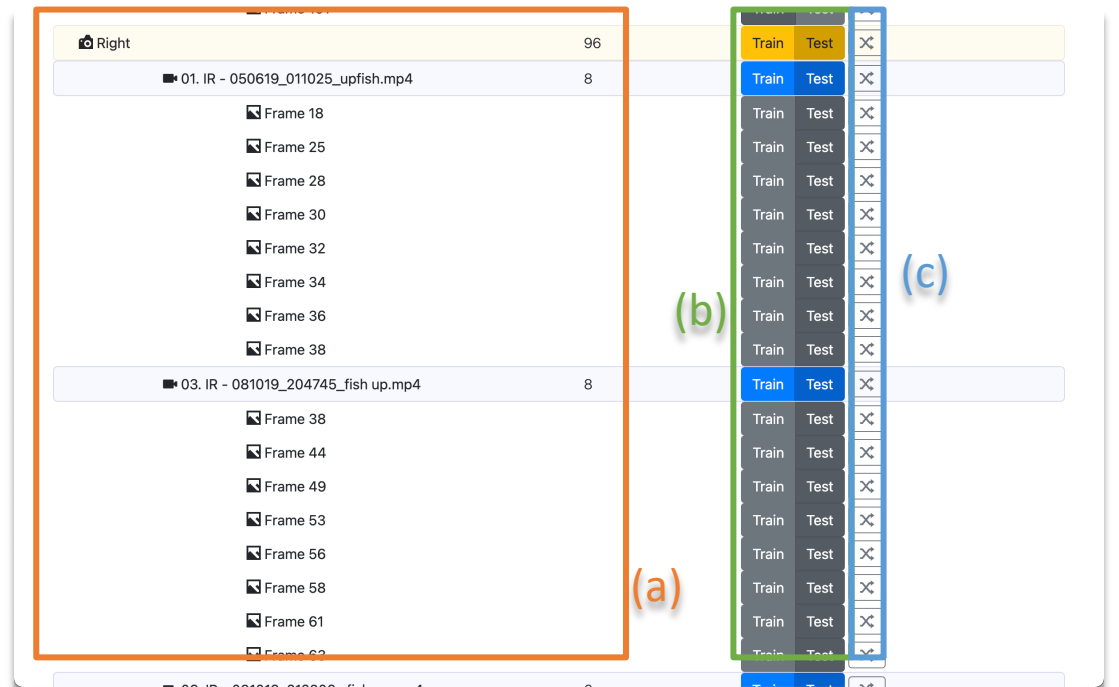
- You can assign images to train or test by clicking the *Train or Test* buttons in (b).
 - Clicking the grey buttons will assign the split of an individual image.
 - Clicking the blue or yellow buttons will assign the split to all images in the given video or camera respectively



4. Build a training dataset

Dataset builder (manual)

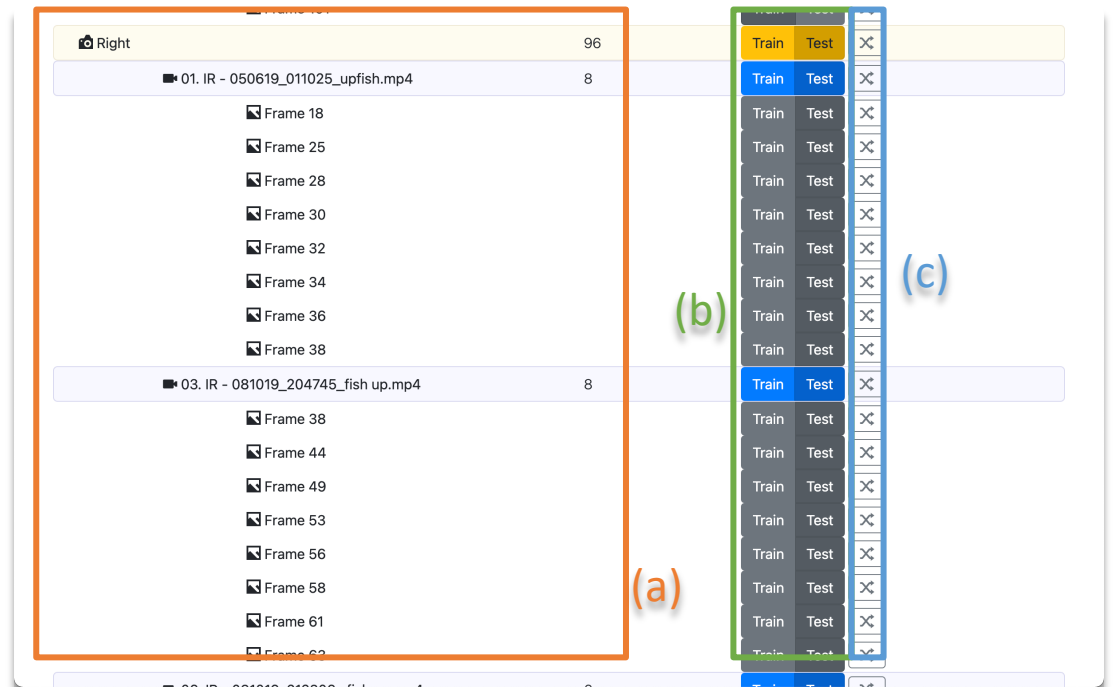
- Clicking the buttons in (c) will change the button to a lock icon. Locked images/videos/cameras will be unaffected if you click the *split randomly* buttons further up, as discussed previously
 - This allows you to specifically assign a split to certain images/videos/cameras, while allowing the rest to be determined randomly



4. Build a training dataset

Dataset builder (manual)

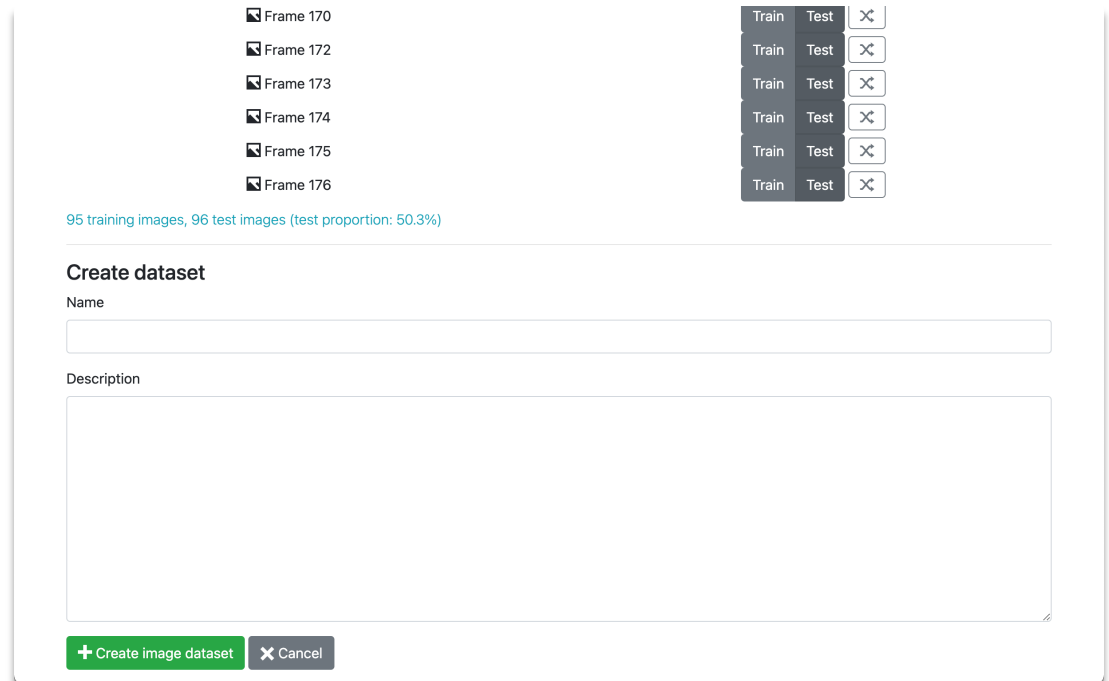
- Clicking the buttons in (c) will change the button to a lock icon. Locked images/videos/cameras will be unaffected if you click the *split randomly* buttons further up, as discussed previously
 - This allows you to specifically assign a split to certain images/videos/cameras, while allowing the rest to be determined randomly



4. Build a training dataset

Dataset builder

- Finally, give the dataset a name and a description
- Click the green *Create image dataset* button to create it
 - As stated earlier, once created, only its name and description can be edited; the splits assigned to the images *cannot* be modified later



The screenshot shows a dataset builder interface. On the left, a list of frames is shown with checkboxes: Frame 170, Frame 172, Frame 173, Frame 174, Frame 175, and Frame 176. On the right, a table shows the assignment of splits to these frames. The table has three columns: 'Train', 'Test', and a close button 'X'. The first row shows 'Train' selected for Frame 170, 'Test' selected for Frame 172, and 'X' for Frame 173. The second row shows 'Train' selected for Frame 174, 'Test' selected for Frame 175, and 'X' for Frame 176. Below the table, a summary line reads: "95 training images, 96 test images (test proportion: 50.3%)". Below this is a "Create dataset" section with a "Name" input field and a "Description" text area. At the bottom, there are two buttons: a green "+ Create image dataset" button and a grey "X Cancel" button.

Frame	Train	Test	Close
Frame 170	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="button" value="X"/>
Frame 172	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="button" value="X"/>
Frame 173	<input type="checkbox"/>	<input type="checkbox"/>	<input type="button" value="X"/>
Frame 174	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="button" value="X"/>
Frame 175	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="button" value="X"/>
Frame 176	<input type="checkbox"/>	<input type="checkbox"/>	<input type="button" value="X"/>

95 training images, 96 test images (test proportion: 50.3%)

Create dataset

Name

Description

Using AVIMS

5. Train an object detection model

5. Train an object detection model

- Section 5 of the survey page lists the models that have been trained.
- Section 5 will be grey and not usable if:
 - You have not created any datasets

5. Train an object detection model










Using one of the training datasets listed in section 4 above, train an object detection model that will be used to analyse videos and generate results. Click the *train an object detection model* button and choose a training dataset to use. You will be taken to a page that allows you to modify the settings used to train the model.

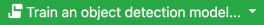
Training a model often takes 1 hour or more. If other training or analysis jobs have been queued, your model will wait in the queue until other jobs have been completed.

While a model is training and after training is complete you may click its *report* button to view graphs showing the how the accuracy of the model progressed during training. It also contains logs that can be used by the development team to assess problems.

Once training is complete, the *view predictions* button will allow you to view the results of applying the model to the individual frames and still images that are in the test set. Clicking this will show the test set images in the annotation tool, with annotations automatically generated using the model. This will give you an idea of the kind of objects that the model is successfully detecting or missing. You may notice the detection failures correlate with certain appearance, e.g. fish with a curved pose. Under the *analysis results* column you will see a link that will take you to the results of all analyses that have been performed using this model.

The *analysis results* column on the right will allow you to view analysis results created using this model. These are the results obtained by using the model to analyse videos, in contrast to the *view predictions* button that views the results on still images in the test set.

Name	Dataset	Status	Accuracy	Created	Analysis results
 River infrared - split by image	River infrared - split by image	Ready for use 	mAP=55.685% 	Aug. 17, 2021, 3:55 a.m. by g french	0 analyses
 River infrared - split by video	River infrared - split by video	Ready for use 	mAP=51.428% 	Aug. 17, 2021, 3:55 a.m. by g french	4 analyses
 River infrared - split by camera	River infrared - split by camera	Ready for use 	mAP=45.556% 	Aug. 17, 2021, 3:54 a.m. by g french	0 analyses



5. Train an object detection model

- Each model in the list shows:
 - The name of the model, with an edit button to change its' name
 - The dataset used to train it
 - A training report and log
 - Accuracy and predictions on the test set
- Links to any analysis results generated using the model (see section 6, later)

5. Train an object detection model










Using one of the training datasets listed in section 4 above, train an object detection model that will be used to analyse videos and generate results. Click the *train an object detection model* button and choose a training dataset to use. You will be taken to a page that allows you to modify the settings used to train the model.


Training a model often takes 1 hour or more. If other training or analysis jobs have been queued, your model will wait in the queue until other jobs have been completed.

While a model is training and after training is complete you may click its *report* button to view graphs showing the how the accuracy of the model progressed during training. It also contains logs that can be used by the development team to assess problems.

Once training is complete, the *view predictions* button will allow you to view the results of applying the model to the individual frames and still images that are in the test set. Clicking this will show the test set images in the annotation tool, with annotations automatically generated using the model. This will give you an idea of the kind of objects that the model is successfully detecting or missing. You may notice the detection failures correlate with certain appearance, e.g. fish with a curved pose. Under the *analysis results* column you will see a link that will take you to the results of all analyses that have been performed using this model.

The *analysis results* column on the right will allow you to view analysis results created using this model. These are the results obtained by using the model to analyse videos, in contrast to the *view predictions* button that views the results on still images in the test set.

Name	Dataset	Status	Accuracy	Created	Analysis results
 River infrared - split by image	River infrared - split by image	Ready for use  Report	mAP=55.685%  View predictions	Aug. 17, 2021, 3:55 a.m. by gfrench	0 analyses
 River infrared - split by video	River infrared - split by video	Ready for use  Report	mAP=51.428%  View predictions	Aug. 17, 2021, 3:55 a.m. by gfrench	4 analyses
 River infrared - split by camera	River infrared - split by camera	Ready for use  Report	mAP=45.556%  View predictions	Aug. 17, 2021, 3:54 a.m. by gfrench	0 analyses

 Train an object detection model... ▾










5. Train an object detection model

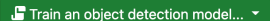
- To train an object detection model, click the green *Train an object detection model...* button
 - A menu will appear allowing you to select the dataset you wish to use
 - Choose a dataset

progressed during training. It also contains logs that can be used by the development team to assess problems.

Once training is complete, the *view predictions* button will allow you to view the results of applying the model to the individual frames and still images that are in the test set. Clicking this will show the test set images in the annotation tool, with annotations automatically generated using the model. This will give you an idea of the kind of objects that the model is successfully detecting or missing. You may notice the detection failures correlate with certain appearance, e.g. fish with a curved pose. Under the *analysis results* column you will see a link that will take you to the results of all analyses that have been performed using this model.

The *analysis results* column on the right will allow you to view analysis results created using this model. These are the results obtained by using the model to analyse videos, in contrast to the *view predictions* button that views the results on still images in the test set.

Name	Dataset	Status	Accuracy	Created	Analysis results
 River infrared - split by image	River infrared - split by image	Ready for use 	mAP=55.685% 	Aug. 17, 2021, 3:55 a.m. by gfrench	0 analyses
 River infrared - split by video	River infrared - split by video	Ready for use 	mAP=51.428% 	Aug. 17, 2021, 3:55 a.m. by gfrench	4 analyses
 River infrared - split by camera	River infrared - split by camera	Ready for use 	mAP=45.556% 	Aug. 17, 2021, 3:54 a.m. by gfrench	0 analyses

 Train an object detection model... ▾

- ... using *River infrared - split by image* dataset
- ... using *River infrared - split by video* dataset
- ... using *River infrared - split by camera* dataset

Use one of the object detection models listed in section 5 above to analyse videos and generate reports.

Clicking the *analyse videos* button will take you to a page where you can:

5. Train an object detection model

- The train model form:
 - Fill in the name and description
 - The model type allows you to choose between detecting objects as oriented ellipses, or non-oriented boxes
 - The default settings for *Epochs* and *Score threshold* should work in most cases. You can try other settings if you wish

Fish counter Home surveys Train a model for dataset *River infrared - split by image*

Train a model for dataset *River infrared - split by image*

Likely unrealistically accurate. Not representative of real life usage for short videos like this.

Dataset size: 143 training samples, 48 test samples

Name

Description

Model type

Mask R-CNN can detect precise outlines that we simplify to ellipses, while Faster R-CNN can only detect rectangles

Epochs

Train for this many epochs. After each epoch the loss and model performance will be reported in the log.

Score threshold

Inference: the detection threshold used during inference, between 0 and 1. Objects whose prediction score is less than this value will be ignored as false detections.

[Show advanced training settings...](#)

5. Train an object detection model

- The train model form:
 - The yellow *Show advanced training settings* button will show more fields. These can be left as is.
 - Speak to the developers about using different settings here
- Click the green *Train* button to train the model
 - Training takes time and will happen in the background

Fish counter Home surveys Train a model for dataset *River infrared - split by image*

Train a model for dataset *River infrared - split by image*

Likely unrealistically accurate. Not representative of real life usage for short videos like this.

Dataset size: 143 training samples, 48 test samples

Name

Description

Model type

Mask R-CNN can detect precise outlines that we simplify to ellipses, while Faster R-CNN can only detected rectangles

Epochs

Train for this many epochs. After each epoch the loss and model performance will be reported in the log.

Score threshold

Inference: the detection threshold used during inference, between 0 and 1. Objects whose prediction score is less than this value will be ignored as false detections.

[Show advanced training settings...](#)

5. Train an object detection model

- The status will start out as *Queued*, indicating that the training job has not started. Once it starts, the yellow *Report* button will appear. You can click this during training to bring up a progress graph

5. Train an object detection model










Using one of the training datasets listed in section 4 above, train an object detection model that will be used to analyse videos and generate results. Click the *train an object detection model* button and choose a training dataset to use. You will be taken to a page that allows you to modify the settings used to train the model.


Training a model often takes 1 hour or more. If other training or analysis jobs have been queued, your model will wait in the queue until other jobs have been completed.

While a model is training and after training is complete you may click its *report* button to view graphs showing the how the accuracy of the model progressed during training. It also contains logs that can be used by the development team to assess problems.

Once training is complete, the *view predictions* button will allow you to view the results of applying the model to the individual frames and still images that are in the test set. Clicking this will show the test set images in the annotation tool, with annotations automatically generated using the model. This will give you an idea of the kind of objects that the model is successfully detecting or missing. You may notice the detection failures correlate with certain appearance, e.g. fish with a curved pose. Under the *analysis results* column you will see a link that will take you to the results of all analyses that have been performed using this model.

The *analysis results* column on the right will allow you to view analysis results created using this model. These are the results obtained by using the model to analyse videos, in contrast to the *view predictions* button that views the results on still images in the test set.

Name	Dataset	Status	Accuracy	Created	Analysis results
 River infrared - split by image	River infrared - split by image	Ready for use 	mAP=55.685% 	Aug. 17, 2021, 3:55 a.m. by gfred	0 analyses
 River infrared - split by video	River infrared - split by video	Ready for use 	mAP=51.428% 	Aug. 17, 2021, 3:55 a.m. by gfred	4 analyses
 River infrared - split by camera	River infrared - split by camera	Ready for use 	mAP=45.556% 	Aug. 17, 2021, 3:54 a.m. by gfred	0 analyses

 Train an object detection model...

5. Train an object detection model

- Once training has finished, the status will change to *Ready for Use*, as seen in the image to the right
 - Under the accuracy column you will see a measure of the accuracy as *mean average precision (mAP)*
 - The *View predictions* button will be available. Clicking it will show the images in the dataset test split in the labelling tool, with the labels that were automatically predicted by the model

5. Train an object detection model










Using one of the training datasets listed in section 4 above, train an object detection model that will be used to analyse videos and generate results. Click the *train an object detection model* button and choose a training dataset to use. You will be taken to a page that allows you to modify the settings used to train the model.

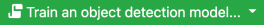
Training a model often takes 1 hour or more. If other training or analysis jobs have been queued, your model will wait in the queue until other jobs have been completed.

While a model is training and after training is complete you may click its *report* button to view graphs showing the how the accuracy of the model progressed during training. It also contains logs that can be used by the development team to assess problems.

Once training is complete, the *view predictions* button will allow you to view the results of applying the model to the individual frames and still images that are in the test set. Clicking this will show the test set images in the annotation tool, with annotations automatically generated using the model. This will give you an idea of the kind of objects that the model is successfully detecting or missing. You may notice the detection failures correlate with certain appearance, e.g. fish with a curved pose. Under the *analysis results* column you will see a link that will take you to the results of all analyses that have been performed using this model.

The *analysis results* column on the right will allow you to view analysis results created using this model. These are the results obtained by using the model to analyse videos, in contrast to the *view predictions* button that views the results on still images in the test set.

Name	Dataset	Status	Accuracy	Created	Analysis results
 River infrared - split by image	River infrared - split by image	Ready for use 	mAP=55.685% 	Aug. 17, 2021, 3:55 a.m. by gfrench	0 analyses
 River infrared - split by video	River infrared - split by video	Ready for use 	mAP=51.428% 	Aug. 17, 2021, 3:55 a.m. by gfrench	4 analyses
 River infrared - split by camera	River infrared - split by camera	Ready for use 	mAP=45.556% 	Aug. 17, 2021, 3:54 a.m. by gfrench	0 analyses












Using AVIMS


6. Analyse videos

6. Analyse videos

The blue *Analyse videos* button In Section 6 will take you to the analysis page

The *analysis results* column on the right will allow you to view analysis results created using this model. These are the results obtained by using the model to analyse videos, in contrast to the *view predictions* button that views the results on still images in the test set.

Name	Dataset	Status	Accuracy	Created	Analysis results
 River infrared - split by image	River infrared - split by image	Ready for use  Report	mAP=55.685%  View predictions	Aug. 17, 2021, 3:55 a.m. by gfrench	0 analyses
 River infrared - split by video	River infrared - split by video	Ready for use  Report	mAP=51.428%  View predictions	Aug. 17, 2021, 3:55 a.m. by gfrench	4 analyses
 River infrared - split by camera	River infrared - split by camera	Ready for use  Report	mAP=45.556%  View predictions	Aug. 17, 2021, 3:54 a.m. by gfrench	0 analyses


 Train an object detection model... ▾

6. Analyse videos

Use one of the object detection models listed in section 5 above to analyse videos and generate reports.

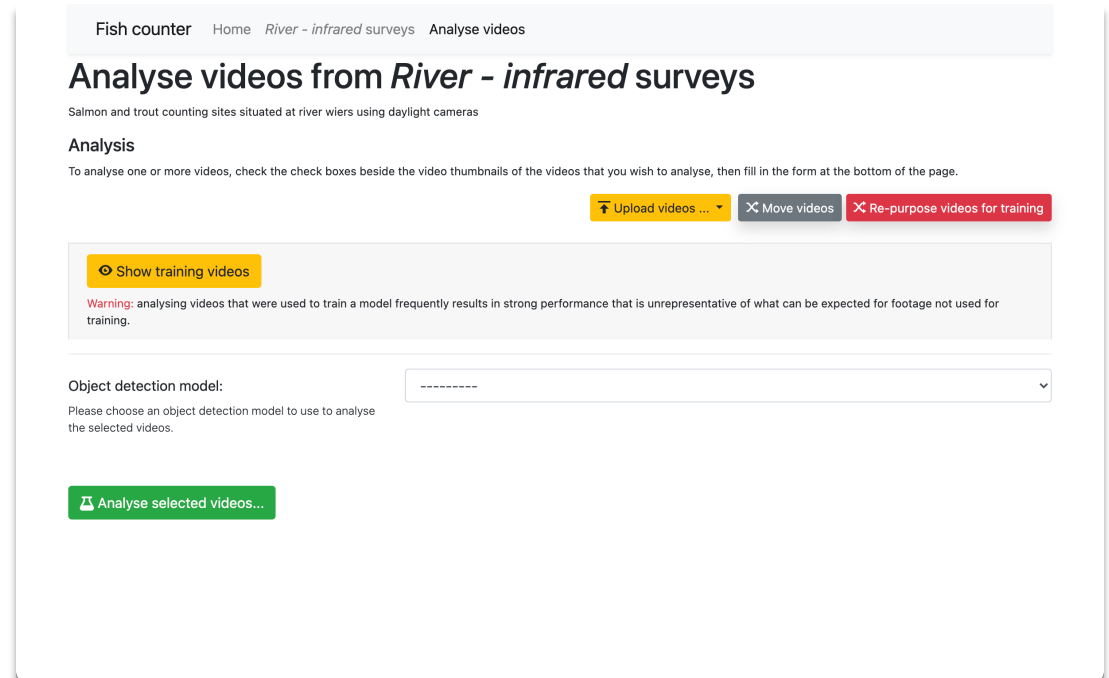
Clicking the *analyse videos* button will take you to a page where you can:

- Upload videos for analysis
- Select videos to analyse and choose an object detection model that you have trained with which to analyse them
- View results of analyses previously performed on videos uploaded for analyses or on training videos.

 Analyse videos

6. Analyse videos

If you haven't uploaded any videos for analysis yet, it will look like this:



6. Analyse videos

If you have, it will look like this:

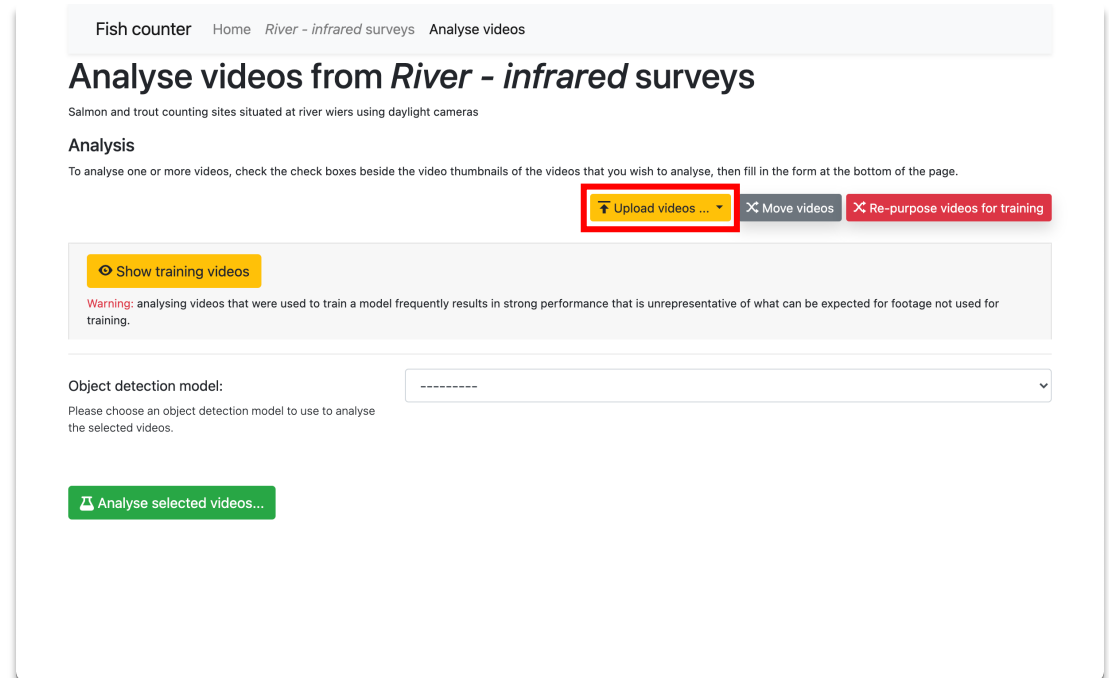
The screenshot displays a web interface for analyzing videos. At the top, there is a navigation bar with links for 'Fish counter', 'Home', 'Watery things surveys', 'Analyse videos', and 'Admin'. The main heading is 'Analyse videos from *Watery things* surveys'. Below this, a sub-heading reads 'Things that live in the water'. The section is titled 'Analysis' and includes a note: 'To analyse one or more videos, check the check boxes beside the video thumbnails of the videos that you wish to analyse, then fill in the form at the bottom of the page.' There are three action buttons: 'Upload videos ...', 'Move videos', and 'Re-purpose videos for training'. The main content area lists four video entries, each with a checkbox, a video thumbnail, and detailed metadata. To the right of each entry are buttons for 'Play video', 'D/L video', 'Summary', and a download icon, along with a 'Most recent analysis' timestamp and an 'All results' button.

Video ID	Original filename	Size	Resolution	FPS	Frame count	Length	Camera	Most recent analysis
<input type="checkbox"/>	30. DL 131219_144903_fish Down.mp4	1020.3 KB	1280 x 720	10.0	50	0:00:05	Central	July 28, 2021, 4:39 p.m.
<input type="checkbox"/>	22. DL - 230419_153023_otter Down.mp4	1.1 MB	1280 x 720	25.0	150	0:00:06	Central	July 28, 2021, 4:39 p.m.
<input type="checkbox"/>	36. DL 070519_105820_otter-fish down.mp4	5.3 MB	1280 x 720	10.0	110	0:00:11	Central	July 28, 2021, 4:39 p.m.
<input type="checkbox"/>	38. DL - 070519_195205_otter down.mp4	2.5 MB	1280 x 720	10.0	130	0:00:13	Central	July 28, 2021, 4:39 p.m.

6. Analyse videos

To analyse videos, you will need to upload them

- Click the yellow *Upload videos* button
- A menu will appear asking you to choose a camera to associate them with
 - If you need to create a new camera, you will need to return to the survey page, then to the upload page as in section 1
- You will be taken to an upload page where you can upload video files



6. Analyse videos

The *Move videos* button allows you to change the camera that videos are associated with, as with the upload page in section 1

Fish counter Home River - infrared surveys Analyse videos

Analyse videos from River - infrared surveys

Salmon and trout counting sites situated at river wiers using daylight cameras

Analysis

To analyse one or more videos, check the check boxes beside the video thumbnails of the videos that you wish to analyse, then fill in the form at the bottom of the page.

[Upload videos ...](#) [Move videos](#) [Re-purpose videos for training](#)

[Show training videos](#)

Warning: analysing videos that were used to train a model frequently results in strong performance that is unrepresentative of what can be expected for footage not used for training.

Object detection model:

Please choose an object detection model to use to analyse the selected videos.

[Analyse selected videos...](#)

6. Analyse videos

Clicking the yellow *Show training videos* will show the videos that were used for training.

- You can analyse these too, with the caveat that analysing a video that was used for training will get strong performance unrepresentative of what can be expected on other footage

Fish counter Home River - infrared surveys Analyse videos

Analyse videos from River - infrared surveys

Salmon and trout counting sites situated at river wiers using daylight cameras


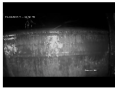

Analysis

To analyse one or more videos, check the check boxes beside the video thumbnails of the videos that you wish to analyse, then fill in the form at the bottom of the page.

[Upload videos ...](#) [Move videos](#) [Re-purpose videos for training](#)

[Show training videos](#)

Warning: analysing videos that were used to train a model frequently results in strong performance that is unrepresentative of what can be expected for footage not used for training.

<input type="checkbox"/>	 <p>Original filename: 11. IR - ch01_20191112022303 Down fish .mp4, Size: 1.0 MB Uploaded: March 11, 2021, 11:11 a.m. by admin Resolution: 1280 x 720, FPS: 25.0, Frame count: 350, Length: 0:00:14 Size: 721.8 KB (after re-encoding) Camera: Left</p>	<p>Most recent analysis: Aug. 17, 2021, 3:11 p.m.</p> <p>Play video D/L video Summary Download</p> <p>See: All results</p>
<input type="checkbox"/>	 <p>Original filename: 41. IR - ch04_20190521005636_fish up.mp4, Size: 9.3 MB Uploaded: April 16, 2021, 1:47 p.m. by crobinson Resolution: 1280 x 720, FPS: 10.0, Frame count: 470, Length: 0:00:47 Size: 8.2 MB (after re-encoding) Camera: Right</p>	<p>Most recent analysis: Aug. 17, 2021, 2:59 p.m.</p> <p>Play video D/L video Summary Download</p> <p>See: All results</p>
<input type="checkbox"/>	 <p>Original filename: 42. IR - ch04_20190521005757_fish up.mp4, Size: 1.0 MB Uploaded: April 16, 2021, 1:48 p.m. by crobinson Resolution: 1280 x 720, FPS: 10.0, Frame count: 50, Length: 0:00:05</p>	<p>Most recent analysis: Aug. 17, 2021, 3:11 p.m.</p> <p>Play video D/L video Summary Download</p> <p>See: All results</p>

6. Analyse videos

You need to select the videos you want to analyse.

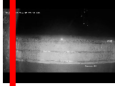

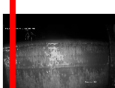
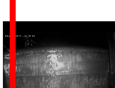
- For each video you want to analyse, tick the checkbox to the left of its' thumbnail image.

To analyse one or more videos, check the check boxes beside the video thumbnails of the videos that you wish to analyse, then fill in the form at the bottom of the page.

[Upload videos ...](#) [Move videos](#) [Re-purpose videos for training](#)

[Show training videos](#)

Warning: analysing videos that were used to train a model frequently results in strong performance that is unrepresentative of what can be expected for footage not used for training.

<input checked="" type="checkbox"/>		Original filename: 11. IR - ch01_20191112022303 Down fish .mp4, Size: 1.0 MB Uploaded: March 11, 2021, 11:11 a.m. by admin Resolution: 1280 x 720, FPS: 25.0, Frame count: 350, Length: 0:00:14 Size: 721.8 KB (after re-encoding) Camera: Left	Most recent analysis: Aug. 17, 2021, 3:11 p.m. Play video D/L video Summary Download See: All results
<input type="checkbox"/>		Original filename: 41. IR - ch04_20190521005636_fish up.mp4, Size: 9.3 MB Uploaded: April 16, 2021, 1:47 p.m. by crobinson Resolution: 1280 x 720, FPS: 10.0, Frame count: 470, Length: 0:00:47 Size: 8.2 MB (after re-encoding) Camera: Right	Most recent analysis: Aug. 17, 2021, 2:59 p.m. Play video D/L video Summary Download See: All results
<input checked="" type="checkbox"/>		Original filename: 42. IR - ch04_20190521005757_fish up.mp4, Size: 1.0 MB Uploaded: April 16, 2021, 1:48 p.m. by crobinson Resolution: 1280 x 720, FPS: 10.0, Frame count: 50, Length: 0:00:05 Size: 886.9 KB (after re-encoding) Camera: Right	Most recent analysis: Aug. 17, 2021, 3:11 p.m. Play video D/L video Summary Download See: All results
<input checked="" type="checkbox"/>		Original filename: 43. IR - ch04_20190521011201_fish up.mp4, Size: 8.7 MB Uploaded: April 16, 2021, 1:48 p.m. by crobinson Resolution: 1280 x 720, FPS: 10.0, Frame count: 470, Length: 0:00:47 Size: 8.2 MB (after re-encoding) Camera: Right	Most recent analysis: Aug. 17, 2021, 3:12 p.m. Play video D/L video Summary Download See: All results

6. Analyse videos

Choose the object detection model using the drop-down near the bottom of the page. One is selected here.

Then click the green *Analyse selected videos...* button

The screenshot displays a video analysis interface. At the top, there is a list of four video entries. Each entry includes a checkbox, a video thumbnail, and detailed metadata. The third and fourth entries are selected with blue checkmarks. To the right of each entry are two icons: a green play button and a grey download button. Below the list, there is a red-bordered box containing an 'Object detection model:' label and a dropdown menu. The dropdown menu is currently set to 'River infrared - split by video'. Below this box is a green button with a play icon and the text 'Analyse selected videos...'.

Selection	Thumbnail	Original filename	Size	Resolution	FPS	Frame count	Length	Camera	Results	Play	Download
<input type="checkbox"/>		15. IR - 130519_220123_otter down.mp4	1.2 MB	1280 x 720	10.0	60	0:00:06	Central	No results yet		
<input type="checkbox"/>		19. IR - 130519_235313_otter down.mp4	984.2 KB	1280 x 720	10.0	50	0:00:05	Central	No results yet		
<input checked="" type="checkbox"/>		23. IR - 240419_044704_otter Down.mp4	798.0 KB	1280 x 720	25.0	125	0:00:05	Central	No results yet		
<input checked="" type="checkbox"/>		25. IR - 270219_235046_otter Down-camera2.mp4	780.4 KB	1280 x 720	25.0	150	0:00:06	Central	No results yet		

Object detection model: River infrared - split by video

Please choose an object detection model to use to analyse the selected videos.

▶ Analyse selected videos...

6. Analyse videos

The settings in the *analyse videos* form can be left as is.





Click the green *Analyse* button to queue the analysis job.

Fish counter Home River - infrared surveys Analyse videos ... using River infrared - split by video

Analyse videos from *River - infrared* surveys using model *River infrared - split by video*.

TODO: Give warnings for videos previously inferred using this model

Videos to analyse

-  45. IR - ch04_20190521012926_fish up.mp4
-  46. IR - ch04_20190521013420_fish up.mp4
-  23. IR - 240419_044704_otter Down.mp4
-  25. IR - 270219_235046_otter Down-camera2.mp4

Score threshold
The detection threshold, between 0 and 1. Objects whose prediction score is less than this value will, be ignored as false detections.

Tracker: minimum detected frames
The object must be detected on at least this number of frames to be regarded as present in the video. Objects detected for less than this number of frames are discarded.

Tracker: max missing run
The object may go missing for up to this number of frames and still be re-detected. An object that goes missing for longer than this will be lost.

Tracker: match threshold
The overlap threshold between an object tracked in prior frames and a detection in the current frame for them to be considered to belong to the same object

6. Analyse videos

Once at least one analysis of a video is complete (a video can be analysed multiple times, e.g. by multiple models), the results can be quickly accessed from the analysis page.

Fish counter Home River - infrared surveys Analyse videos

Analyse videos from *River - infrared surveys*

Salmon and trout counting sites situated at river wiers using daylight cameras










Analysis

To analyse one or more videos, check the check boxes beside the video thumbnails of the videos that you wish to analyse, then fill in the form at the bottom of the page.

[Upload videos ...](#) [Move videos](#) [Re-purpose videos for training](#)

[Show training videos](#)

Warning: analysing videos that were used to train a model frequently results in strong performance that is unrepresentative of what can be expected for footage not used for training.

<input type="checkbox"/>	 <p>Original filename: 11. IR - ch01_20191112022303 Down fish .mp4, Size: 1.0 MB Uploaded: March 11, 2021, 11:11 a.m. by admin Resolution: 1280 x 720, FPS: 25.0, Frame count: 350, Length: 0:00:14 Size: 721.8 KB (after re-encoding) Camera: Left</p>	<p>Most recent analysis: Aug. 17, 2021, 3:11 p.m.</p> <p>Play video D/L video Summary</p> <p>See: All results</p>	 
<input type="checkbox"/>	 <p>Original filename: 41. IR - ch04_20190521005636_fish up.mp4, Size: 9.3 MB Uploaded: April 16, 2021, 1:47 p.m. by crobinson Resolution: 1280 x 720, FPS: 10.0, Frame count: 470, Length: 0:00:47 Size: 8.2 MB (after re-encoding) Camera: Right</p>	<p>Most recent analysis: Aug. 17, 2021, 2:59 p.m.</p> <p>Play video D/L video Summary</p> <p>See: All results</p>	 
<input type="checkbox"/>	 <p>Original filename: 42. IR - ch04_20190521005757_fish up.mp4, Size: 1.0 MB Uploaded: April 16, 2021, 1:48 p.m. by crobinson Resolution: 1280 x 720, FPS: 10.0, Frame count: 50, Length: 0:00:05</p>	<p>Most recent analysis: Aug. 17, 2021, 3:11 p.m.</p> <p>Play video D/L video Summary</p> <p>See: All results</p>	 

6. Analyse videos

A video with detected and tracked objects can be played or downloaded.

A tabular summary of the detections can be downloaded as a .CSV file or viewed as a table.

Fish counter Home River - infrared surveys Analyse videos

Analyse videos from River - infrared surveys

Salmon and trout counting sites situated at river wiers using daylight cameras










Analysis

To analyse one or more videos, check the check boxes beside the video thumbnails of the videos that you wish to analyse, then fill in the form at the bottom of the page.

[Upload videos ...](#) [Move videos](#) [Re-purpose videos for training](#)

[Show training videos](#)

Warning: analysing videos that were used to train a model frequently results in strong performance that is unrepresentative of what can be expected for footage not used for training.

<input type="checkbox"/>	 <p>Original filename: 11. IR - ch01_20191112022303 Down fish .mp4, Size: 1.0 MB Uploaded: March 11, 2021, 11:11 a.m. by admin Resolution: 1280 x 720, FPS: 25.0, Frame count: 350, Length: 0:00:14 Size: 721.8 KB (after re-encoding) Camera: Left</p>	<p>Most recent analysis: Aug. 17, 2021, 3:11 p.m.</p> <p>Play video D/L video Summary</p> <p>See: All results</p>	 
<input type="checkbox"/>	 <p>Original filename: 41. IR - ch04_20190521005636_fish up.mp4, Size: 9.3 MB Uploaded: April 16, 2021, 1:47 p.m. by crobinson Resolution: 1280 x 720, FPS: 10.0, Frame count: 470, Length: 0:00:47 Size: 8.2 MB (after re-encoding) Camera: Right</p>	<p>Most recent analysis: Aug. 17, 2021, 2:59 p.m.</p> <p>Play video D/L video Summary</p> <p>See: All results</p>	 
<input type="checkbox"/>	 <p>Original filename: 42. IR - ch04_20190521005757_fish up.mp4, Size: 1.0 MB Uploaded: April 16, 2021, 1:48 p.m. by crobinson Resolution: 1280 x 720, FPS: 10.0, Frame count: 50, Length: 0:00:05</p>	<p>Most recent analysis: Aug. 17, 2021, 3:11 p.m.</p> <p>Play video D/L video Summary</p> <p>See: All results</p>	 

6. Analyse videos

Clicking the yellow *All results* button will show you all the analysis results for that video...

Fish counter Home River - infrared surveys Analyse videos

Analyse videos from River - infrared surveys

Salmon and trout counting sites situated at river wiers using daylight cameras




Analysis

To analyse one or more videos, check the check boxes beside the video thumbnails of the videos that you wish to analyse, then fill in the form at the bottom of the page.

[Upload videos ...](#) [Move videos](#) [Re-purpose videos for training](#)

[Show training videos](#)

Warning: analysing videos that were used to train a model frequently results in strong performance that is unrepresentative of what can be expected for footage not used for training.

<input type="checkbox"/>	 <p>Original filename: 11. IR - ch01_20191112022303 Down fish .mp4, Size: 1.0 MB Uploaded: March 11, 2021, 11:11 a.m. by admin Resolution: 1280 x 720, FPS: 25.0, Frame count: 350, Length: 0:00:14 Size: 721.8 KB (after re-encoding) Camera: Left</p>	<p>Most recent analysis: Aug. 17, 2021, 3:11 p.m.</p> <p>Play video D/L video Summary Download</p> <p>See: All results</p>
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<input type="checkbox"/>	 <p>Original filename: 42. IR - ch04_20190521005757_fish up.mp4, Size: 1.0 MB Uploaded: April 16, 2021, 1:48 p.m. by crobinson Resolution: 1280 x 720, FPS: 10.0, Frame count: 50, Length: 0:00:05</p>	<p>Most recent analysis: Aug. 17, 2021, 3:11 p.m.</p> <p>Play video D/L video Summary Download</p> <p>See: All results</p>

6. Analyse videos

In this case, this video has only been analysed once, so only one entry is visible.

Clicking the small blue '4 analysis results' in the *Model* column will show all the analysis results created using that model...

Fish counter Home River - infrared surveys Analyse videos Results for video 11. IR - ch01_20191112022303 Down fish .mp4

Analysis results for video 11. IR - ch01_20191112022303 Down fish .mp4

River - infrared - Left

Created	Model	Status	Output
Aug. 17, 2021, 3:10 p.m.	River infrared - split by video (all 4 analysis results for model)	Finished	▶ Play video ↓ D/L video ☰ Summary

6. Analyse videos

Analysis results from a model

This can also be accessed from the survey page; the last column in the table in section 5 links here.

Fish counter Home River - infrared surveys Analysis results from model River infrared - split by video

Analysis results from model *River infrared* - split by video

Created	Video	Status	Output
Aug. 17, 2021, 2:58 p.m.	41. IR - ch04_20190521005636_fish up.mp4 <small>(all 1 analysis results for video)</small>	Finished	▶ Play video ↓ D/L video ☰ Summary
Aug. 17, 2021, 3:10 p.m.	11. IR - ch01_20191112022303 Down fish .mp4 <small>(all 1 analysis results for video)</small>	Finished	▶ Play video ↓ D/L video ☰ Summary
Aug. 17, 2021, 3:10 p.m.	42. IR - ch04_20190521005757_fish up.mp4 <small>(all 1 analysis results for video)</small>	Finished	▶ Play video ↓ D/L video ☰ Summary
Aug. 17, 2021, 3:10 p.m.	43. IR - ch04_20190521011201_fish up.mp4 <small>(all 1 analysis results for video)</small>	Finished	▶ Play video ↓ D/L video ☰ Summary

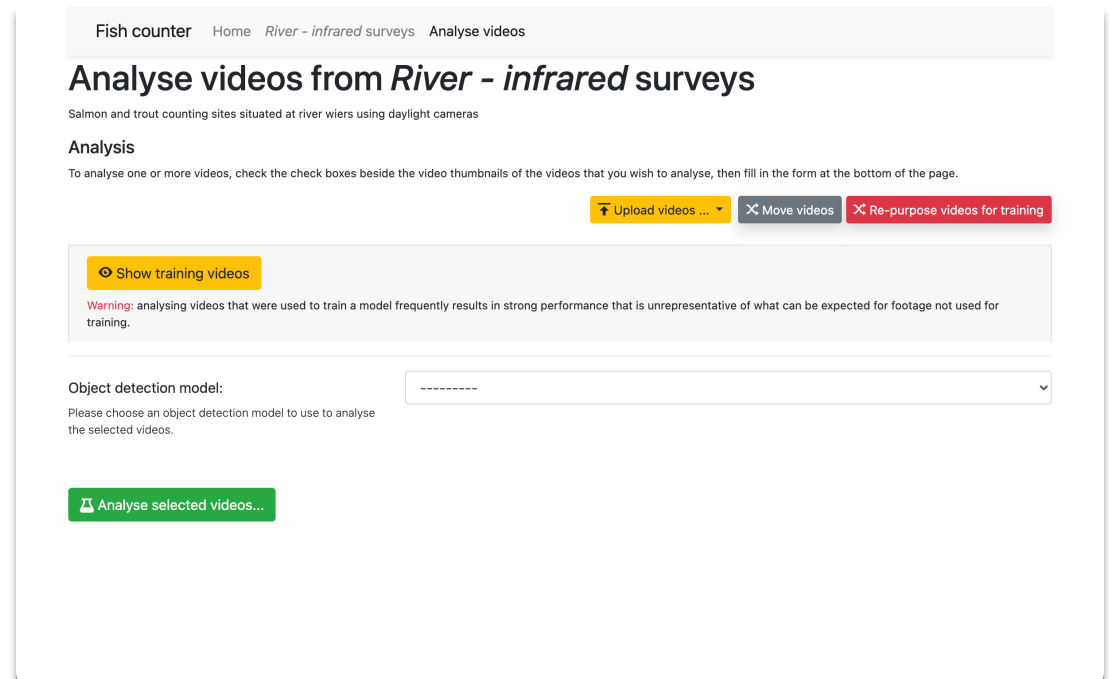
Using AVIMS

Circular work-flow

Circular work-flow

Let's assume that after watching the video generated by analysis, you conclude that the performance needs improvement.

One option is to add this video to the training set.



The screenshot shows a web interface for video analysis. At the top, there is a breadcrumb trail: "Fish counter Home River - infrared surveys Analyse videos". The main heading is "Analyse videos from River - infrared surveys". Below this, a subtitle reads "Salmon and trout counting sites situated at river wiers using daylight cameras". The section is titled "Analysis" and includes a note: "To analyse one or more videos, check the check boxes beside the video thumbnails of the videos that you wish to analyse, then fill in the form at the bottom of the page." There are three buttons: "Upload videos ..." (yellow), "Move videos" (grey), and "Re-purpose videos for training" (red). A yellow button labeled "Show training videos" is also present. A warning message states: "Warning: analysing videos that were used to train a model frequently results in strong performance that is unrepresentative of what can be expected for footage not used for training." Below this is a dropdown menu for "Object detection model:" with a placeholder "-----". A note below the dropdown says: "Please choose an object detection model to use to analyse the selected videos." At the bottom, there is a green button labeled "Analyse selected videos..." with a play icon.

Circular work-flow

Adding an analysed video to the training set

- Click the red *Re-purpose videos for training* button
- This will take you to a page where you can select videos to move to the training section

Fish counter Home River - infrared surveys Analyse videos

Analyse videos from River - infrared surveys

Salmon and trout counting sites situated at river wiers using daylight cameras

Analysis

To analyse one or more videos, check the check boxes beside the video thumbnails of the videos that you wish to analyse, then fill in the form at the bottom of the page.

[Upload videos ...](#) [Move videos](#) [Re-purpose videos for training](#)

[Show training videos](#)

Warning: analysing videos that were used to train a model frequently results in strong performance that is unrepresentative of what can be expected for footage not used for training.

Object detection model:

Please choose an object detection model to use to analyse the selected videos.

[Analyse selected videos...](#)

Circular work-flow

Adding an analysed video to the training set

- Return to the upload footage page (section 1) and choose frames for labelling
- Label these frames (section 3)
- Repeat the subsequent steps...

Thank you!

I hope you found it helpful

Contact

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