CAGE REPORTER

H2: DATA CAPTURE AND REAL-TIME DATA QUALITY ANALYSIS

SENSOR SYSTEM FOR 3D VISION

SEALABs task is to provide an underwater stereo vision system for use in fish cages (Figure 1), to monitor the condition of the fish, inspect the fish cage facility as well as provide vision for a Remotely Operated Vehicle (ROV). In this project, an optical 3D camera system is developed that can be used for capturing data to analyse A) FISH CONDITIONS and B) CAGE INSPECTION, as well as the robotic vision to the underwater vehicle for interactive path planning inside the cage volume.

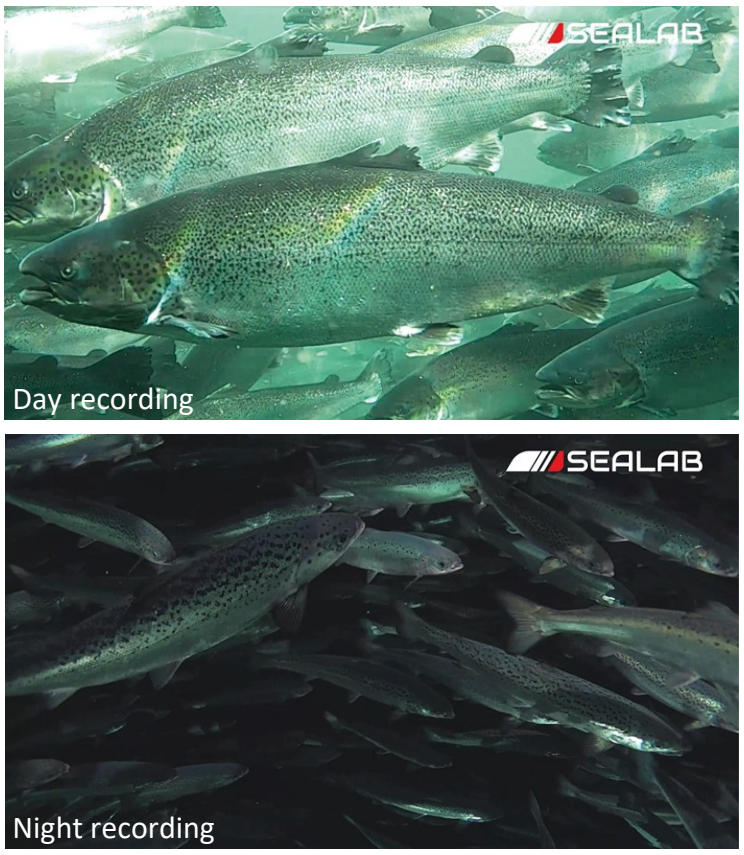

Figure 1: Video frame of salmon with SEALAB camera system.

REAL-TIME ANALYSIS OF DATA CAPTURE QUALITY

In order to perform high quality data capture from the cage volume, algorithms were developed that evaluate the quality of the data collected. To set criteria for video data recorded in the fish cages a look at common defects in digital video streams is necessary. One of the most common video artifacts in real time video streams is blocking. Figure 2 shows blocking in the red highlighted squares.

By determining the 'image quality' of videos in the context of aquaculture, the suitability of a particular image sequence for obtaining information for specific computer vision task can be evaluated. For an initial experiment, we concatenated six image/ video-sequences and evaluated several quality measurement candidates on them, as shown in Figure 3.

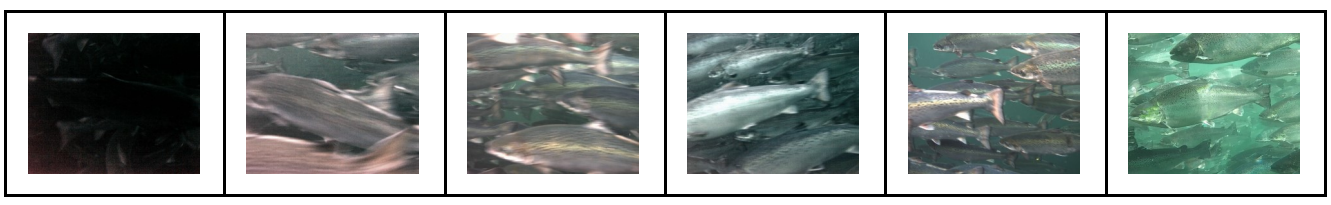

Figure 3: Stills of image sequences chosen for the initial experiment.

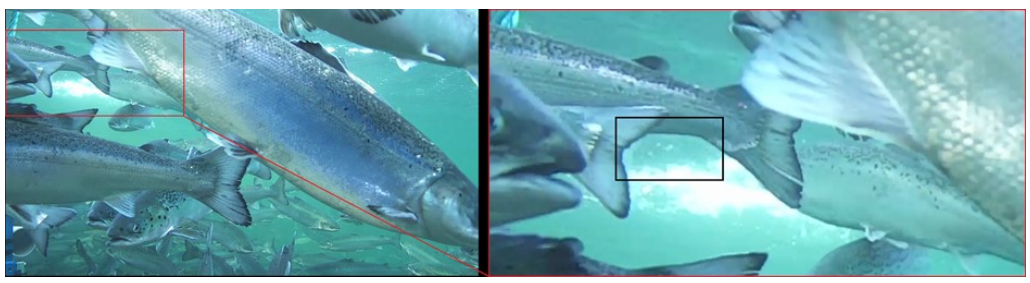

Figure 2: Illustration of blocking.

ESTIMATION OF DISTANCE AND ORIENTATION FOR INSPECTION OBJECT

This project aims to help fish farmers see and understand what happens under water. One of the many challenges fish farmers have is fish escaping from the net (Figure 4). One of the first problems to solve is to estimate distance to the net and the relative orientation of the two cameras attached to the Remotely Operated Vehicle (ROV), before these inputs are provided to the control system that is responsible for the autonomous navigation of the ROV inside the cage and the inspection of the entire net area.

Later, when this inspection procedure is functional, SEALAB aims to develop algorithms that can detect holes and possibly net areas showing wear, thus preventing escapes.

Figure 4: Picture of fishnet in fish cage.

There are multiple approaches to estimate the distance to the fish net. They differ in hardware setup, using e.g. one or several cameras. In this project, the use of single camera and stereo camera system are investigated.

SEALAB Digitalisering av lakseoppdrett

SINTEF

The Research Council of Norway