



# Application of Templates Matching to Fish Detection

Project Management and Software Development  
for Medical Applications

## General Info

Project Title: **Application of Template Matching to Fish Detection**

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## Project Abstract

The main goal is to detect fishes in a monocular video sequence. This will be based on the template matching approaches such as DOT (Dominant Orientation Templates) [2] or LINEMOD (LINEarizing Memory multimodal template matching) [3].

These algorithms require a number of templates defined from images that represent the fish seen from various viewpoints and under different deformations. We will concentrate on a limited number of viewpoints and deformations from which we can detect the fish. They will be selected manually from the video sequences. Template matching approaches have to be tested using this subset of defined templates on other video sequences.

The alternative approach will be based on the FERNS/Regression Forest classifier [4], where patches related to the particular points of interests on the fish, like the tip of the head, tail, fins etc. are used. The goal is to define particular keypoints on available video sequences, train the FERNS/Regression Forest classifier and test on the other video sequences of a school of fish.

In the end, the two approaches have to be compared.

## Background and Motivation

In the context of fish farming application, there is a need on counting and estimating the biomass of the fish using ordinary underwater cameras. In order to do, this we have to provide a tool for fish detection that will tell us where the fishes are in each video frame. This will be used as a first step for later fitting of the deformable fish model to the detected fish outline.



## Student's Tasks Description

The student must accomplish the following task:

1. Create a datasets to be used to train a fish template;
2. Train and Detect the fish template using existing codes;



3. Train and test the classifier in order to detect keypoints on the fish; and,
4. Compare two approaches.

### Technical Prerequisites

The students must have background in C/C++ and knowledge in Computer Vision. A good understanding of Template Matching is a plus.

### Administrative Info

Working Time: 120 hours

Project Location: Nowhere specific.

Required Equipments: Microsoft Visual Studio 2010, OpenCV

### Timeline and Milestones

There will be weekly or biweekly meetings for updates and two presentations (intermediate and final presentation).

### References

- [1] Hyperplane Approximation for Template Matching, F. Jurie and M. Dhome.
- [2] Dominant Orientation Templates for Real-Time Detection of Texture-Less Objects, S. Hinterstoisser, et al. CVPR 2010
- [3] Multimodal Templates for Real-Time Detection of Texture-less Objects in Heavily Cluttered Scenes, S. Hinterstoisser et al. ICCV2011
- [4] Keypoint recognition in 10 lines of code, M. Ozuysal et al. PAMI10