



Fish Segmentation and Matching in Monocular Videos

Project Management and Software Development
for Medical Applications

General Info

Project Title: Fish Segmentation and Matching in Monocular Videos

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Project Abstract

The main goals of this project are:

- Segmentation of the fishes in monocular ToF(Time of Flight) video sequences.
- Matching of the deformable fish shapes using shape context descriptors[1]

Synthetic images simulating the ToF camera data with different amount of noise will be provided. As a first part of the project it is necessary to develop a region growing algorithm that will segment a number of closest fishes to the camera. The algorithm will be a greedy procedure that will segment one fish after the other until the desired number of segmentations have been obtained or until predefined distance from the camera has been reached.

Once the segmentation is obtained a shape context descriptor will be used to match a predefined number of fish templates representing the fish from various viewpoints to the segmented input image.

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 segmentation and 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. Note that not all input images are good for fish detection and shape estimation, therefore we need to segment images and make decision which images are suitable for fitting the deformable 3D fish model to them and which have to be rejected.



Student's Tasks Description

The student must accomplish the following task:

1. Develop a greedy region growing algorithm for fish segmentation from synthetic ToF camera images,
2. Use Shape Context Descriptors to match the segmented fish with a fish model.
3. Create rejection mechanism for images containing fishes in positions not suitable for fitting the deformable model to them.

Please send the completed document to us (Shakir@in.tum.de) before the project proposal deadline, **September 30**.

Please note that this proposal will be evaluated by the BMC coordinators and will be assigned to a student only in the case of acceptance.



Technical Prerequisites

The students must have background in C/C++ and knowledge in Computer Vision.

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] Shape matching and object recognition using shape context, S. Belongie et al. PAMI02