A review of image-based tools for Automatic Fish Ageing from otolith features

AFISA Project
Automatic Fish Ageing

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Introduction

Advantages of an automatic fish ageing system
1) standardize ageing
2) control ageing consistency within and between ageing laboratories
3) build interpreted image databases (information conservation and sharing)
4) improve growth studies while reducing the cost

Issues

-Most of European fish stocks are assessed using age-based models
-Otolith interpretation for age estimations costs several millions euros annually
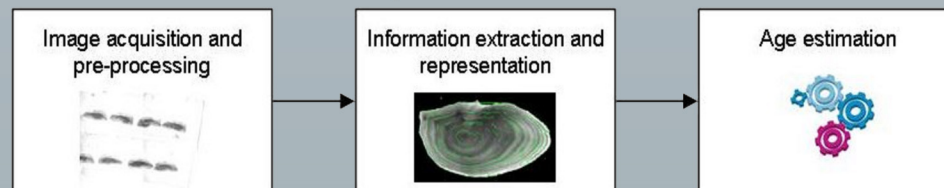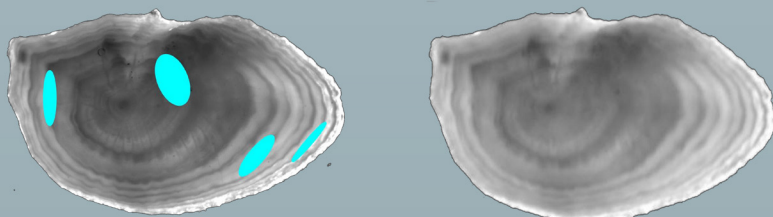

1. Acquisition and pre-processing

Acquisition
-Capture mosaic image of several otoliths (camera+motorized microscope)
-Detect the otolith on image
-Store images of individual otolith in a database

Database
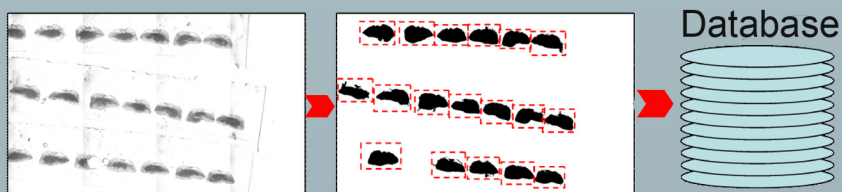
Pre-processing
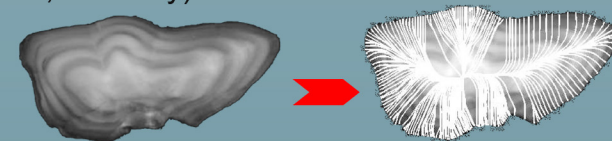-Filter with adapted orientation and scale

2. Growth Extraction of 2D information

Nucleus position
-Morphological approach on plaice (98% of correct detection rate)
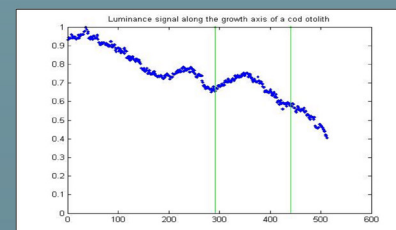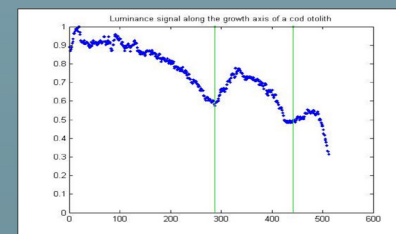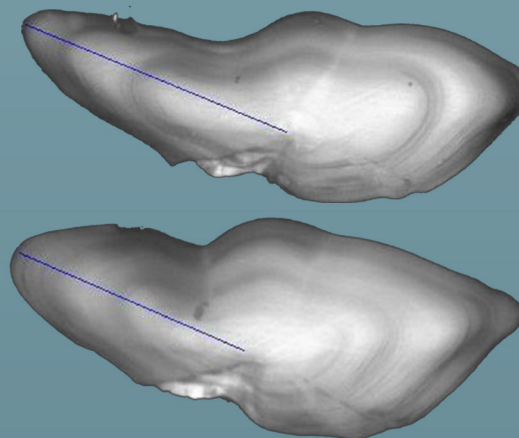-Still challenging for other species (cod, anchovy)

Axis
-Line
-Multiple-line segments
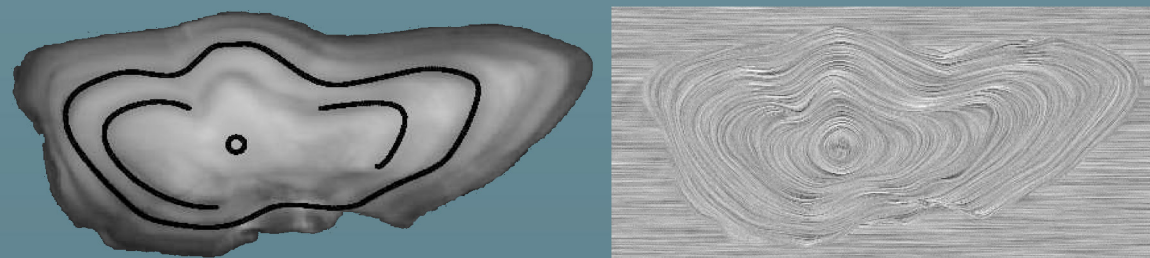-Curve -> better approximation of real growth

Growth marks
-1D detection along growth axis

-2D detection using method based on psychovision

## 3. Analyse and interpretation

Age estimation process
-Extraction of one or several luminance profiles
-Age demodulation
-Classifier, Statistical Learning method

Results
-reach 88%* of good estimation rate on plaice
-close to expert agreement (86%)

*R. Fablet. Statistical learning applied to computer-assisted fish age and growth estimation from otolith images. Fisheries Research, 81:219-228, 2006.
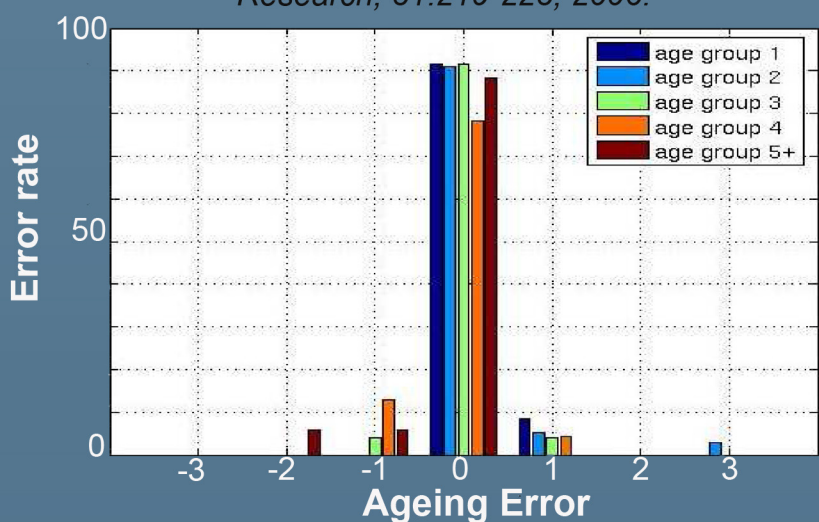
Conclusions

-Standardization -> relevant comparisons between laboratories
-Provide several automatic measures
-Reduce cost and acquisition time

Automatic ageing system does not substitute to experts but provide a useful tool