Fish4Knowledge Deliverable D6.5

Joint biological and ICT workshop

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Dissemination: PU

Abstract: This document reports the delivery of a joint workshop between the Taiwan Marine biology community and the Fish4Knowledge research team.

Deliverable due: Month 36

1   The Workshop Concept

The Fish4Knowledge team organised a one day event describing the project and data on April 21, 2013. The purpose of the event was to present the fish-oriented aspects of the project to Taiwan's marine biology community and obtain feedback on how well the methods that we have developed might suit their research needs. The event was held at the Howard Civil Service Hotel (Taipei, Taiwan), with Prof. Shao (from our Scientific Advisory Board) promoting the event in Taiwan.

The workshop organisers were Prof. R. Fisher (University of Edinburgh) and Prof. K.-T. Shao (Taiwan Academica Sinica).

2   Workshop Attendees

From the Fish4Knowledge project:
Univ of Edinburgh (Fisher,Chen-Burger,Boom,Nadarajan,Huang,Beyan,Yang),
CWI (Hardman,Beauxis-Aussalet,He,Arslanova),
Univ of Catania (Spampinato,Palazzo),
NARL (Lin,Chou,Lo,Lin).

From the Taiwan marine biology community:

Kwang-Tsao Shao	Academica Sinica
Ker-Yea Soong	National Sun Yat-sen University
Tung Yung Fan	National Museum of Marine Biology & Aquarium
Jing-Yi Chen	Academica Sinica
Yi-Ta Shao	Academica Sinica
Jian-Hua Huang	Taiwan University
Hong-Hu Jiang	Tai power
Jing-Ping Lee	Tai power

3   The Workshop Programme

The programme was designed to present the main technical aspects of the Fish4Knowledge system in the morning, through a variety of talks, and then the afternoon consisted of a set of demonstrations.

9:00	Welcome	Bob
9:15	Fish detection, tracking and data status	Concetto & Simone
10:00	Fish recognition status	Xuan
10:45	Break	
11:00	Fish behaviour	Cigdem
11:30	Diving experiment : biology	Shao
12:00	Diving experiment : computational	Concetto
12:45	lunch	
14:00	Open demonstration of F4K system	
	Fish detection	UCAT
	Recognition	UEDIN
	Data exploration interface	CWI
17:00	Finish	

4   Workshop Feedback and Lessons

Feedback about the data collection and image analysis

During the technical discussion, Prof. Shao has suggested that the real data (they observed when diving) should be less imbalanced than our ground-truth dataset. Because some fish are coral residents and they are repeatedly counted when occur. We may be able to design some ratios to define the confidence of fish counting results.

For the given camera position we agreed with marine biologists that it will be really hard and perhaps almost impossible to detect the behaviours given in the 20 question such as feeding, reproduction etc. The field of view is also limited to see real interaction between different species, schooling etc. To detect such behaviours we need data having a larger field of view which covers more distant and deeper areas of the sea. In such a case the detection algorithm should not also eliminate the fish in the more distant sea which would be smaller than the closer ones.

The marine biologists suggested continuing current work for fish behaviour which is a good preliminary work. They also suggested using other underwater datasets which covers larger areas to test the method to detect more interesting behaviours. We asked for suggestions about another dataset however they said that they do not know and the best is to dive and capture data.

All ground truth for abnormal behaviours and some sample ground truth of normal behaviours were given to Prof. Shao and he is going to sent feedback. Currently, Prof. Shao is only hesitating about the behaviour which we are labelling as fish biting coral and/or interaction with coral because he assumes that this should be very frequent. But in our dataset it is not that frequent compared to normal behaviours: fish freely swimming and hovering on the coral. He will make a decision after watching the corresponding videos.

Our general observation is even though the literature assumes abnormal behaviours are rare behaviours, people are happier to use the term "rare behaviours" instead of "abnormal

behaviours", especially for fish trajectory analysis.

We discussed with Dr. Fan, a marine biologist, about potential future collaboration on coral reef observation, growth, well-being monitoring and potential disease discovery and recovery. Dr. Fan has led a team of experts in this field. He also has extensive connections in the US and Australia. This discussion is at an early stage just now, but it may become a suitable follow-up project of F4K. To make this work, we need additional European marine biologists to be interested on this topic. We are currently discussing further interactions.

Feedback about the User Interface

The biologists were very interested in the interface to the database and a few tried it there and then. A number of bugs were detected, which were recorded for later resolution (most of which have already been resolved).

A number of interface improvements were requested, e.g. show an image of the species or the precise count when hovering over a decomposition, give counts per lunar month. These have all been noted and will be taken into account during interviews with biologists and in future interface improvements.

Higher level remarks were made about potential biases of the system. One biologist mentioned specifically that some fish species may be better or less well detected because of the visual features of the species. Another pointed out that species can be classified as resident, transient or semi-resident. This is something that could be checked using the F4K system.

Given this initial feedback, CWI is now working on two tracks in parallel:

1. Polishing the interface to ensure that researchers are able to use it with only online instruction;

2. Setting up longer interviews with marine biologists to discuss what they would like to be able to find out with the system and to what extent they are willing to trust the system's analyses and trends based on these.

Feedback about data accuracy

The system demonstration to the marine biologists allowed us to gather useful feedback concerning their current degree of satisfaction and the aspects which still have to be refined. As their main interest is the estimation of fish population size, we showed the results of a joint counting experiment, consisting in comparing the figures obtained by human and software counting. Although in some cases the results were markedly different (due to the obvious limitations of the software capabilities with respect to human researchers in this specific task), the biologists were satisfied with our explanations for the unavoidable inaccuracy. Most importantly, they understood that the numbers obtained through this system must undergo further analysis (as would be for manual counting) due to the limitations in the camera field-of-view.

They also provided us with important information concerning the relation between fish territoriality and counting accuracy, since different species show different behaviours in the short- and long-term dwelling in a given area. This information clearly hints at the necessity to create species-oriented models for the estimation of a population's size in an observed time period.