Fish4Knowledge Annual Report

www.fish4knowledge.eu

The Fish4Knowledge project is investigating: information abstraction and storage methods for reducing the massive amount of video data (from 10E+15 pixels to 10E+12 units of information), machine and human vocabularies for describing fish, flexible process architectures to process the data and scientific queries and effective specialised user query interfaces. A combination of computer vision, database storage, workflow and human computer interaction methods will be used to achieve this. Data from 10+ undersea cameras will populate the massive database which will in turn support structured queries by the marine biology user community.

Summary of Activities

The project started October 2010, and we have had a successful first full project year. The main achievements include:

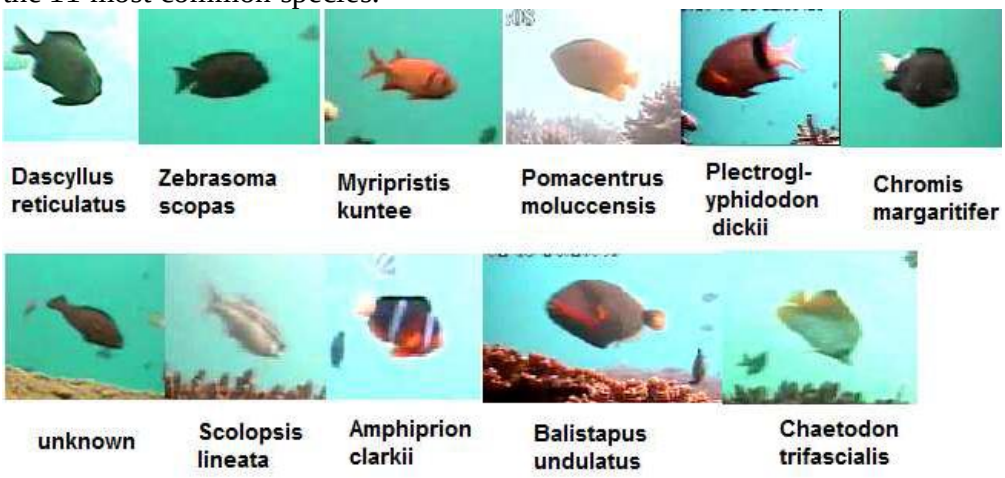
- Design of the software data collection and analysis architecture, consisting roughly of video capture, fish detection, tracking and description, after which fish species recognition and presentation to the user occurs.

- The construction of a 96 processor system architecture at NARL for executing the implemented system.

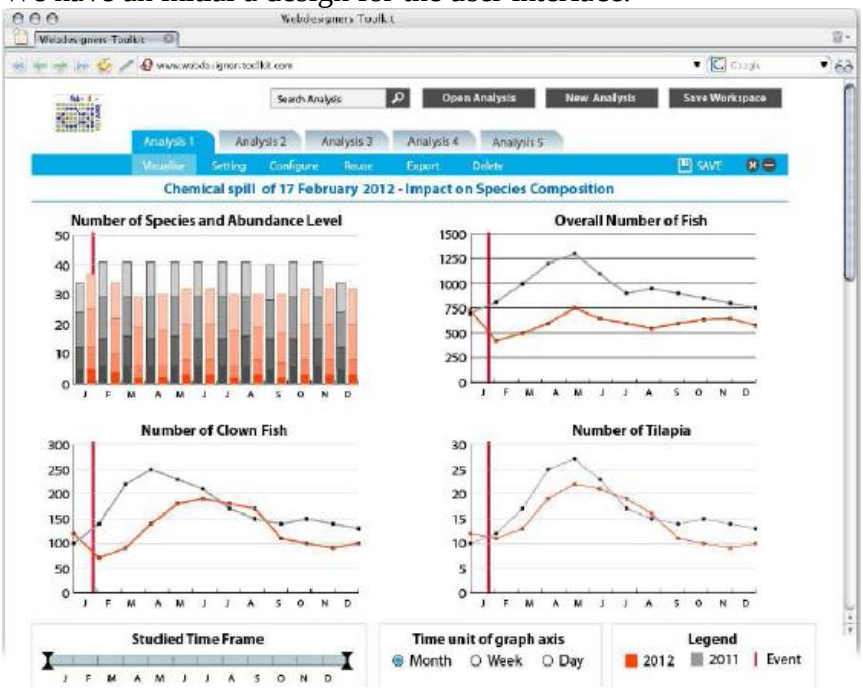
- 9 cameras are installed at 4 different locations from which we have approximately 8000 hours of video. Here are views from the cameras:

- The first stage of processing of the video is fish detection and tracking, for which we have prototype processes running. These have been applied to 471 hours of video, resulting in 3869473 fish detections recorded in an SQL database.

- From these, we have extracted about 3000 detections for initial work on species recognition, resulting in a cross-validated ground truth over about 25 species. Here are the 11 most common species:



- We have an initial a design for the user interface:



User Involvement, Promotion and Awareness

We have:

- Met with several members of the Scientific Advisory Board, and developed a useful set of potential species and identification of actually observed species. This has led to a set of scientific questions to focus on.
- Developed a Second Life public portal to the project: http://maps.secondlife.com/secondlife/Edinburgh_University/70/198/26. Here is the upper (academic showcase) floor:

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- Made arrangements for the second of 4 technical seminars hosted by the project. This will be the "Visual observation and analysis of animal and insect behavior 2012", a one day workshop to be held in conjunction with the 21st International Conference on Pattern Recognition (ICPR 2012), Tsukuba, Japan, November 11, 2012.
- Starting to collaborate with the Aquacam projct, a consortium based in the Caribbean which is also investigating undersea video data collection and analysis.
- We have had a team visit to Taiwan, to see the camera placements and meet with potential scientific users, as well as the Taiwan member of the Scientific Advisory Board.

Future Work

The main work in year 2 is the technical development of the scientific components of the project: fish detection, fish tracking, species recognition, event recognition, behaviour analysis. This also includes the development of the hardware and software environment for the storage and analysis of large amounts of data, and the development of a user interface that allows scientific users to analyse the data. Data collection will continue and we expect to have a large corpus of video and detected fish available at the end of the year. Full system integration should be ready near the end of year 2, but much tuning and performance enhancement will still be needed. Near the end of year 2 we will be starting to present the system at marine biology conferences as well as technological conferences.