



Fish4Knowledge – Long-term analysis of undersea video footage to monitor coral reef fish populations

informatics

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GOAL

▶ Long-term analysis of underwater video footage to monitor fish assembly in coral reef (Southern Taiwan):

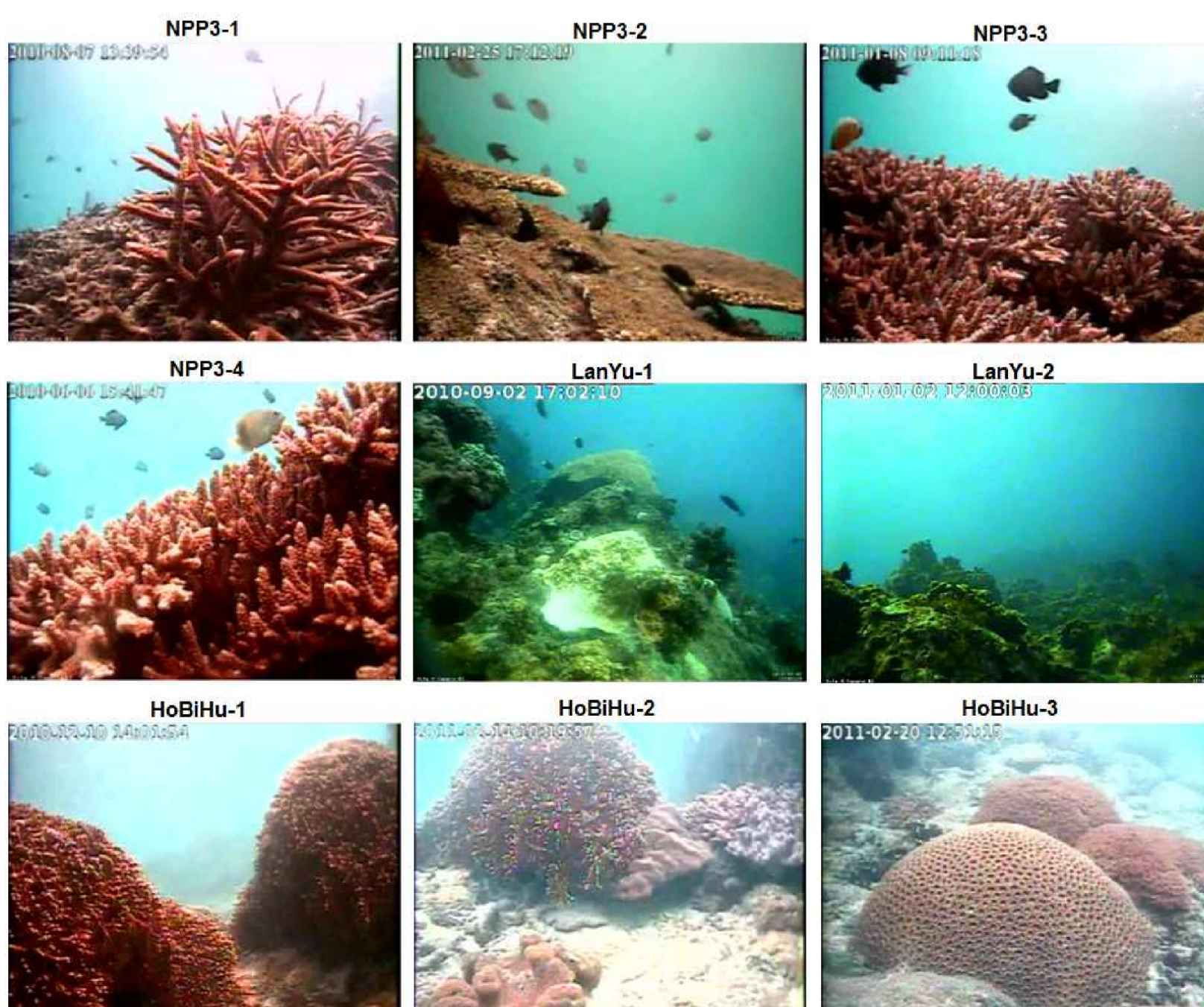
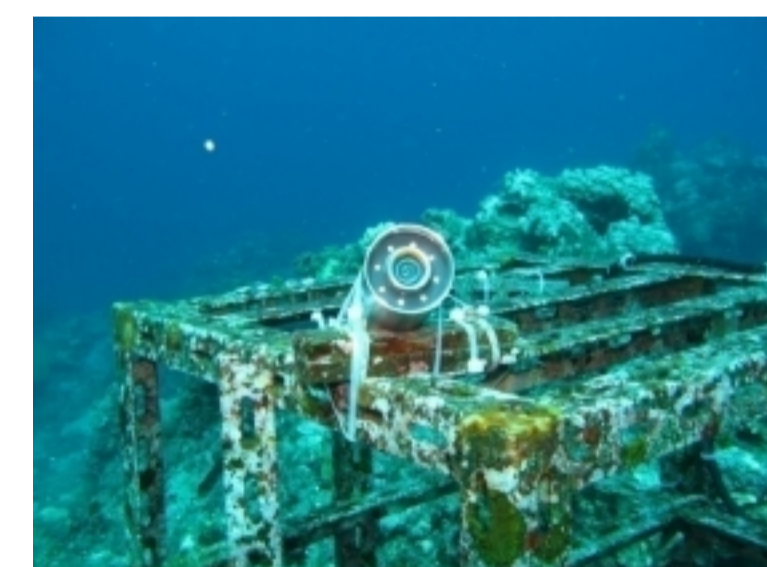
- 3 Years of recording using around 8 cameras
- 1010 fish (around 10 images of each fish)
- Interface for statistic information
- Running the software on clusters of computers

DATA



▶ A photo of the coral reef in Southern Taiwan, close to our underwater cameras.

▶ Static underwater cameras monitor the coral reef during the hours of daylight for over 3 years (focal length of 3.6 mm)



▶ Typical scenes recorded by 9 underwater cameras

▶ The video resolution varies between 320x240 with 5 frames per second (fps) to 640x480 with 20 fps

PROCESSING



▶ High Performance Computing Facilities analyse the videos

▶ Processing with 500+ CPUs

▶ Around 200 Tb video footage

▶ Fish are detected using Background Modelling methods which also gives us the contour of the fish

▶ After detection, tracking is used to follow the fish in the consecutive frames which gives us a trajectory

▶ Currently we have found 14,870,224 fish (167,181,170 observations)



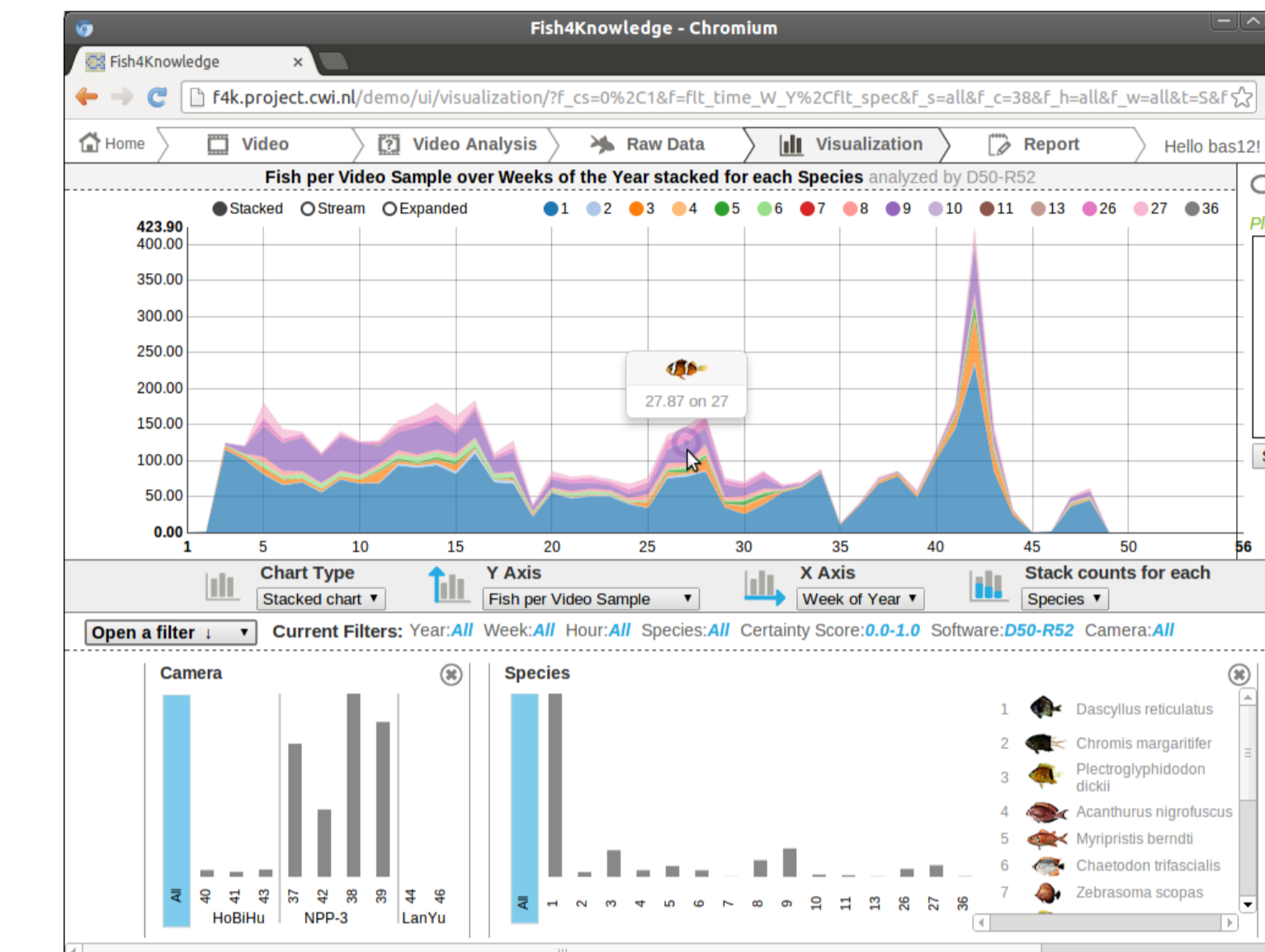
Many resident species are frequently re-observed



▶ These 15 species are currently recognised by the fish species recognition software (Recognition software is performed on 80,854,759 observations)

▶ These species represented 93% of the fish typical observed in our video footage.

WEB INTERFACE

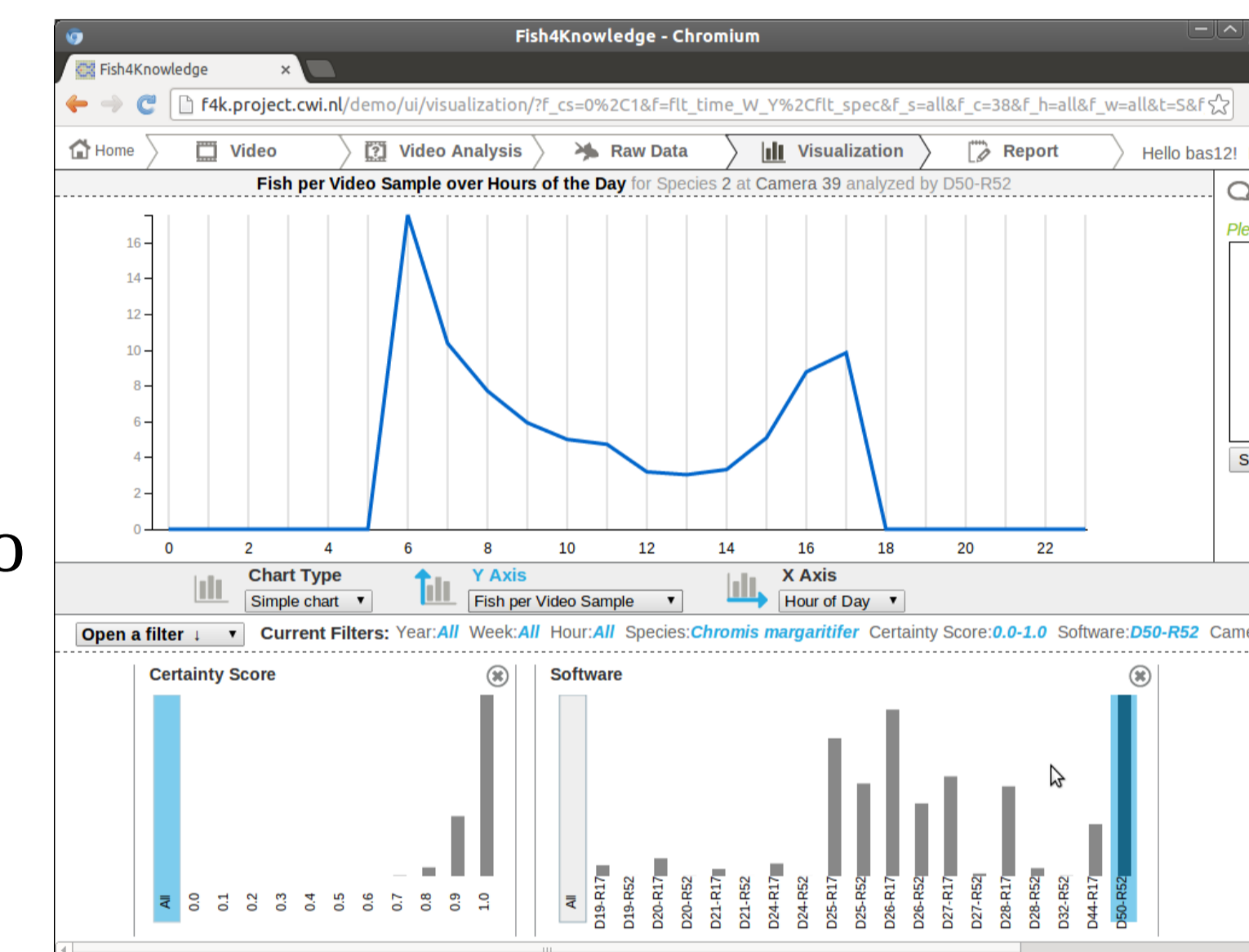


▶ Around one year of video footage has been processed, where the graph shows the species distribution in this data

▶ Multiple filters can be applied to focus on specific aspects of the data (i.e. species, camera)

▶ The web interface allows the user to create different kind of graphs

▶ Automatic video analysis makes errors, so users can compare different video analysis software



CONCLUSION

▶ First prototype system for long-term underwater video analysis of the coral reef

▶ User interface is available at: <http://f4k.project.cwi.nl/demo/ui/>

▶ Interaction with Marine Ecology community is necessary for further improvements

Fish4Knowledge is funded by the European Union Seventh Framework Programme [FP7/2007-2013] under grant agreement 257024.

