



Monitoring aesthetic value of the Great Barrier Reef by using artificial intelligence to score photos and videos

Stakeholder Update – May 2017

Project aim

The Great Barrier Reef as a UNESCO World Heritage site is inscribed for multiple criteria, including its outstanding heritage value that includes significant aesthetic characteristics that are important to Australians and visitors, now and in the future. Aesthetic values, like ecological values, are under multiple pressures and better understanding of what constitutes aesthetic value, how it can be measured, and how environmental changes affect value is imperative. Focusing on the underwater landscapes of the Reef, this research uses advanced technology (including eye tracking) to elicit what environmental and experiential attributes contribute to aesthetic value. A Big Data platform using artificial intelligence will be created to assess large volumes of visitor-supplied imagery and to map aesthetic value across space and time.

Findings to date

Determining aesthetic value

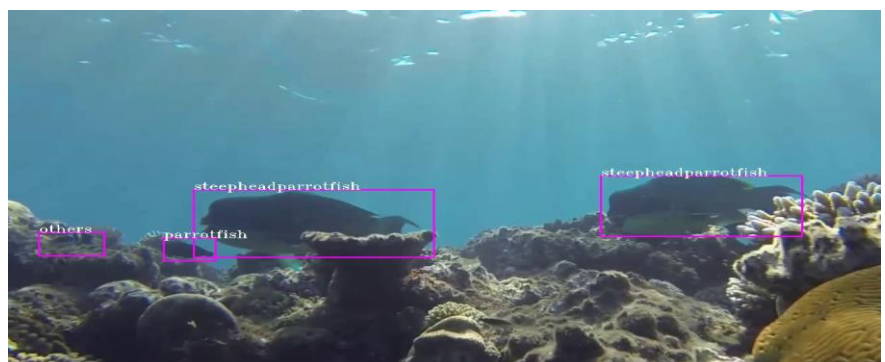
Several phases of eye-tracking research were conducted to explore the possibility to measure aesthetic value/beauty by eye-tracking. So far, we found that there are significant correlations between:



- The picture's beauty and participant's attention to the picture (total fixation duration, fixation count and total visit).
- The picture's beauty and beauty of a particular Area of Interest (AOI) (e.g. a turtle).
- The picture's beauty and AOI's attention (AOI's time to first fixation, AOI's total fixation duration, AOI's fixation count and AOI's total visit).
- AOI's beauty and some variables of AOI's attention (AOI's time to first fixation and AOI's fixation count).
- AOI's beauty and participant's attention to the picture (total fixation duration, fixation count and total visit).

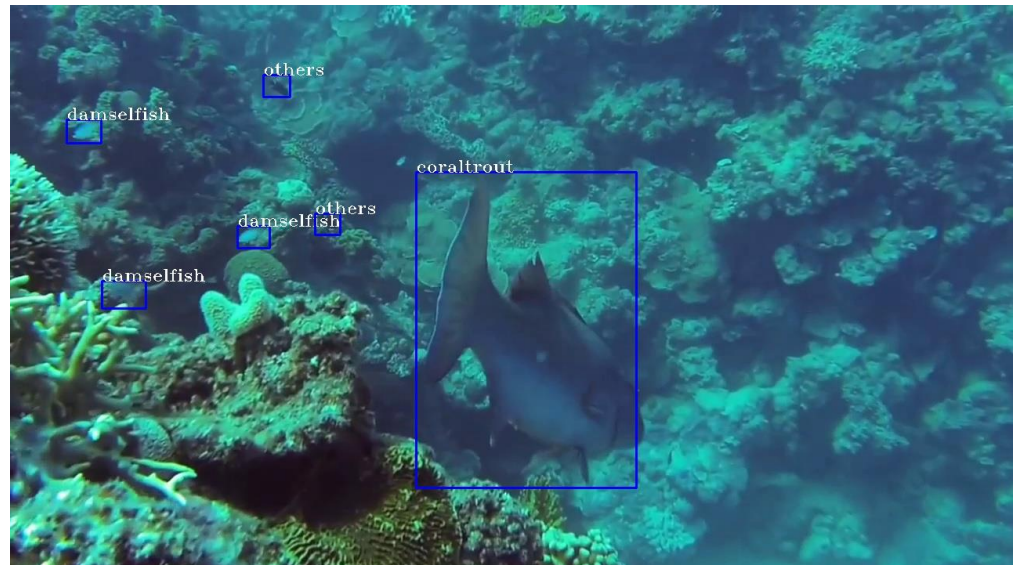
Automated scoring using AI

Progress has been made on developing algorithms for video footage processing and image recognition. A relational database was established where details of recognition, time, quantity as well as aesthetic values are stored. This involved a combination of



marine science input, manual annotation of videos, and utilization of deep learning. An experiment was conducted on GBR fish species to test accuracy of recognition.

We have reviewed related work and established that there are two different ways to compute aesthetics value: 1) Classification, whereby an image is classified into two categories – high or low aesthetics, and 2) Regression, whereby a quantitative approach predicts the aesthetic scores (range 0-1). In addition, semantic attributes such as perceptual (e.g. colour or shape), interpretive (relates to knowledge about the object) and reactive (personal/emotional response) can be employed to rank images.



Outputs

- Scott, Noel, Zhang, Rui & Le, Dung (2017). Eye-tracking: A review. Submitted to Current Issues in Tourism.
- A project summary can be found here: <http://nesptropical.edu.au/index.php/round-3-projects/project-3-2-3/>
- You can also watch a youtube video: <https://www.youtube.com/watch?v=Wj3CWxxfRSc>

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