

Project 3.2.3 Monitoring aesthetic value of the Great Barrier Reef by using artificial intelligence to score photos and videos

Project Summary

This project addresses the urgent need to understand and monitor the aesthetic value of the Great Barrier Reef. Focusing on the fast-changing underwater systems of the Reef, this research will use advanced technology (including eye tracking and heart rate measurement) 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.

Problem

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.

How Research Addresses Problem

Understanding the relationships between aesthetic value, ecological health and visitor satisfaction is crucial for future management of the Reef. Users of the Great Barrier Reef share substantial amounts of imagery (photos and videos) via channels such as Instagram, Twitter, Flickr, Weibo and Youtube. The images give important clues about what “matters” to Reef users. The objects (e.g. fish), attributes (e.g. colour) or relations (e.g. fish with coral) that are important to define beauty, naturalness, discovery and other dimensions will be measured in an ‘objectified’ way. This knowledge will then inform the development of algorithms and deep learning (using artificial intelligence) for automated analysis of imagery (proof of concept).





Visitors snorkeling at a Quicksilver Cruises pontoon

Approach and methods

This project involves two separate but interconnected research strands.

The first concerns understanding and determining what constitutes aesthetic value. Eye-tracking technology in combination with other forms of measurement will be used to systematically test attention and emotion triggered by different visual stimuli. For example, the responses to different stages of coral bleaching or other environmental changes will be measured.

Understanding key factors of 'aesthetic beauty' will then inform the second strand of research in which machine learning will be utilised to train and calibrate the computer system to recognize particular features in an image or video. Expert input from both tourism operators and marine scientists will be integrated into this process, and the algorithms will be trained to distinguish specific color, shape, diversity, amongst others, and Regions of Interest (ROI).

The ultimate outcome will be the development of a robust basis for automatically measuring aesthetic value of the Great Barrier Reef to be adopted by the Reef 2050 Integrated Monitoring and Reporting Program (RIMReP). The research also advances basic research on algorithms and an automated, machine-based procedure to assess large amounts of data (in the form of photos and videos) for the purpose of marine monitoring.

Further information

See www.nesptropical.edu.au or contact:

Prof Susanne Becken – GU

T: +61 (0)7 5552 8827

E: s.becken@griffith.edu.au

Prof Bela Stantic – GU

T: +61 (0)7 5552 8761

E: b.stantic@griffith.edu.au



This project is supported through funding from the Australian Government's National Environmental Science Programme