



National Environmental Science Programme

Human sensors – monitoring the Great Barrier Reef

Jinyan Chen,
Prof Susanne Becken,
A/Prof Bela Stantic

Griffith University



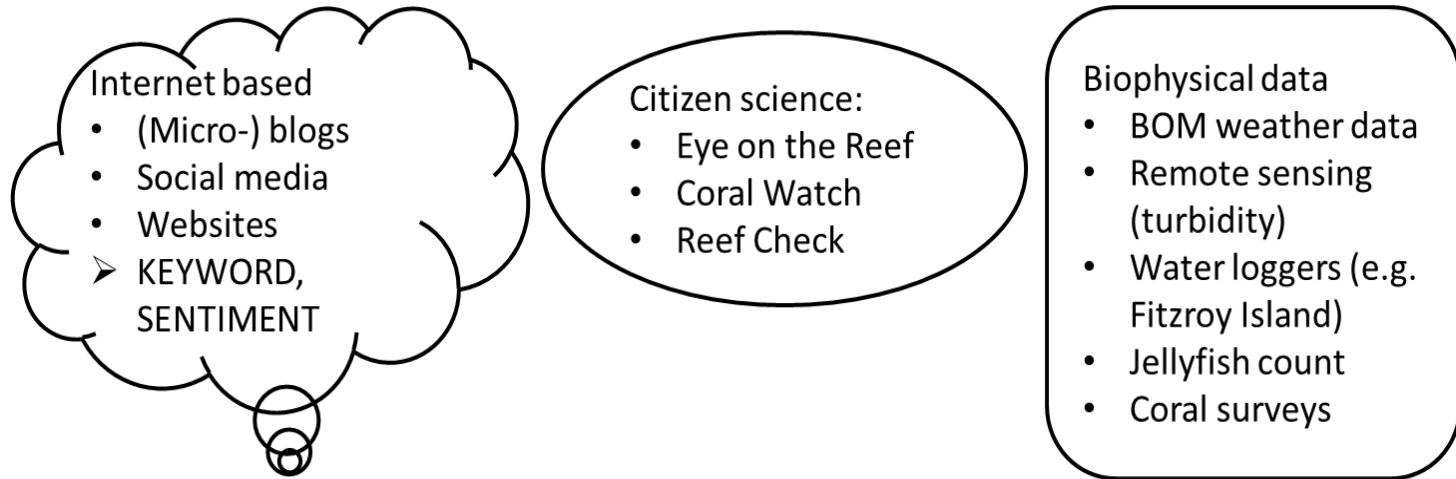
Griffith Institute for Tourism

Project Aim



- Improve monitoring of environmental and aesthetic conditions by using information provided through micro-blogs from visitors to the GBR.
- The data mining will integrate human sensing data (e.g. twitter) with existing data.
- A cost-effective monitoring tool will be made available to stakeholders to complement traditional monitoring.

Different sources of data



Step 1: Verification and validity

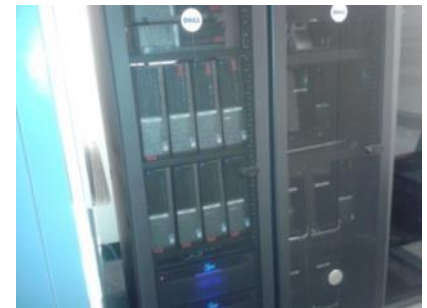
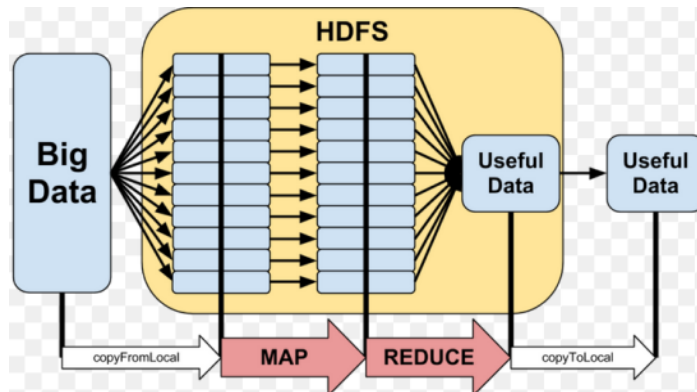
Step 2: Monitoring environmental quality through a portfolio approach



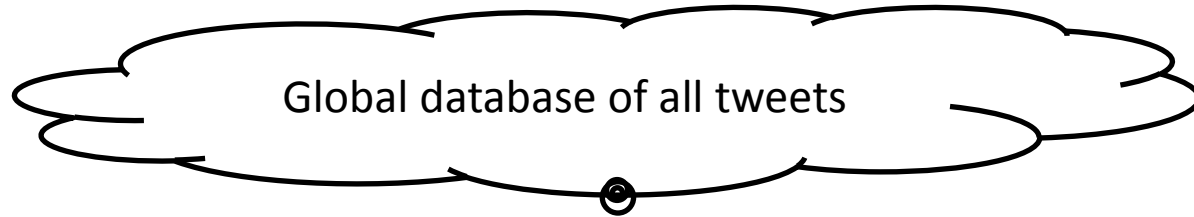
- We begin with Twitter (keywords + sentiment).
- Ultimately a portfolio approach is desirable.

Infrastructure

- Horizontally scaling of a 'share nothing Hadoop style computing cluster', where computers are connected but do not share memory or disk storage.
- Computer space can add up to almost infinite capacity – allowing users to store and process large volumes of data in real time.



Decision tree for filtering relevant tweets



Filter by: Geo-coded to the GBR catchment

Environment TARGETS:

- Water quality
- Marine life
- Coral etc.



ASPECTS:

Water quality: clear, turbid, visibility, dirty, blue, turquoise, grey, algae, sediment

Marine life: turtles, dugongs, sighting, whales, crown of thorn, outbreak, jellyfish, nemo, all relevant species names

Coral: colour(ful), diverse, broken, damaged, bleached, relevant species names



Tweets that tell us something about environment

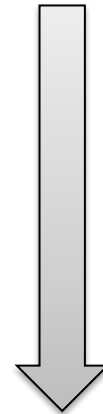
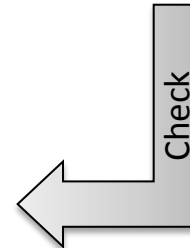
Activity TARGETS:

- Diving
- Snorkelling
- Boat etc.



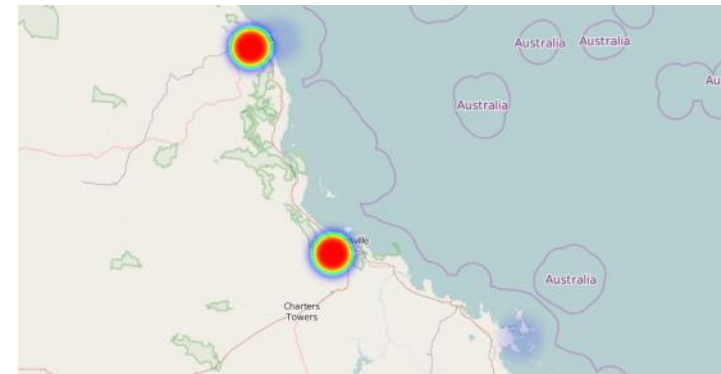
Location TARGETS:

- Cairns
- Whitsunday Islands
- Whitehaven beach etc.



Irrelevant

Target-specific sentiment analysis



- Identify Targets and Aspects, e.g.:
- Sentiment analysis is a sentiment polarity classification problem (typically positive, negative or neutral):

– *@College_FIIT this is wrong. Southern 2/3s appears largely unaffected. Sadly the bleached section is the most pristine. Its a catastrophe.*

SENTIMENT: {'neg': 0.398, 'neu': 0.602, 'pos': 0.0, 'compound': -0.8901}

– *Watching the stages of #coralbleaching go the wrong way. Stressed to fluorescent, bleached to algae.. #coralnotcoal*

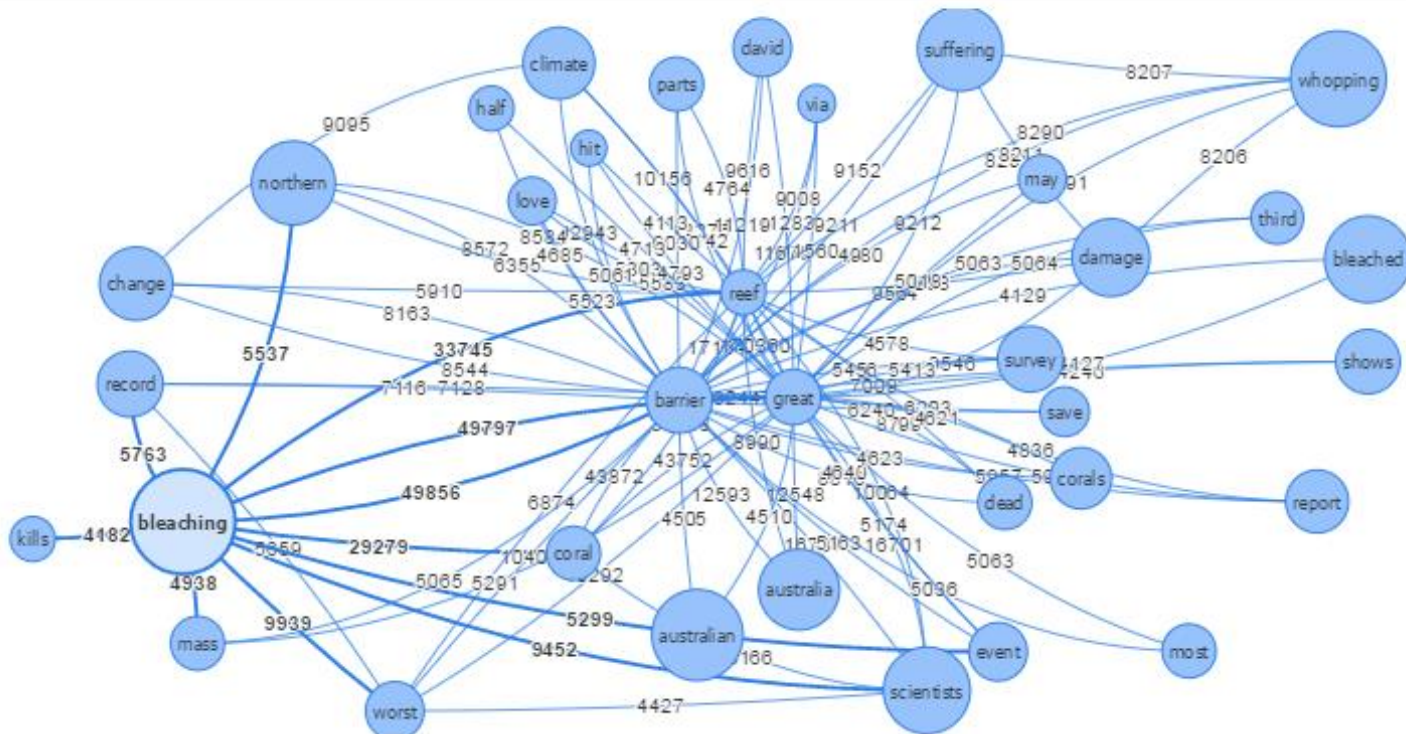
SENTIMENT: {'neg': 0.282, 'neu': 0.718, 'pos': 0.0, 'compound': -0.6705}

– *Heading up to the Keppel Islands today to help with the #GreatBarrierReef #bleaching surveys! @reef_algae_lab @griffith_ari @gbrmarinepark*

SENTIMENT: {'neg': 0.0, 'neu': 0.842, 'pos': 0.158, 'compound': 0.4574}

Binary Graph of GBR tweets

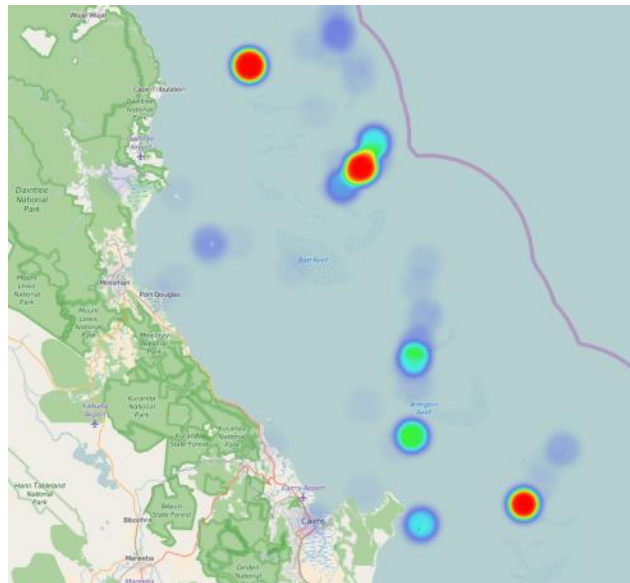
Words Graph



Additional datasets

Eye on the Reef (GBRMPA) citizen science and tourism operator data:

- Rapid monitoring,
- Tourism weekly,
- Reef Health and Impact Surveys
- Sightings network



A screenshot of the "Add Sighting" form in the Eye on the Reef mobile app. The form is displayed on a smartphone screen with a status bar at the top showing the time as 12:53. The form fields are as follows:

- Date:** 5/13/2013
- Time:** 12:52 PM
- Location:** 20.523 S 152.018 E
- Select at least one of the following:**
 - Wildlife
 - Incident
 - More...

At the bottom of the form is an orange button labeled "Create Sighting".

Next steps

- Refine twitter analysis (filtering procedure, identify 'holder', determine location)
- Apply sentiment to targets
- Use other social media data
- Verify against biophysical monitoring





Australian Government



For more information please contact:
s.becken@griffith.edu.au



Griffith Institute for Tourism

