

Machine Learning in Benthic Habitat Mapping

Justin Ting — Honours Student

Simon O'Callaghan — NICTA Researcher

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Introduction

- ▶ Less than 10% of the world's oceans are mapped compared to 99% of Earth's topography mapped (low resolution)¹

¹<http://www.wired.com/2009/06/nasa-satellite-maps-99-of-earths-topography/>

Problem Statement

- ▶ Marine habitat mapping cuts across marine biology, geology, hydrography, oceanography, geophysics (Brown et al., 2011), along with habitat mapping
- ▶ Much research in benthic habitat mapping generates deterministic maps using as-is machine learning techniques/implementations
- ▶ We need to be able to monitor marine habitats on a large scale to assess human impact over time to be able to make informed management decisions

Solution

- ▶ We will use Gaussian Processes to obtain distributions of likely habitat maps
- ▶ Probabilistic approach allows us to state certainty about a particular mapped area
- ▶ Use of Gaussian Processes requires a matrix inversion step with $O(n^3)$ complexity - attempt to overcome this by making our covariance matrix sparse and hence the inversion step computationally feasible for large datasets

Results

- ▶ stuff

Discussion and Analysis

- ▶ stuff

Bibliography

Craig Brown, Stephen J Smith, and Peter Lawton. Benthic habitat mapping: A review of progress towards improved understanding of the spatial ecology of the seafloor using acoustic techniques. *Estuarine, Coastal and Shelf Science*, 92, 2011.