Receding Horizon Approach to Informative Seafloor Exploration using Linearised Entropy of Gaussian Process Classifiers

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Abstract

While seafloor bathymetry have been mapped extensively over the last century, geological and ecological observations of benthic zones only began in recent years. Unlike bathymetric mapping, data collection of benthic imagery requires *in situ* exploration - a significantly slower and costly endeavour. An efficient exploration policy would thus require solving the informative path planning problem. This paper investigates a receding horizon approach to the informative path planning problem using linearised entropy as the proposed acquisition function. We model the benthic environment upon five bathymetric features through Gaussian process classifiers, whose linearised entropy would be defined and derived. We compare our method to a monte carlo approach for estimating joint entropy under a prediction accuracy criterion, as well as greedy and open loop method, demonstrating the benefits of our approach. We test our method on collected benthic datasets from past AUV missions to Scott Reef, Western Australia.

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