

Detection and Classification of *Rathbunaster californicus* in Underwater Video

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The Monterey Bay Aquarium Research Institute (MBARI) deploys remotely operated vehicles (ROVs) equipped with high resolution video equipment. This technology enables quantitative video transects (QVTs) to be obtained providing data at the scale of the individual organisms and their natural aggregation patterns. QVTs are a sophisticated means of sampling that has recently replaced conventional methodologies and significantly advanced studies in animal diversity, distribution and abundance. The method currently used to analyze QVTs, however, is labor intensive and costly, reducing the amount of data analyzed from the ROV dive and thus limiting marine ecological research.

An automated program for detecting and classifying organisms in the video would address these concerns. Video frames are processed with a neuromorphic selective-attention algorithm, modeled after the human vision system. The candidate locations identified by this module are subject to a number of parameters that when combined with successful tracking determine whether detected events are deemed "interesting" or "boring". "Interesting" events are marked in the video frames. The interesting events undergo further processing with a Bayesian classifier utilizing a Gaussian mixture model to determine the abundance and distribution of a representative benthic species. Presented data details the comparison between automated detection of organisms and program classification of *Rathbunaster californicus* in video footage with professional annotations.

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