

Detecting Benthic Megafauna in Underwater Video

2004 AGU Fall Meeting

Edgington, D.R., Kerkez, I., Oliver, D., Kuhnz, L., Cline, D., Walther, D., Itti, L. Detecting Benthic Megafauna in Underwater Video, Eos Trans. AGU, 85(47), Fall Meet. Suppl., Abstract OS43B-0551, 2004.

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Remotely operated vehicles (ROVs) have revolutionized oceanographic research, supplementing traditional technologies of acoustics and trawling as tools which assess animal diversity, distribution and abundance. Video equipment deployed on ROVs enable quantitative video transects (QVTs) to be recorded from ocean habitats, providing high-resolution imagery on the scale of individual organisms and their associated habitat. Currently, the manual method employed by trained scientists analyzing QVTs is labor-intensive and costly, limiting the amount of data analyzed from ROV dives. An automated system for detecting organisms and identifying objects visible in video would address these concerns. Automated event detection (scene segmentation) is a step towards an automated analytical system for QVTs. In the work presented here, video frames are processed with a neuromorphic selective-attention algorithm. The candidate locations identified by the attention selection module are subject to a number of parameters. These parameters, combined with successful tracking over several frames, determine whether detected events are deemed "interesting" or "boring". "Interesting" events are marked in the video frames for subsequent identification and processing. As reported previously for mid-water QVTs, the system agrees with professional annotations 80% of the time. Poor contrast of small translucent animals in conjunction with the presence of debris ("marine snow") complicates automated event detection. While the visual characteristics of the seafloor (benthic) habitat are very different from the mid-water environment, the system yields a 92% correlation of detected animals on the seafloor compared with professional annotations. We present results detailing the comparison between a) automated detection and b) professional detection and classification, and we outline plans for future development of automated analysis.

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