

Marine Biodiversity Conservation

Advanced Computer Vision Techniques for Efficient Seafloor Surveying

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Abstract:

Conventional seafloor surveying approaches are limited to trawling and scuba-diver based survey. While trawling is destructive, scuba-diver based survey is limited to shallow water (e.g., 30m) and is highly time-consuming. Data scarcity becomes one of the key limitations for marine research. More importantly, both approaches are limited to scientific researchers and the involvement of the general public is limited. We propose a novel cloud-based video analysis platform that allows divers (scientific researcher or general citizen) to upload their diving video(s) and return with a biodiversity report. The platform will be equipped with computer vision algorithms (object detection, segmentation and object counting) for automated visual processing. Users can upload a video taken on an area of interest and the platform will return the user with some basic biological parameters such as coral coverage, object (fish, sea urchin) count. With accumulation of videos uploaded by users, this platform can develop into a centralized marine biodiversity database that can facilitate robust data analysis. Moreover, a novel semantic SLAM (simultaneous localization and mapping) system can be further integrated to serve for underwater seafloor surveying. Each object observed and identified by the platform will be mapped to the reconstructed dive path. The video analysis platform is targeted to encourage sharing of marine biodiversity data among different stakeholders such as general public, researchers, government sectors for research, education and promotion purposes. Overall, we expect the general public can contribute data to study of marine biodiversity and thereby increase awareness of general public on marine conservation.