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ROCK DETECTION ON MARS VIA SUPERPIXELS METHOD

Abstract

A novel rock detection method on Mars is proposed via superpixels and multi-scale features in this paper. Automatically selecting a safe landing region for planetary landing mission remains an interesting yet challenging topic in the past decade. Rock detection plays a crucial role whether it is in preselected site assessment or in the descent phase of the lander, even in the route planning and geologic analysis for Mars rover. Using the images of planar surface, hazards posed by rocks can be detected by some auto rock detection algorithms. Current state-of-art detection algorithms are usually time-consuming to be practical or imprecise in adhering to rock boundaries. Accurate and real-time rock detection would guarantee the success of the mission. SLIC superpixels method is a novel faster and more memory efficient algorithm than previous methods. It is suitable for onboard application of the lander and the speed advantage makes SLIC capable to handle large image which contains more information with small size rocks. Multi-scale features can reduce the detection errors as a result of directional lighting, variable rock morphology and weak local cues. New method combined SLIC with multi-scale detectors and preliminary results show that it can be practically applied to rock detection process in future Mars landing mission.