

Comparative analysis of ROS-based monocular SLAM methods for indoor navigation

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Abstract

© 2017 SPIE. This paper presents a comparison of four most recent ROS-based monocular SLAM-related methods: ORB-SLAM, REMODE, LSD-SLAM, and DPPTAM, and analyzes their feasibility for a mobile robot application in indoor environment. We tested these methods using video data that was recorded from a conventional wide-angle full HD webcam with a rolling shutter. The camera was mounted on a human-operated prototype of an unmanned ground vehicle, which followed a closed-loop trajectory. Both feature-based methods (ORB-SLAM, REMODE) and direct SLAM-related algorithms (LSD-SLAM, DPPTAM) demonstrated reasonably good results in detection of volumetric objects, corners, obstacles and other local features. However, we met difficulties with recovering typical for offices homogeneously colored walls, since all of these methods created empty spaces in a reconstructed sparse 3D scene. This may cause collisions of an autonomously guided robot with unfeatured walls and thus limits applicability of maps, which are obtained by the considered monocular SLAM-related methods for indoor robot navigation.

<http://dx.doi.org/10.1117/12.2268809>

Keywords

indoor navigation., localization and mapping, Monocular SLAM, ROS

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