Effect of Oscillating the Camera in a VSLAM-guided Robot Travelling on a Circular Path

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Abstract

This study is executed to find the feasibility of the oscillation of the camera of a small Visual Simultaneous Localization and Mapping (VSLAM) guided robot on a curved path. The attached camera can be oscillated rotationally left and right to improve detection efficiency and track better obstacles outside the view range. Detectable objects were arranged along circular paths and in a horizontal strip of the camera view because, in the case of a small vehicle, how the other vehicles and pedestrians are seen along the road and in the case of a small boat, how the other boats and landmarks are seen along the path. The robot will travel along a circular path, and four sets of objects were arranged in a circular pattern along the path as fixed objects which are to be tracked. The robot's path is tracked using VSLAM with different camera angles and checked with the actual track of the robot. The ROS simulation software and the OpenCV software were used to simulate the study. The results show that the calculated path has only a small deviation from the actual path, thus camera oscillation is possible in this case. Due to the circular path, the distance between detectable objects in the camera frame changes according to the camera angle. Detection-wise, the algorithm must choose the correct camera frames which have sufficient detectable objects and sufficient distance between every similar object. An algorithm must be developed to detect online which camera frames should be excluded when the camera is oscillating. Thus, different numbers of camera frames were skipped between each considered frame for each camera angle to get the results. Furthermore, objects on inner circular paths will block one another from the camera view reducing the possible oscillation angle.

Keywords: *Oscillating VSLAM, Oscillating VSLAM Camera, VSLAM with Oscillating Camera.*

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