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# A Diagnostic Comparative Analysis of on Simultaneous Localization and Mapping (SLAM) Models for Indoor and Outdoor Route Planning and Obstacle Avoidance

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**Abstract :** In robotics literature, the simultaneous localization and mapping (SLAM) is commonly associated with a priori-posteriori problem. The autonomous vehicle needs a neutral map to spontaneously track its local position, i.e., “localization” while at the same time a precise path estimation of the environment state is required for effective route planning and obstacle avoidance. On the other hand, the environmental noise factors can significantly intensify the inherent uncertainties in using odometry information and measurements obtained from the robot’s exteroceptive sensor which in return directly affect the overall performance of the corresponding SLAM. Therefore, the current work is primarily dedicated to provide a diagnostic analysis of six SLAM algorithms including FastSLAM, L-SLAM, GraphSLAM, Grid SLAM and DP-SLAM. A SLAM simulated environment consisting of two sets of landmark locations and robot waypoints was set based on modified EKF and UKF in MATLAB using two separate maps for indoor and outdoor route planning subject to natural and artificial obstacles. The simulation results are expected to provide an unbiased platform to compare the estimation performances of the five SLAM models as well as on the reliability of each SLAM model for indoor and outdoor applications.

**Keywords :** route planning, obstacle, estimation performance, FastSLAM, L-SLAM, GraphSLAM, Grid SLAM, DP-SLAM
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