

Abstract

Autonomous navigation in complex unstructured environments has recently stimulated considerable interest among the robotics research community. This paper discusses the major challenges such as robust feature extraction and data association or the correspondence problem faced in achieving the above goal. The interrelationship between the feature extraction and the data association is elaborated by using the multi-frame multidimensional data association framework with concentration to simultaneous localization and map building (SLAM) problem in mobile robot navigation. It is explained how this data association framework can sustain under weak feature extraction scenarios in highly cluttered environments. Two suboptimal methods are presented to solve the resulting NP hard multidimensional assignment problems. Simulation results and experiments are presented to verify the claims above.