RTAB Demonstration in Gazebo Simulation

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Abstract—SLAM or Simunateous Localization and Mapping is a problem in robotics. Here RTAB or Real time appearance based mapping algorythim is used in a simulated Gazebo environment to produce a map as well as to serve as a basis of localization for the Robots. Solutions to SLAM problems are one of the key principles for autonamous navatigion and can be utilized in path planning.

Index Terms—Robot, IEEEtran, Udacity, LaTeX, SLAM.

1 Introduction

Real Time Appearence Based Mapping or RTAB-Map is an algorythim that uses a camera image of the environment as input form a map. The image can then be used in conjunction with feature extraction algorythims(i.e SIFT), to localize the robot. Here a simulated RGB-D camera is use to construct a 3d octomap.

RTAB-map is fast due to the special memory management approach it utilizes in conjunction with bag of words feature extraction and loop closure.

2 Background

Some of the early works in using feature extraction to reconstruct large areas in 3d was done by MIT students on campus. SLAM is the problem of making maps and localizing robots given controls and measurements only. FastSLAM uses landmarks much like a modified Extended Kalman Filter for localization and mapping. Representing maps as grids opens the world up to more arbitrary environments and broader scope of use. Grid based SLAM algorithms derive the robot pose using particle filters.

2.1 Graph-SLAM

Graph- based SLAM are simlular to GRID but employ a different method of discretization and weight constraints to determine Maximum likelyhood estimate. The Graph-SLAM reprensents constraits as a linear system. The most likey pose is derived by solving these system of equations.

3 Results

The robot was tasked with mapping two worlds. One was the kitchen world provided. The robot was teleoperated using the provided script.

3.1 Mapping comparisons

The mapping used SIFT features to calculate look closure.

4 Conclusion / Future work

In the future, hardware deployment can also be tested on a Jetson TX2.

Fig. 1. Gazebo Environment

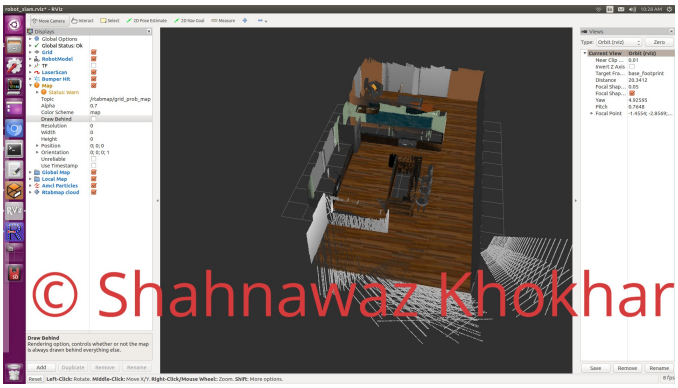

Fig. 2. Mapped enviroment