International Journal of Engineering Applied Sciences and Technology, 2016
Vol. 1, Issue 5, ISSN No. 2455-2143, Pages 24-29
Published Online March – April 2016 in IJEAST (http://www.ijeast.com)

LIKELIHOOD ESTIMATION FOR SLAM USING KINECT DEVICE

Zeeshan Asim
Faculty of Industrial Management
University of Malaysia Pahang,
Lebuhraya Tun Razak 26600 Gambang
Kuantan Pahang

Dr. Shahryar Soroosshain
Faculty of Industrial Management
University of Malaysia Pahang,
Lebuhraya Tun Razak 26600
Gambang Kuantan Pahang

Ahsan Bashir
Faculty of Electronic Engineering
Sir Syed University of Engineering Technology,
Karachi, Pakistan

Abstract— **In the world of robotics, problems of visual SLAM requires an understanding of loop-closure detection and global localization, having said that in order to perform mapping and localization simultaneously we should be able to efficiently recognize an environment that has been previously visited using the current data from our RGBD camera. In this paper we present an online method to recognize and generate information regarding a previously visited place using the visual bag of words model which relies on Bayesian filtering to calculate the probability of loop closure. We would also demonstrate the robustness and effectiveness of our method by real time loop closure detection for an indoor image sequence using Microsoft Kinect camera**

Keywords—**SLAM, RGB MCL, FSLAM, EM Algorithm**

I. INTRODUCTION

In the field of robotics and specifically robotic mapping, (SLAM [1], [2]) is recognize as a computational and mathematical problem of generating and upgrading a map of a particular environment using various computational algorithms, while also should have the capacity to track the location of the agent within the map. Over the last ten years we have seen the massive development in the computer industry that aid us by providing the clients with high tech processors with better latency and instructions per cycle efficiency and it also helped in supplementing the orthodox approaches to simultaneous localization and mapping, traditional methods has their pros and cons but mostly less efficient as a consequence better algorithms has tend to be used with or replaced the bearing sensors (i.e. sonars, lasers and radio detection and ranging equipment) with single RGBD camera or camera arrays. It is important to understand that SLAM algorithms are not designed to have perfection rather compatibility with the environment they are being employed furthermore in SLAM algorithms there are issues concerning loop closure detection and global localization factors that check for the location of the agent and robot within the premises of the environment. Also in the case occlusion where abrupt Camera movements cause dissipations in path tracking the robot and keep updating the map using probabilistic approach and an online imagery database, so in this paper we have basically put forward a method to use that online imagery database and Bayesian appearance based loop closure detection to verify the 3D visual loop closure detection as the one presented in [3]. Eventually this is the problem concerning an image retrieval task to determine if the current data of image from our Kinect match the past imagery. There is a threshold value for the viewpoints of the current image and the past database, algorithm checks for the threshold value in all nearest neighbors [4] and then epipolar geometry [18] is used to detect the loop closure. In section 2, we provided a brief overview of related work on different algorithms of SLAM such as visual bag of words model and loop closure detection using Bayesian filtering, section 3 explains in few lines about the usage of visual bag of words model. In section 4 we have discussed the various filtering methods involve in the process of SLAM and the findings of our experiment are presented in section 5. The final two sections are dedicated to discussion and future enhancements

II. RELATED W0RK

The Monte Carlo Localization (MCL) method [5], recently adapted to vision ([6]) uses the map to perform global localization. The Rao-Black wellised algorithm for particle filters demonstrates loop closure probabilities to be used effectively for Fast SLAM [7], even when only bearing sensors [8] are deployed. But in all these techniques for better efficiency we need an exponential number of objects or particles are involved which is obviously intractable within the parameters of a large scale environment, which apparently leads to inefficient and abrupt sampling of data which leads to deterioration during loop closure. In this paper, we try to present a simple loop closure detection method for simultaneous localization and mapping for an online image retrieval task, following a somewhat similar approach to MCL but in a non-incremental sense. We also used the EM algorithm as presented in ([9], [10], [11]), to check for the maximum