

Laser-Based Plane Detection and Visualisation

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Abstract

Mobile Autonomous Robots navigate on the basis of a digital map which will be acquired using on board sensory systems. Independent of the sensors the digital map is mostly focusing on a grid of cells on the ground or in three dimensions which is indicating a free or occupied area on the floor or in space. The approach in this paper is to detect structures in the environment rather than storing cell based information. These structures are edges of geometric objects than are represented as lines in a Laser image. Lines can be more easily stored and retrieved in list as compared to large cellular maps. The next step deals with compression of lines to planes. Maps of planes will again be more concise and support route planning better. The final step of generating objects on the basis of planes will be discussed but is not yet completed.

Introduction

Mobile Robots or Autonomous Systems will be used increasingly in the near future for different applications. They will do tedious and repetitive tasks not suitably or unpleasant to perform by human operators. Robot orientation and navigation are mostly implemented using internally stored maps and a number of landmarks. Those landmarks are located by onboard sensors. The estimated and the true positions are compared and the position estimation is corrected. Onboard sensory systems are also used to detect obstacles in the driving path. Conventional mobile systems were wire-guided, modern systems use internal maps and sensors for route planning. Such systems are more flexible and powerful for industrial and other applications. They are also more complex and difficult to be used safely.

A mobile autonomous system named 'kiss-mobile'(Holzhausen, 1995) is being used at the Bochum Polytechnical Institute, Laboratory for Artificial Intelligence, Computer Graphics, and System Software (kiss-lab). Kiss-mobile is mainly used for research in multisensorics and route planning. Robot navigation in this vehicle is based on a two dimensional map. This map is acquired using simple ultrasonic devices. It is updated dynamically, measured changes in the environment are continually fed into the map. It is a pixel map and consists of a matrix of cells. Each cell describes the robot environment in the format of 10 x 10 cm areas to be empty