

AN ENVIRONMENTAL VISUAL FEATURES BASED NAVIGATION METHOD FOR AUTONOMOUS MOBILE ROBOTS

FAIRUL AZNI JAFAR, YASUNORI SUZUKI, YUKI TATENO
KAZUTAKA YOKOTA AND TAKESHI MATSUOKA

Graduate School of Engineering
Utsunomiya University
7-1-2 Yoto, Utsunomiya-shi, Tochigi-ken 321-8585, Japan
{ fairul; suzuki; tateno }@ir.ics.utsunomiya-u.ac.jp; yokotak@cc.utsunomiya-u.ac.jp

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ABSTRACT. Navigation and localization are two important issues which need to be addressed in order to let robots work in the human living environment. We believe that it is not always necessary to build a robot system with a precise and accurate navigation in some situations. For example, those cases where a robot is programmed for guiding way in a building environment or fulfilling a delivery task. With this regard, we propose a navigation method for the autonomous mobile robot where the robot will identify its own position and orientation robustly based on visual features in the environment without any complicated techniques. In our method, the robot takes advantage of the localization process to navigate from a point to a given destination without losing the correct path.

Keywords: Navigation, Localization, Autonomous mobile robot, Visual features

1. **Introduction.** Navigation is a fundamental issue in mobile robotics and a very important technology for the robots to perform various tasks. Navigation is usually accomplished while the robot moves and estimates its own position and orientation by using the information from several sensors. There are numerous research studies on autonomous mobile robot navigation which make use of external sensors such as laser range sensor [1,14], omni-directional camera [2,4,6], etc to localize and identify positions in order for the robot to follow the correct path. Among these studies, vision based navigation [2-13] has been broadly studied with different types and approaches of vision-based navigation space description.

The main objective of this paper is to introduce a new learning visual perception navigation system for mobile robot where the robot accomplishes navigation tasks based on information from images captured by the robot. We believe that for the robot which is developed for elementary missions such as giving a guide in an indoor environment or delivering objects, a simple navigation system will be good enough. The robot for these tasks does not require any precise position or orientation identification. Our study puts focus on these situations and that is why we choose to apply visual features owing to the fact that extracting the features from images is simple and easy to be managed. Besides, visual features are also rich with information.

In our approach, the robot identifies its own position and orientation based on the visual features in the images while moving to the desired position. We focused on developing a navigation system where the robot will be able to recognize its orientation to the target destination through the localization process without any additional techniques or sensors required. We believe that by having this kind of navigation system, it will minimize the cost on developing the robot and reduce burdens on the end-user.