MASTER'S THESIS

Design and Implementation of Multi-robots Visual SLAM System
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ABSTRACT

Simultaneously Mapping And Localization(SLAM) systems are essential in robotics systems. Using a single robot to map a large scene is time-consuming. Therefore, a map can be constructed using a group of robots working together. Visual-based loop detection in cooperative SLAM is essential, which can help to efficiently and accurately merge and construct global maps among robots working independently. However, most visual SLAM algorithms focus on loop detection along the same trajectory direction. These algorithms cannot handle multi-robot cooperative systems well because, in such systems, multi-robot trajectory direction may often form loops along opposing or perpendicular directions. In this paper, we propose a multi-robot cooperative SLAM system based on panoramic images. Each robot uses a camera as a sensor and a local map algorithm to construct a local map. All local maps are merged into a global map when loops are detected. The panoramic images provide scene information in all directions for loop detection. Experiments show that the loop detection accuracy is improved in the proposed system, and the time for constructing a global map is significantly reduced by using a multi-robot cooperative system.

Keywords: Visual SLAM, Cooperative Mapping, Panoramic Image