Visual Localization for Mobile Robots Based on Composite Map

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Abstract

In this paper, we propose a novel mobile robot visual localization method consisting of two processing stages: map construction and visual localization. In the map construction stage, both laser range finder and camera are used to construct a composite map. Depth data are collected from laser range finder while distinct features of salient feature points are gathered from camera provided images. In the visual localization stage, only camera is used and the robot system detects feature points from camera provided images, computes features of the detected feature points, matches them with the features recorded in previously constructed composite map, and decides location of the robot. Using this method, a robot can locate its own position effectively without expensive laser range finder so that greater acceptance can be expected due to affordability. With the proposed method, several experiments have been performed. The average displacement is 0.168 meters, and the average angle error is 3.911o. Experiment results show that our method not only reduces hardware cost of robot localization, but also offers high accuracy.

Keyword：Autonomous Mobile robot, Composite Map Construction, Visual Localization, Feature Point Extraction, Feature Point Matching