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Abstract

Aerial Cooperative SLAM for Ground Mobile Robot Path Planning †

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Abstract: The trajectory planning for ground mobile robots operating in unknown environments can be a difficult task. In many cases, the sensors used for detecting obstacles only provide information about the immediate surroundings, making difficult to generate an efficient long term path. For instance, a robot can easily choose to move along a free path that eventually will have a dead end. This research is intended to develop a cooperative scheme of visual-based aerial simultaneous localization and mapping (SLAM) that will be used for generating a safe long-term trajectory for a ground mobile robot. The general idea is to take advantage of the high-altitude point of view that aerial robots can inherently have, for obtaining spatial information of a wide area of the surroundings of the robot. In this case, it could be seen as having a zenithal picture of the labyrinth for solving the robot's path. More specifically, the system will generate a wide-area spatial map of the ground robot's obstacles from the images taken by a team of aerial robots equipped with onboard cameras, by means of a cooperative visual-based SLAM method. At the same time, the map will be used for generating a safe path for the ground mobile robot. While the ground robot moves, its onboard sensors will be used for refining the map and thus for avoiding obstacles that were not detected from the aerial images.

Keywords: visual sensing; autonomous robotics; computer vision; visual SLAM