Mobile Robot Localization and Mapping using Visual Information

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The localization of robots in an unstructured environment is crucial for them to cooperate in achieving a task. As the application of mobile service robots are increasing, localization and map building of new environment is needed.

By intuition, when several humans cooperate while navigating in a certain space, it becomes much easier to identify the place in terms of time to build a map and its accuracy. The diversity in the location offer precise information from different observers. The same can be extended to mobile robots deployed in a space and scattered to form multi observer system. The visual information gained from each robot contains uncertainty and hence information vagueness.

Therefore, it had been realized in the literature [1] that by co-operating the multiple mobile robots, the map and localization quality can be significantly improved. Ming *et al.* , used two mobile robots with single camera mounted on each of them to achieve this task. They used salient landmarks to increase the SLAM accuracy. The principle can be extended to several robots as well.

Other researchers preferred to use stereo vision to perform visual SLAM and applied this to one robot only. We propose here the use of multiple robots with stereo vision to perform the SLAM task cooperatively. The features that can be extracted from a single camera are either edges or color, beside the use of time tracking of such features. While for stereo vision we have the third dimension as an added cue for the detected features.

We show an overview on our previous research regarding the design of a service robot and its navigation in the indoor environment. We have done experiments on the efficient use of color and edges in order to track the features and derive the robot position in the space.

We propose the use of cooperative communication among two robots to accelerate the rate of building the environment map and increasing it accuracy and reliability.

References

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