

Investigation of Vision-based indoor localization

Proposal for a Master thesis topic (EN)

Nowadays, as the techniques of GPS and GNSS develop, outdoor navigation and localization is widely used by normal consumers. However, due to limitations in reception, these satellite signals cannot be received in an indoor environment. To overcome this problem, methods which take advantage of fingerprinting localization techniques, such as WI-FI or Bluetooth, can be used, but they also suffer from signal attenuation during diffusion.

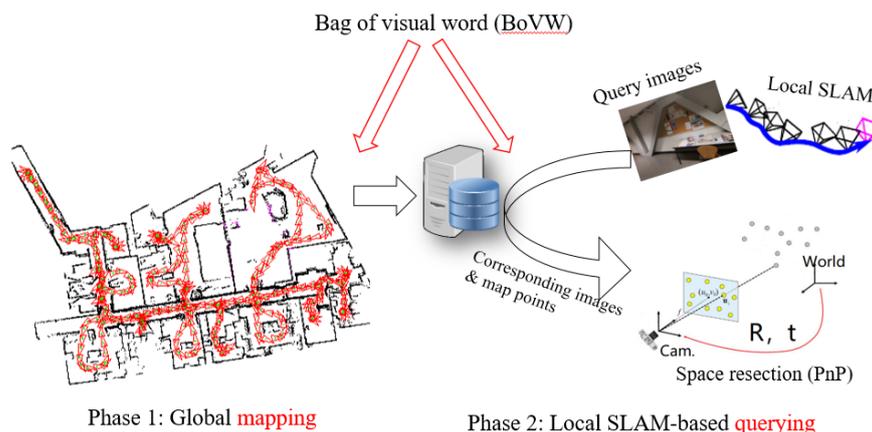


Figure 1. Workflow of vision based indoor localization

In this topic, we would like to use the information of two-dimensional images to solve the problem, i.e. use the paradigm of vision-based localization. The general workflow is shown by Fig.1. First, a global map of the indoor scene is generated, and then the consumers can localize themselves in real-time in this indoor environment.

We first would like to investigate the database map, which can be pre-generated. Thus, database maps generated by various methods are of interest and need to be compared. More specifically, conventional structure-from-motion (SfM) can be applied to generate a sparse point cloud of the indoor environment, whereas simultaneous localization and mapping (SLAM) can also be employed to do this job. It might be interesting to see the differences in the resulting two maps and investigate which one can perform better on which specific aspect. After obtaining the map, the further research is concentrated on real-time localization by visual SLAM, and the localization accuracy is analyzed on the obtained different maps.

This thesis will be supervised by Xin Wang, M.Sc. and Yajie Chen, M.Sc.