論 文 の 内 容 の 要 旨

A Study on Pedestrian Navigation and Localization Using Various Sensors
（多様なセンサを用いる歩行者ナビゲーションと位置同定に関する研究）

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Against a background of the fast increasing usage of modern mobile phones throughout the world, research topics relevant to phone-based navigation and localization have currently attracted a great deal of attention. In this thesis we present our research efforts that are organized as two parts related to pedestrian navigation and pedestrian localization respectively.

In the former part, we first present a multi-factor cost model that is used to fuse sensor data of heterogeneous environmental factors. This model takes a cost-based approach to assess the effects of the environmental factors on pedestrian's comfort level. Aggregation formula is derived on the basis of a set rules of substitution induced from the observations of the behaviors of pedestrians. Then we propose a framework for constructing pedestrian navigation systems for comfort in time varying environments. We apply data warehouse and data forecasting techniques in the framework and also design a set of path planning algorithms that select paths in time varying networks. In the evaluations sensor data from the real world are used and simulations are also performed to generate the necessary data. The results prove the effectiveness of the proposed methods.

In the later part of this thesis, we first propose an adaptive inference approach for pedestrian localization using phone-based inertial sensors. Places with salient geographical or physical features are used as the ground truth to trigger the online learning phase, which plays a central role in which location data as well as system parameters are refined. Then we enhance the system by incorporating sensor data of environmental signals. We design a sparse particle filter in order to reduce the computation burden when fusing the various phone-based sensors. Evaluation results show that the system can perform localization with high robustness, much higher efficiency, and only slight loss of accuracy compared to traditional method.