

Non-Parametric Model for RSS-based Active RFID Indoor Positioning System

Abstract

Indoor positioning is a key technology enabler for future smart systems. This thesis proposes several non-parametric models to improve RSS-based active RFID indoor positioning system in terms of accuracy, processing time, and robustness. In geometric method, we propose the use of density-based cluster detection to detect outliers in location candidates, allowing bilateration method to achieve shorter processing time while maintaining the same level of accuracy and robustness. We also introduce several improvements on location fingerprinting methods. To improve the accuracy and robustness of the location fingerprinting when training points are sparsely distributed, we combine two existing methods which are Location Estimation using Model Tree (LEMT) and LANDMARC. Because LEMT method and its derivative rely on M5 model tree that has long processing time, we propose the use of Extreme Learning Machine (ELM) regression model in place of the M5 model tree to shorten the processing time. We found that training input must be filtered in a way that null data do not interfere the regression process of the ELM.