

Indoor Area Estimation Using Constraints of Area Transition Based on Wireless LAN

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ABSTRACT

In growing needs of a location dependent service, this is not already prevailed indoors on the grounds that GPS is unavailable indoors. In this paper, focusing knowing symbolic area according to requirements of service, we propose indoor area estimation method with high accuracy using Received Signal Strength Intensity (RSSI) of wireless LAN which can be detected by smartphone. In the presence of various methods of localization using RSSI, location fingerprinting based on pattern recognition technique is well known for its good performance. Although, this method face the problem to estimate error often occurs at locations where observed RSSI is similar to one in different areas, for example near a wall. Recently, in order to remedy this situation, there has been approached to restrict human's area only to topologically movable areas using an indoor map. Although, this method still remains estimation errors in areas where can be entered each other topologically. In this paper, we focus on the constraint of passing a boundary location between areas in moving to a different area, and then resolve above problem by inhibiting area transition if being far away from a boundary location without passing its location, based on fingerprinting method using Support Vector Machine. Specifically, in order to measure distance from each boundary location, we use RSSI statistics at boundary location. Furthermore, we apply Bayes Filter paradigm to implementation of fingerprinting and inhibition of area transition for preventing estimate error caused by uncertainty of RSSI. As a result of the experiment that the smartphone user walks around the office over 4 areas, the average hit rate improves from 81.7% to 97.1% by applying our proposed inhibition. This proves that considering constraints of area transition in terms of passing boundary location is effective for indoor area estimation using wireless LAN.

KEYWORDS: indoor area estimation, RSSI of wireless LAN, constraints of area transition, fingerprinting, Bayes Filter