Body:

Motivation

Short-lived indoor events such as conventions, conferences and trade fairs usually require some orientation effort by the attendees as these events often take place in locations they are unfamiliar with. Generally, providing navigational assistance via smartphones, as already used for outdoor scenarios, is not possible via GPS, and indoor maps are not available to everyone. However, smartphones provide other sensors that can be exploited to detect characteristics of the environment, for example, wifi signals. Using collaboratively gathered data, we want to automate the process of creating topological maps of buildings (i.e., maps that reflect the structure but not necessarily preserve distances). Besides navigation, the localization of users within these maps can be used to study (anonymized) personal and social behavior, which is useful for event organizers and also interesting for sociologists. Besides topology, we want to enrich maps with topical information that reflects the interests of people and can be used for place recommendation.

Challenges & Highlights

Existing wifi fingerprinting methods for indoor localization and mapping make assumptions about a specific user behavior, like holding the sensor device in front of the user or walking in a steady pace and direction. Other methods require regular scanning of preinstalled landmarks (for example NFC or QR-Codes) for sensor drift correction or manual fingerprint scanning and mapping preparations. We want to develop methods that can be used in a practical scenario with realistic user behavior (e.g., users carrying their smartphone in their pocket and changing walking directions) and without any preinstalled infrastructure or manual map preparation.

Potential applications & future issues

Our grassroots approach complements commercial approaches to indoor localization and navigation. Applications of our technology are enhanced customer services in shopping malls, guidance systems for security companies, navigation in (the shopping areas of) airports, and many more.

Project abstract:

We study the emergence of topological, topical, and social maps of short-lived indoor events such as conventions, conferences and trade fairs,1 in a crowd-sourced manner with little to no effort by participants of the event (and possibly no support by the event organizers). We consider scenarios where no explicit infrastructure for localization and navigation is provided, where no specific mapping activities are performed prior to the event, and where participants are not required to deviate from their usual behavior and to wear any systems beside their smartphones.

Project duration:  
31.12.2018

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