

Understanding Indoor Behavior: Where, What, with Whom?

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ABSTRACT

Capturing and understanding users' context is key to the success of applications such as computational advertising and recommender systems. Currently, context is usually inferred from a user's interaction history with Web content. As an ever-increasing portion of Web interaction occurs in a mobile context, the physical and social environment in which the interaction occurs is a key factor of user context and holds additional signals of user intent. In this talk, I will discuss recent work on understanding user behavior based on recorded traces of the cyber, social and physical component of users' interaction with the indoor environment (i.e., shopping malls), based on an extensive dataset of Wi-Fi logs. We will draw lessons for the future of indoor recommender services and context-aware mobile applications.

Keywords

Information behaviour; contextual services; indoor behaviour; movement

1. A MULTIFACETED VIEW OF INDOOR CONTEXT

Modern computational advertising systems match suitable products to users, based on interaction models capturing information context. They are but one example of services enabled by interaction tracking technologies that assemble detailed data about user's interaction with the cyber (on-line) world [1], enabling to improve recommendations of products to buy, articles to read, and jobs to apply for. Traditionally, users' desktop context has been modeled on data about the users' browsing and searching activities. With the shift towards mobile information access, recommendations need to be delivered to users situated in the physical environment, seeking relevant suggestions across information items, physical products and locations. This shift opens up new challenges for the analysis of user context and consequently for the development of context-aware services.

Successfully addressing such challenges will come from understanding how the different facets of the environment influence the information needs of people. People's shift towards mobile information access opens opportunities for the capture of data about their interaction with online content at a given location

and possibly in the presence of others. We will discuss the interplay of the following traceable facets of behaviour:

1. **Cyber behavior:** the way people interact with online content, captured in logs of accessed Websites, query logs, as well as in the meta-information about such interaction (session length, device identification);
2. **Physical behavior:** the way people interact with the material environment, captured in spatio-temporal traces best interpreted together with additional data (e.g., floorplans, current weather, identification of objects purchased);
3. **Social behavior:** relates to the way people interact in their social environment and how such ties evolve. This includes both immediate (close physical proximity) and virtual social environments (e.g., through social networks).

We focus on the analysis of this interaction in large indoor retail environments, as they have a structured well understood layout; they are increasingly equipped with public Wi-Fi networks enabling the capture of the cyber and physical (including retail) behavior of thousands of users; and the retail behaviour has been extensively studied by social scientists and economists, providing a certain baseline for new findings.

2. FINDINGS AND FUTURE DIRECTIONS

I will describe the findings conducted based on logs collected by an operator of a large shopping mall from registered users of a Wi-Fi network, in particular focusing on the measured dependencies between the three facets of behaviour [3, 2, 4], and argue that the analysis of information behaviour within and across the cyber, physical, and social contexts can inform the design of advertising recommender systems that provide a more nuanced view of user's needs.

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