

Envisioning the Future of Personalization Through Personal Informatics: A User Study

Federica Cena, Computer Science Department, University of Torino, Italy

Amon Rapp, Computer Science Department, University of Torino, Italy

Silvia Likavec, Computer Science Department, University of Torino, Italy

Alessandro Marcengo, TIM, Torino, Italy

ABSTRACT

In recent years, User Modeling (UM) scenery is changing. With the recent advancements in wearable and mobile technologies, the amount and type of data that can be gathered about users and employed to build User Models is rapidly expanding. UM can now be enriched with data regarding different aspects of people's daily lives and is likely to deliver novel personalized services. All these changes bring forth new research questions about the kinds of services which could be improved, which of them would be the most useful, the ways of conveying effectively new forms of recommendations, and how users would perceive them. In this paper the authors tried to find answers to some of these questions by exploiting a novel personalized system to conduct a qualitative user study, with the aim to understand users' needs and expectations w.r.t. personalization enabled by the presence of wearable and mobile technologies.

KEYWORDS

Personal Informatics, Personalization, Quantified Self, Recommendations, Self-Tracking, User Model

INTRODUCTION

With the recent development of wearable and mobile technologies, the amount and type of data that can be gathered about users is rapidly increasing (Rapp et al., 2015). There are many aspects which contribute to this trend. First of all, the paradigm of Internet of Things (IoT) (Gubbi et al., 2013) digitally connects everyday objects in the real world making data pervasive. IoT brings to life Weiser's vision of ubiquitous computing (Weiser, 1998) which tries to bring intelligence to our everyday environment and make it sensitive to our presence. It builds upon advances in sensors and networks, pervasive computing, and artificial intelligence. Then, Personal Informatics (PI) (Li, Dey, Forlizzi, 2010) is a set of tools which use increasingly popular wearable technologies for acquiring personal information on relevant aspects of people's daily lives. They allow users to self-track a variety of data about themselves: from user's physical states (e.g. blood glucose level), psychological states (e.g. mood or stress), behaviour (e.g. movements) and habits (e.g. food intake, sleep) and contextual information (e.g. people met). With self-tracking we intend systematic recording and collection of personal data, usually by using various technologies, with the aim to improve some aspects of daily life. Personal

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Informatics systems best show an expanding trend in acquiring personal data for providing support to users, from increasing their self-awareness to improving their self-knowledge and motivating self-reflection (Rapp & Cena, 2014; Rapp & Tirassa, 2017). Although PI systems may provide users with complex images of themselves, offering opportunities for personal growth and change, as well as health management, self-tracking also introduces the problem of information overload and the need to filter the collected data (Rapp et al., 2016). The influence of the PI systems can be overly invasive and dominant in a person's life. Also, some suggestions could arrive in inappropriate moments, posing some privacy concerns.

Quantified Self (QS) or life logging is a movement which tries to integrate developing technology into the process of personal data acquisition and analysis and relies heavily on IoT and PI tools (Marcengo & Rapp, 2013). With such technological advances, the amount and the type of data that can be collected about users is exponentially increasing, creating a constant stream of information that may reveal many aspects of their daily lives. This is when User Modeling (UM) process come to play since it creates digital representations of users, used to calibrate and adapt the interaction with a system, or to provide personalized recommendations (Brusilovsky, Kobsa, & Nejd, 2007). Until recently, UM field has focused mainly on web data (Kobsa, Koenemann, & Wolfgang, 2001), thus creating User Models using data from web usage behaviour and providing primarily personalized web applications and systems. As many real-world data (hours of sleep, blood pressure levels, locations visited, etc.) are becoming easily available due to self-tracking methodologies and PI tools, interesting opportunities for user modeling arise. UM's could be enriched with data concerning users' real-world characteristics and activities and could incorporate such information to create an "enhanced" model of the user, i.e. a holistic representation of her body, activities, and habits. The "enhanced" user model could enable highly personalized services, since the personalization process would be based on real human beings rather than on Web behaviour. This could further support new forms of personalized and highly dynamic services directly integrated in the users' real lives, by adapting themselves almost in real-time depending on the ongoing users' internal states and external contexts. So, the inevitable symbiosis between User Modeling and PI systems is being born. On one hand, UM can be filled with data coming from PI systems, providing more effective adaptive services in UM-based applications (Cena, Likavec, & Rapp, 2015). On the other hand, PI systems, as a result of UM usage, can provide personalized visualisations and recommendations that improve their efficacy in promoting behavioural change.

In this scenario new research questions arise: What kind of personalization enabled by PI systems would be the most useful in the users' eyes? What are the opportunities for user modeling coming from PI systems? What worries would the users have regarding personalization? Hence, there is a need of further research in the field of personalization. To answer these questions, we used a PI system, developed previously by our research team, to ground a user study. The system can be used to collect and aggregate data from different self-tracking tools and provide useful visualisations and correlations to users. The focus of this paper is not on the system itself and on the design choices made when building it, rather on the user study enabled by the system. The system was used to trigger reflections on the future of personalization and on how PI data could enable new forms of recommendation. Our final aim was to gather insights from users on how to build an "enhanced" UM for designing novel personalized services. As opposed to other works in this field, our study was not conducted with the aim of designing a particular system, rather to gather knowledge which could be used by a wide spectrum of researchers when designing personalized services and which would take into account users' perspective on future of personalization.

RELATED WORK

Both the commercial and research contexts are witnessing rapid increase in the number of available mash-up systems and other services which can enable and support the Quantified Self process. These

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