Evaluating Three Scrutability and Three Privacy User Privileges for a Scrutable User Modelling Infrastructure

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Abstract. This paper describes the evaluation of a Scrutable User Modelling Infrastructure. SUMI is intended to form a service to allow users to share their user models from social e-networking and e-commerce providers to educational systems. The model is scrutable, meaning users can inspect and correct the data that is held about them, and implements privacy policies so that users can control how their models are accessed by other users. This evaluation was conducted with 107 users, which were exposed to a prototype service, for determining whether the proposed scrutability and privacy privileges were acceptable to the users, whether the users were able to achieve the desired outcome, and whether they understood the consequences of their interactions with the system. The conclusions show that the users expressed their general approval of the proposed privileges while making useful suggestions regarding improvements to the presentation and interface to the system.

1 Introduction

Our research has revolved around gathering the requirements for adopting a Scrutable User Modelling Infrastructure (SUMI) for the e-commerce and social e-networking domains, in order to enable exchanging of user models among these domains and educational personalization systems, in an attempt to enrich the various sets of user information which are being used for adaptation purposes. We have focused on three key User Modelling ‘ingredients’ - interoperability, scrutability and privacy. In this paper we present our work on scrutability and user privacy while attempting to answer the following research question: To what extend is it possible for such an infrastructure to allow users to scrutinize the modelling process and express their data privacy preferences?

2 Key User Modelling Components and Identified Problem

Lifelong User Modelling: User Modelling (UM) is the ‘heart’ of educational personalization services such as AHA!, which offers adaptive content through fragment variants and adaptive link presentation [1]. By keeping a model for each user, it allows
unique adaptation and presentation of the available resources based on these models, thus enabling successful interactions between users and personalization systems. Life-long UM was introduced in an attempt to model users’ daily-life-long interactions with several services on the World Wide Web (WWW) while offering to the users the ability to scrutinize and control the whole personalization process [2].

**Scrutability:** The term scrutability in user modelling signifies that every user’s model can be inspected and altered by its owner in order to determine what should be modelled about him/her and how that modelling and following personalization process will be conducted. Scrutable solutions allow users to inspect and alter the value of any single inference that is used for drawing conclusions about them [3].

**Privacy-Enhanced Personalization:** An area that aims at merging together the techniques and goals of UM with privacy considerations and apply the best possible personalization inside the boundaries set by privacy rules. As the research shows, there is no ideal solution while attempting to combine these two crucial elements. Instead, numerous small enhancements can be implemented, depending on the user and application domains in each case, in order to achieve the best possible solution [4].

**Identified Problem:** The area of UM is undoubtedly progressing. But, while we find UM in a state of transition, is still been applied single-dimensionally: Most adaptive systems developed, are only using their internal models when offering personalization services to their users. In addition, newly introduced frameworks and architectures, while offering a solution in achieving interoperability across peer systems, do not involve systems beyond the educational domain. Furthermore, User Modelling Servers, a client-server architecture for allowing central information storing and simultaneously data access and retrieval, although are considering and offering scrutability and privacy options to their users, are mostly designed and developed to meet commercial requirements [5]. We are loosing user information, which is flowing on the WWW, because we are not thinking multi-domain. We can enrich UM if we find a way to model our every day (life-long) interactions with services from the social e-networking and the e-commerce domains, in order to enrich user information sets which are used in the educational domain for personalization purposes. Recent data portability announcements from two key players in the social e-networking domain [6, 7] which revealed these providers’ initiatives to pass user data back to their ‘owners’ have made this multi-domain vision even more feasible.

### 3 SUMI User Evaluation

SUMI’s goal is to allow users to gather their various models which they hold with several social e-networking and e-commerce providers, and interact with these models via a SUMI service, using a set of offered scrutability and privacy privileges. Special consideration has been given to collecting the requirements for employing such an infrastructure in an attempt to enrich the current picture in UM [8].

**Achieving Interoperability:** In this paper we have focused on presenting our work on scrutability and user privacy, thus we will not expand on our solution for achieving interoperability across the social e-networking and e-commerce domains, which is