Towards User-centric Cross-site Personalisation

Kevin Koidl, Owen Conlan, Vincent Wade,

Knowledge and Data Engineering Group (KDEG), Trinity College Dublin, School of Computer Science, Dublin, Ireland
{Kevin.Koidl, Owen.Conlan, Vincent.Wade}@cs.tcd.ie

Abstract. Personalisation on the web is mostly confined to Websites of online content providers. The main drawback of this approach is the missing consideration of the users previous cross-site browsing experience resulting in an often fragmented browsing experience. This paper introduces a service driven architecture for user-centric personalisation in online cross-site tasks. We introduce the proposed architecture and results of an initial experiment evaluating cross-site personalisation across separately hosted open-source Web-based Content Management Systems (WCMS).

Keywords: Cross-Site Personalisation, Adaptive Hypermedia Systems, Web-based Recommender Systems, Open-Source Web-based Content Management Systems (WCMS)

1 Introduction

Personalisation on the web is mostly confined to specific Websites of content providers and not cross-site. It can be argued that the main reason for this shortcoming is the need for Website owners to encourage users to remain within their Website as long as possible. The expected outcome of a prolonged user visit is an increase in revenue either during the visit or in future visits [1]. The user on the other hand benefits from Website specific personalisation by receiving personalised recommendations, such as purchase related items, that may be of interest to the user. However this approach cannot assist the user in online tasks which require cross-site browsing, such as exploring product related information across enterprise and user generated Websites. The result of this fragmented browsing experience can increase user frustration through repetitive query usage within the different Websites [2]. To unify the fragmented browsing experience both the need of the user (freely browsing across the web) and the need of the content provider (encouraging the user to stay on the Website as long as possible) needs to be addressed.

2 The UNITE Architecture

The UNITE (UNIfied Task-based browsing Experience) architecture is designed to assist users in complex online tasks which are short-term and cross-site, such as in

Online Customer Care scenarios. This is achieved through a third-party Adaptive Feature Service (AFS) interfacing with the different Websites the user browses across. The main approach of UNITE is to unify terms related to Web pages the user has browsed across. This unified term model can then be used to send personalised recommendations to interfacing Websites reflecting the overall browsing experience of the user. Typical examples of personalised recommendation usage are link and content recommendation [4]. The advantage for the user is a more unified browsing experience across the web and for Website owner the possibility to tailor a more personal and customer specific Website experience. This approach reflects research related to Open Corpus Adaptive Hypermedia [3] and consists of following elements:

Term Identification Service: The main purpose of the Term Identification Service is to identify terms related to the current Webpage the user is viewing. Terms can either be retrieved directly from the interfacing Website (e.g. though an existing taxonomy or folksonomy) or through term extraction tools such as Yahoo JQL table[1]. In a second stage the extracted terms can be used to receive related terms through external knowledge services such as WordNet[2] or openCalais[3]. Once an initial term-based taxonomy is created the service can train text analytics tools such as Weka[4] to create related taxonomy terms for Websites which either have no related terms or for which the terms are not in the scope of the previously collected terms.

User Model Repository: The User Model consists of terms related to the current task of the user and which were identified by the Term Identification Service. The User Model can be enriched with addition properties such as preferred content type or language preferences.

Strategy Repository: Depending on the User Model properties the Strategy Model Repository can identify suitable strategies to create cross-site personalised recommendations.

Scrutiny Interface: To ensure user trust in the recommendations provided the user can view all models and adaptive decisions.

RESTful Service Layer: The UNITE architecture implements a RESTful service layer for client communication.

WCMS Module Extensions: Based on the mostly flexible and simple extensibility mechanisms of Web-based Content Management Systems different modules can be deployment at run-time to enable cross-site personalised recommendations.

[1] http://developer.yahoo.com/search/content/V1/termExtraction.html
[2] http://wordnet.princeton.edu/
[3] http://www.opencalais.com/
[4] http://www.cs.waikato.ac.nz/ml/weka/

3 Experimental Results

To provide a realistic real world scenario the initial experiment was based on Online Customer Care tasks in which users explore information related to the Symantec Norton 360 product range. The goal of the experiment was to study the perceived usefulness of the approach. For this two system pairs were deployed; one non-adaptive WCMS system pair and one adaptive WCMS systems pair. Each WCMS system pair consisted of two Drupal[5] based WCMS with one hosting structured manual content and the other hosting user generated forum content. Furthermore the Drupal based WCMSs were extended with modules allowing both the interfacing with the third-party service and the usage of term based personalised recommendation for link annotation. The experiment was conducted online with 36 volunteering participants from Trinity College Dublin and the University of South Australia. Each participant was asked to provide information about their knowledge in adaptive systems and the Symantec product range. After this the participants were asked to conduct two out of four real world customer care tasks. The tasks were assigned based on the Latin Square design. Each participant conducted one task in the adaptive system pair and one task in the non-adaptive system pair. After each task the participants were asked to fill out a System Usability Score (SUS) questionnaire. Finally, two concluding questionnaires were presented to the participants.

The pre-questionnaire indicated that most participants had limited knowledge in the usage of both Norton 360 products and adaptive systems. Furthermore most participants stated that they are consulting online manual and forum information on a regular base and using search engine technology frequently in searching for task related information. The SUS score resulted in 68.67 for the adaptive system pair and 62.58 for the non-adaptive systems pair. It can be argued that both scores are an indication for a general acceptance of the experimental system. However, the difference in scores is too small to make a clear conclusion on usability differences. In relation to discussing the quantitative data execution time, content views and query count was recorded. The average execution time was 24 minutes and 37 seconds (SD 05:35) in the adaptive system pair and 22 minutes and 24 seconds (SD 05:08) in the non-adaptive system pair. In relation to content views the adaptive system pair recorded an average of 116 content views (SD 32) and the non adaptive system pair an average of 96 content views (SD 20). Finally in relation to query count the adaptive system pair recorded 429 queries (260 in the manual hosting Website and 169 in the forum hosting Website) and the non-adaptive system pair 339 queries (203 in the manual hosting Website and 136 in the forum hosting Website). In order to investigate if the increased number of content views and queries resulted in a higher quality in tasks answers further analysis of the results needs to be conducted.

The qualitative data provided by the final two questionnaires is based on a 4-point[6] LIKERT scale (1=strongly disagree, 2=disagree, 3=agree, 4=strongly agree). In relation to the usefulness of the link annotations when browsing across both Websites (manual and forum) 7 strongly agreed, 13 agreed, 11 disagreed and 1 strongly

[5] http://drupal.org/

[6] To ensure the user provides a positive or negative tendency a 4-point scale instead of a 5-point scale was used.

disagreed. Asked if the adaptive recommendations were relevant in relation to the content 2 strongly agreed, 19 agreed, 2 disagreed and 1 strongly disagreed. Asked if the participants were satisfied with the performance, assistance and guidance of the adaptive web system 6 strongly agreed, 18 agreed, 7 disagreed and 1 strongly disagreed. It can be argued that the participants mostly agreed that the systems approach was useful and relevant.

4 Conclusion and future work

This poster abstract introduced UNITE, a cross-site web personalisation architecture towards cross-site personalisation on the open web. Selected findings of an initial experiment were presented. Future evaluation will be addressing different aspects of the overall architecture in order to gain a more in dept understanding of cross-site personalisation and which techniques are most useful.

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