RELIABLE AND ENHANCED USER DEFINED PERSONALIZED WEB SEARCH

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ABSTRACT: Personalized web search (PWS) has demonstrated its effectiveness in improving the quality of various search services on the Internet. However, evidences show that users' reluctance to disclose their private information during search has become a major barrier for the wide proliferation of PWS. We propose a privacy-preserving personalized web search framework UPS, which can generalize profiles for each query according to user-specified privacy requirements. Relying on the definition of two conflicting metrics, namely personalization utility and privacy risk, for hierarchical user profile, we formulate the problem of privacy-preserving personalized search as #-Risk Profile Generalization, with its N P-hardness proved. We develop two simple but effective generalization algorithms, GreedyDP and GreedyIL, to support runtime profiling. While the former tries to maximize the discriminating power (DP), the latter attempts to minimize the information loss (IL). By exploiting a number of heuristics, GreedyIL out performs GreedyDP significantly. We provide an inexpensive mechanism for the client to decide whether to personalize a query in UPS. This decision can be made before each runtime profiling to enhance the stability of the search results while avoid the unnecessary exposure of the profile. Our extensive experiments demonstrate the efficiency and effectiveness of our UPS framework.

KEYWORDS: Personalized web search (PWS), information loss (IL), discriminating power (DP), UPS, Greedy IL, bookmarks

INTRODUCTION:

THE web search engine has long become the most important portal for ordinary people looking for useful information on the web. However, users might experience failure when search engines return irrelevant results that do not meet their real intentions.

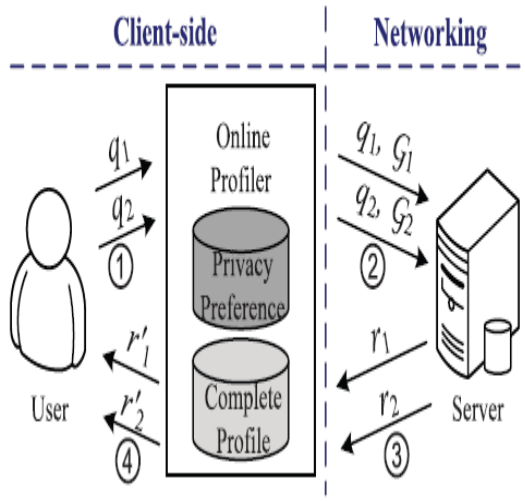
Such irrelevance is largelydue to the enormous variety of users' contexts and backgrounds, as well as the ambiguity of texts. Personalized web search (PWS) is a general category of search techniques aiming at providing better search results, which are tailored for individual user needs. As the expense, user information has to be collected and analyzed to figure out the user intention behind the issued query. The solutions to PWS can generally be categorized into two types, namely click-log-based methods and profile-based ones. The click-log based methods are straightforward— they simply impose bias to clicked pages in the user's query history. Although this strategy has been demonstrated to perform consistently and considerably well [1], it can only work on repeated queries from the same user, which is a strong limitation confining its applicability. In contrast, profile-based methods improve the search experience with complicated user-interest models generated from user profiling techniques. Profile-based methods can be potentially effective for almost all sorts of queries, but are reported to be unstable under some circumstances [1]. Although there are pros and cons for both types of PWS techniques, the profile-based PWS has demonstrated more effectiveness in improving the quality of web search recently, with increasing usage of personal and behavior information to profile its users, which is usually gathered implicitly from query history [2], [3], [4], browsing history [5], [6], click-through data [7], [8], [1] bookmarks [9], user documents [2], [10], and so forth. Unfortunately, such implicitly collected personal data can easily reveal a gamut of user's private life. Privacy issues rising from the lack of protection for such data, for instance the AOL query logs scandal [11], not only raise panic among individual users, but also dampen the data-publisher's enthusiasm in offering personalized service. In fact, privacy concerns have become the major barrier for wide proliferation of PWS services.

PRIVACY PROTECTION IN PWS SYSTEM : Generally there are two classes of privacy protection problems for PWS. One class includes those treat privacy as the identification of an individual, as described in [20]. The other includes those consider the sensitivity of the data, particularly the user profiles, exposed to the PWS server. Typical works in the literature of protecting user identifications (class one) try to solve the privacy problem on different levels,

including the pseudoidentity, the group identity, no identity, and no personal information. Solution to the first level is proved to fragile [11]. The third and fourth levels are impractical due to high cost in communication and cryptography. Therefore, the existing efforts focus on the second level. Both [21] and [22] provide online anonymity on user profiles by generating a group profile of k users. Using this approach, the linkage between the query and a single user is broken. In [23], the useless user profile (UUP) protocol is proposed to shuffle queries among a group of users who issue them. As a result any entity cannot profile a certain individual. These works assume the existence of a trustworthy third-party anonymizer, which is not readily available over the Internet at large. Viejo and Castell_a-Roca [24] use legacy social networks instead of the third party to provide a distorted user profile to the web search engine. In the scheme, every user acts as a search agency of his or her neighbors. They can decide to submit the query on behalf of who issued it, or forward it to other neighbors. The shortcomings of current solutions in class one is the high cost introduced due to the collaboration and communication. The solutions in class two do not require third-party assistance or collaborations between social network entries. In these solutions, users only trust themselves and cannot tolerate the exposure of their complete profiles an anonymity server. In [12], Krause and Horvitz employ statistical techniques to learn a probabilistic model, and then use this model to generate the near-optimal partial profile. One main limitation in this work is that it builds the user profile as a finite set of attributes, and the probabilistic model is trained through predefined frequent queries. These assumptions are impractical in the context of PWS. Xu et al. [10] proposed a privacy protection solution for PWS based on hierarchical profiles. Using a user-specified threshold, a generalized profile is obtained in effect as a rooted subtree of the complete profile. Unfortunately, this work does not address the query utility, which is crucial for the service quality of PWS. For comparison, our approach takes both the privacy requirement and the query utility into account. A more important property that distinguishes our work from [10] is that we provide personalized privacy protection in PWS. The concept of personalized privacy protection is first introduced by Xiao and Tao [25] in Privacy-Preserving

DataPublishing (PPDP). A person can specify the degree of privacy protection for her/his sensitive values by specifying "guarding nodes" in the taxonomy of the sensitive attribute. Motivate by this, we allow users to customize privacy needs in their hierarchical user profiles. Aside from the above works, a couple of recent studies have raised an interesting question that concerns the privacy protection in PWS. The works in [1], [26] have

SYSTEM ARCHITECTURE:



found that personalization may have different effects on different queries. Queries with smaller click-entropies, namely distinct queries, are expected to benefit more from personalization, while those with larger values (ambiguous ones) are not. Moreover, the latter may even cause privacy disclosure. Therefore, the need for personalization becomes questionable for such queries. Teevan et al. [26] collect a set of features of the query to classify queries by their clickentropy. While these works are motivative in questioning whether to personalize or not to, they assume the availability of massive user query logs (on the server side) and user feedback.

ADVANTAGES OF PROPOSED SYSTEM:

Increasing usage of personal and behaviour information to profile its users, which is usually gathered implicitly from query history, browsing history, click-through data bookmarks, user documents, and so forth.

The framework allowed users to specify customized privacy requirements via the hierarchical profiles. In addition, UPS also performed online generalization on user profiles to protect the personal privacy without compromising the search quality.

CONCLUSION:

Finally, this project presented a client-side privacy protection framework called UPS for personalized web search. UPS could potentially be adopted by any PWS that

captures user profiles in a hierarchical taxonomy. The framework allowed users to specify customized privacy requirements via the hierarchical profiles. In addition, UPS also performed online generalization on user profiles to protect the personal privacy without compromising the search quality. We proposed two greedy algorithms, namely GreedyDP and GreedyIL, for the online generalization. Our experimental results revealed that UPS could achieve quality search results while preserving user's customized privacy requirements. The results also confirmed the effectiveness and efficiency of our solution.

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