

Web Personalization: As A Key to Relevant And Precise Information

Ramandeep Kaur
Research Scholar
Department of Computer Science
Chandigarh Group of Colleges, Gharuan
Punjab, India
88ramandeep@gmail.com

Er. Iqbaldeep Kaur
Associate Professor
Department of Computer Science
Chandigarh University, Gharuan
Punjab, India
Iqbaldeepkaur.cu@gmail.com

ABSTRACT

World Wide Web contains huge amount of data and information. Therefore processing of data available on World Wide Web is very important to extract the useful information and knowledge from this huge amount of data. Searching information on the internet is a very common task. The basic tools of internet are the search engines which are used by users to retrieve information. But it becomes very difficult to retrieve the most relevant information from the web because a large number of documents are available in different formats. The users have to go through a long list of information to choose the one relevant to them. This process is time consuming. The search engines do not cater to about the needs of users and show the same information to the different users searching with the same keyword. Web personalization is used to improve retrieval effectiveness, save the time and provide useful results to the users. We can also define web personalization as a recommendation system. This paper provides the information about web personalization, functions of web personalization and their challenges.

Index terms

web mining, web usage mining, web personalization, recommendation system, challenges of web personalization.

1. Introduction

1.1 Data Mining

The World Wide Web contains a huge amount of data. Data Mining is a very powerful and new technology to analyse and extract the important information from the data available on the World Wide Web. Sometimes Data Mining process is called as Data or Knowledge Discovery process.

Here is the list of areas where data mining is widely used:

- Financial Data Analysis
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- Retail Industry
- Telecommunication Industry
- Biological Data Analysis
- Other Scientific Applications

1.2 Web Usage Mining

Web Usage Mining is a process of applying data mining technique to discover the interesting patterns from the web usage data. Web usage mining provides better understanding for serving the needs of Web-based applications [1]. Web usage mining focuses on techniques that could predict user behaviour while the user interacts with the Web [2].

1.3 Web Personalization

The application area of web usage mining is Web Personalization. Web personalization is used for providing the relevant and useful information to the web users. World Wide Web is the largest and most accessible source of information. Users often miss the goal of their inquiry or receive a huge amount of ambiguous information when they try to navigate through the search engines. Commonly, the search engines investigate the relevant web and pages according to the user's query. Quite often the users find a lot of information for their each query. Personalized concepts involve in collecting, monitoring and storing present and past status of user interaction with web. This helps the user to get the appropriate and right information. It is difficult to personalize World Wide Web because web is a place for human to human communication whereas personalization requires software system to take part in interaction [3]. The objective of a personalization system is to "provide information that users want or need exactly, without expecting from them to ask for it explicitly" [4].

Web Personalization process is divided into three main phases: [5]

- a) Data preparation and transformation
- b) Pattern discovery
- c) Recommendation

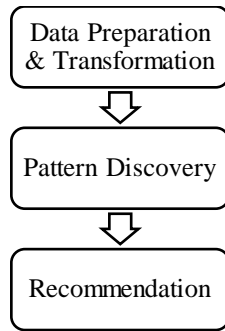


Figure 1. Web Personalization Process

- a) **Data preparation and transformation:** The information available in the web is unprocessed and unstructured. The data preparation phase transforms unprocessed Web log files into transaction data which can be then processed by data mining tasks [6].
- b) **Pattern discovery:** This stage employs machine learning and statistical methods on pre-processed web data in order to extract the patterns of website usage [7]. In the pattern discovery phase different data mining techniques can be applied to transaction data, such as clustering, classification, association rule mining, and sequential pattern discovery.
- c) **Recommendation:** Recommendation is the retrieval process which functions in accordance with the previous two stages [8]. The recommendation engine takes into account the active user session in conjunction with the discovered patterns to provide personalized content [6].

2. Evolution of Web Personalization

Phase 1: 2000-2005

Kramer developed a framework to use personalization techniques to benefit user experiences and user acceptance. Cheing Cheng develops a category-based Web personalization system in which an unconventional system logger, along with a category generator and a customizer, was designed [9].

Phase 2: 2006-2008

Carvahlo presented a methodology for the personalization of e-newsletters based on the analysis of user access logs [10]. To approach the problem we have used clustering on the set of users, described by their Web access patterns. Germanakos presented a Web adaptation and personalization architecture that uses cognitive aspects as its core filtering element. [11]. In 2008 Minxiago presented a Web personalization system, which can find out users interested domains [12].

Phase 3: 2009-2011

W.Gang proposed a system which uses an efficient sequential pattern-mining algorithm to identify frequent sequential Web access patterns [13]. In 2010 Antoniou proposed a new web personalization technique, based on advanced data structures. The data structures which are used are Splay tree and Binary heaps [14].

Phase 4: 2012-2015

C.Liang proposed machine learning algorithms for web personalization [15]. Leung proposed a personalized mobile search engine (PMSE) that captures the users' preferences in the form of concepts by mining their click through data [16]. Chen developed a novel collaborative filtering algorithm designed for large-scale web service recommendation [17]. Lidan proposed a PWS framework called UPS that can adaptively generalize profiles by queries while respecting user-specified privacy requirements [18].

3. Challenges in Web Personalization

Web search engines help users to discover useful information on the web according to user query. When the same query is submitted by different users, most search engines return the same results regardless the query submission. In general, each user has different requests for his/her query. More than half of the documents returned by search engines are irrelevant information [19]. Challenges of personalization are as follows:

- a) **Security and Privacy:** The security and privacy is main challenge in web personalization. Security refers to the ability of user or site to protect information against unauthorized third parties by preventing them to access, use or modify information whereas privacy is the quality of being secluded from the presence or view of others [20]. Privacy includes the users' level of acceptance in how the data is acquired, whether the benefits of the approach outweigh the privacy risks, and whether the site will disclose the information to third parties [21].
- b) **Fair dealing and Integrity:** Dealing with users and visitors of a web-site is a critical task. All visitors expect to be treated equally in terms of information, prices and services provided. When it comes to personalization, there are of course many occasions that a company is obliged to act discriminately based on the time, efforts, and money invested by customers as well as level of loyalty and pervious transactions [22].
- c) **Timing:** Personalization needs to be efficient enough in order to keep the balance between time spent by user and to the extent to which his or her online behaviour can be symbolized [22].

- d) **Cost:** It was found that operating a personalized web site can cost more than four times than operating a “comparative dynamic site” and most sites that deployed personalization have not realized adequate returns on their investments [23]. In order to personalize their products and services for their customers many companies like Google, flipkart, amazon and airline companies spent millions on their portal web-sites.
- e) **Agility:** Agility or nimbleness is the capability to swiftly adapt to changes and can be achieved in three distinct ways including operational, portfolio and strategic [24].

4. Conclusion

Web Personalization is a solution for information overload problem on World Wide Web. The web personalization increase the accuracy of search engine, simplifies the searching process and reduce the time user has to spend for searching. Today for both Web-based organizations and for the end users the web personalization has become an important tool. Web-based applications like ecommerce sites, e-learning systems etc. improve their performance by addressing the needs and interest of individual user and preferences of each user, increasing satisfaction of user. In this paper, we present some background knowledge on existing Web personalization systems and challenges in web personalization.

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