Personalization Technologies in Cyberspace

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INTRODUCTION

Hundreds of thousands of companies worldwide are using the Web as a major channel to interact with their customers for brand promotion, product marketing, order fulfillment, and after-sales support. Competition is extremely keen among online merchants.[1] In doing business online, the question that lurks in the back of their mind is, are we maximizing our business opportunities?

With the high interactivity of e-commerce, online merchants now adopt various differentiating strategies to attract and retain customers in the hope of remaining competitive. To provide a differentiated service, online merchants first identify each individual, and then acquire more information about each individual's interests. Then, they can tailor Web content directly to a specific user by having the user provide information to the Web site either directly or through tracking devices on the site. The software can then modify the content to the needs of the user. Ultimately, highly focused and relevant products or services are delivered to each customer, who is treated in a unique way to fit marketing and advertising with his or her needs. This process is generally named *personalization*.

There is a wide range of personalization strategies used nowadays. For instance, My Yahoo! provides a personalized "space" for each user. It automatically generates personalized content (e.g., information on the horoscope for the correct star sign) matched with users' profiles (e.g., a person's date of birth). Apart from automatic personalization, it also presents the users with an array of choices and allows the users to select what is of interest to them. The users can personalize not only the content (e.g., weather, finance) but also the layout (e.g., color, background). My Yahoo! was considered to be one of the forerunners among the growing number of personalized Web sites that have been springing up on the Internet over the last few years (Manber, Patel, & Robison, 2000). Amazon.com greets returning customers with a personalized message and offers a hyperlink to book recommendations congruent with their past purchases. These recommendations are generated based on the customers' previous purchases and the preferences of like-minded people, and there is no extra work imposed on the customers. Amazon continues to establish its personalization system, and more filtering mechanisms are being added to make the book recommendations be more relevant and useful. Recently, there has been the introduction of a personalized search engine, A9.com by Amazon.com, which recommends relevant Web sites to each individual by analyzing his or her browsing history and bookmarks. Expedia.com asks users for their desired destinations and then e-mails them information about special discounts to the place where they like to travel. It is expected that corporate investment in personalization technologies will continue to surge in the future (Awad & Krishnan, 2006; Poulin, Montreuil, & Martel, 2006; Rust & Lemon, 2001).

Given the proliferation of personalization, this chapter will address the key issues related to personalization and provide definitions to some keywords, such as rule-based personalization and collaborative filtering.

BACKGROUND

Definition of Personalization

Personalization is one of the rapidly emerging technologies in the field of information systems (IS) and is drawing increasing attention in academia (Adomavicius & Tuzhilin, 2005). Due to its fast emergence, there is still no globally agreed definition from researchers and practitioners as to what personalization actually is. Here are some of the representative ones:

- Wikipedia defines personalization to be a means of changing Web pages based on the interests of an individual. Personalization implies that the changes are based on implicit data, such as items purchased or pages viewed.
- As defined by Personalization Consortium in 2003, personalization is "the use of technology and customer information to tailor electronic commerce interactions between a business and each individual customer."
- According to Bitpipe,[2] personalization is a process of creating a means of communication (Web site, letter, etc.) that is specific to your readers in order to improve customer relationships and loyalty.

Generally speaking, we agree with the previous definitions. In this chapter we would reference personalization to be a process of matching products, services, and advertising content with each individual. The matching process is

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based on what an online merchant knows about a user. With this knowledge, online merchants construct a user profile, which defines users' preferences and their interaction behaviors. Personalization technologies can be applied not only on e-commerce, but also mobile commerce or other business channels in the hope of generating more business opportunities.

The technology enabler is generally referred to as a *personalization agent*, which is a collection of software modules that provides tools to collect and analyze user data and adapt the content to Web users' objectives and facilitate their navigation or buying process (Cingil, Dogac, & Azgin, 2000). This is accomplished by deploying pattern recognition software to collect and analyze Web semantics, navigation activities, and purchase transactions of the individuals. Then, content and presentation format is adapted for each individual. Examples of software modules include customer relationship management, data mining, collaborative technology, and clickstream analysis components. With the help of personalization agents, online merchants can now exert control and manipulate content-related parameters at a very fine level not previously possible. In this way, they can ensure the right person receives the right content in the right format at the right time.

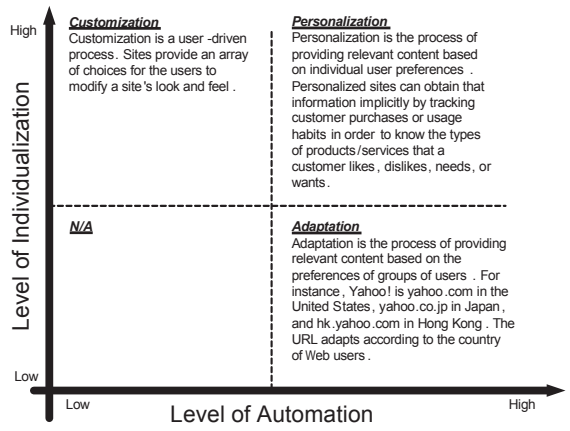
Adaptation, Customization, and Personalization

When researchers and practitioners start a project on personalization, they might ask whether the terms, *adaptation*, *customization,* and *personalization*, are interchangeable. So far, there are few studies that clearly distinguish these three terms. We modify the definition by Ho (2006) and distinguish these terms with two dimensions: level of automation and level of individualization. Level of automation refers to user control in the process of generating recommendations. The two ends are user-driven and machine-driven. Level of individualization refers to the degree of differentiation of recommendations from one person to another person. Some recommendations are offered for a group of people, whereas some are tailored for each individual.

Customization focuses on direct user control. In this user-controlled process, the user is given a set of options, and he or she chooses specific interests on a checklist so that the site can display the requested information. In some sophisticated settings, based on these user preferences, the merchant's system recommends additional products to the user. This technique is fairly complicated because the merchant has to map among different product categories in advance.

Adaptation is driven by intelligent software programs, and a group of users receives the same outcome of adaptation. For instance, a global brand differentiates itself in each market segment by the domain name. For example, Yahoo is yahoo.com in the United States, and yahoo.co.jp in Japan. Each regional portal provides local news and weather reports relevant to the local users.

Figure 1. Taxonomy of customer relationship management systems for e-commerce



Personalization is driven by the software package. The online merchants extract, combine, and integrate data taken from multiple sources before personalization becomes operational. Then personalization software packages mine a Web site's data and attempt to serve up individualized pages to the user based on a model of that user's preferences. By definition, personalization will generate different recommendations to different individuals.

Figure 1 presents a summary of these three terms. Nowadays, these technologies are powerful tools in the battle for customer loyalty.

Personalization Process

Figure 2 shows the process to operate personalization. It also specifies the data and the machine components to support the process. The five key steps are:

1. **User Interaction:** Web users interact with the Web site and gradually provide information that profiles them in terms of browsing habits and product needs. In many cases, the site requests the users to fill out a survey stating their preferences.
2. **Installation of Cookies:** A cookie is a set of small text files stored on users' hard drives, and it is usually installed without the users' consent when the users first visit a Web server (Goldsborough, 2005). When the users revisit the site and request a page from that Web server, the cookie sends a message to that server. In this way, online merchants can identify each user.

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