Personal Information Assistant for Personalized Web-based Education

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Abstract: With the rapid progress of Internet, WWW has become the most powerful means of information spreading and knowledge transmitting. Web-based education is also developing quickly along with the increasing volume of the data available through WWW and the growth of the number of Internet users. In this paper, we put forward a personal information assistant which can discover and collect information through Web for individual users. The personalized characters of the information assistant make it a convenient and efficient tool in Web-based education.

Keywords: information retrieval, Web-based education, personalization

1.Introduction

Internet is developing rapidly day by day with constantly expanding information space on it. In just a few years the World Wide Web has become an essential and pervasive information resource [1]. The amazing proliferation of electronically accessible information of Web and the utilizing convenience urge even more information publication and knowledge transmission through WWW in turn. Nowadays, WWW has affected people's daily life in every aspect deeply and thoroughly. Education is one of the most distinguished domains in which the Web has brought out novel changes.

The huge content, widely utilization, flexibility and interactivity of Web offer an excellent chance of learning for millions of people. Anyone can access to Internet at any time from any point of the world to collect the needed information and learn the desired knowledge. Thus, Web-based education really makes education become an individual-oriented life-long process and overcomes the temporal and spatial limitations on traditional education. Moreover, the revolution of multimedia technology enables Web-based education provide diversiform ways in teaching and learning. Other advantages of Web-based education include the high spreading speed of information, the share of resources, the focus of intellectual ability etc. All of these make Web-based education a promising developing trend.

This paper is emphasized on the personalized Web-based education because that we believe the personalization is the most important characteristic and merit of Web-based education. From a personal viewpoint, we present an information retrieval assistant for individual users in Section 2 and illustrate how it works for personalized Web-based education in Section 3. Section 4 is the concluding part and some future work is discussed.

2.Personal Information Assistant

Because of the increasingly expanding data available in WWW, powerful means are urgently needed to assist Internet users in locating and retrieving information. In Web-based education, such tools are also useful in some arduous tasks such as courseware collecting and learning materials filtering. Further more, an information retrieval tool based on individual point of view can contribute greatly to personalized Web-based education because of its personalized characteristics. Our personal information assistant absolutely fits for this. We will introduce the architecture and basic abilities of the agent based assistant in this section and explain its action in personalized Web-based education later.

The personal information assistant we discuss here can simulate the manual process of information retrieval through WWW, automatically collect and filter information discovered according to the preference of individual users. Since the information space is so immense today, such an assistant is especially important to guide Web browsing and help user make full use of the available information more effectively. The assistant is composed of seven main components, as figure 1 shows.

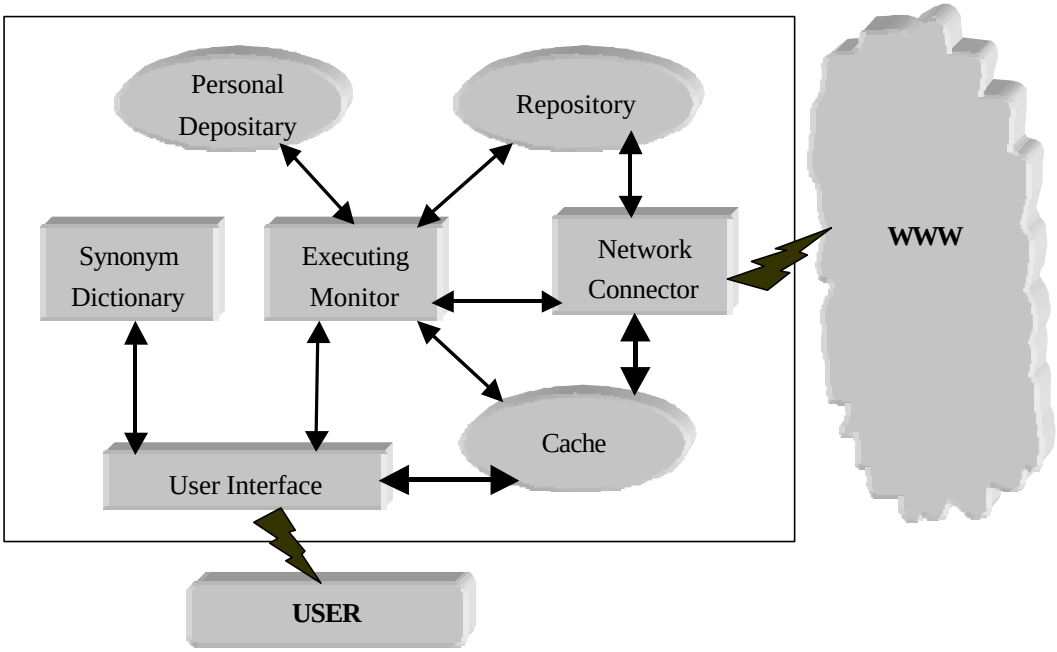

Fig. 1. Architecture of Information Assistant

User Interface acts as the input/output entrance with the user. Executing Monitor is the central processing unit, responsible for arranging the searching tasks and starting the Network Connector for actual information discovery. Cache stores Web pages retrieved by the Network Connector. Knowledge used by the Network Connector in Web crawling and page analyzing is stored in the Repository while information about the user's preference is stored in the Personal Depositary. Synonym Dictionary is used to provide keyword options and information guiding to users.

The working process of the information assistant can be divided into two phases: learning phase and serving phase. In the learning phase, searching for information from WWW requires three steps of operations:

1. Users submit their information requirements by providing the original seed URLs as the starting point for the search and the keyword list for the information matching and ranking;

2. Web pages are retrieved and scanned for relevant information according to the keyword list;

3. Retrieved documents are scanned to find links to other URLs and potential useful Web pages are retrieved as step 2.

After finishing the learning phase, the information assistant helps the user build up a virtual information site with filtered and reorganized Web pages, seed URLs, the keyword list and the corresponding information classification from the user. The meta-information of these pages, including their physical location and updating time, is also stored in the virtual information site. Then in the serving phase, the information agent actively retrieves the latest version of the preferred pages and presents them to the user. The virtual site can be expanded dynamically during the serving phase if needed[2].

From the introduction of the main structure and working process of our personal information assistant, we can clearly see that it has potential supports for personalized information retrieval, which would be of much help to individual oriented Web-based education. Unlike the general search engines which serves as a public information store for multiple users, the personal information assistant mainly works for only one master and hence is able to care more for the individual preference and current network condition. The main advantages of it include:

- User may specify the starting point and the scope of the searching;
- Keyword list used in link extracting and data filtering is also organized according to the specific interest of user. That means a more precise match to user's preference which can not be reached by a general purposed system like search engines.
- User may give feedback constantly to the assistant to improve its performance and ability.
- The assistant can learn human preference continuously from all above and adapt itself t to the shifting interest of user and the dynamically changing environment of Internet [3].

The most important character of the personal information assistant is that the assistant holds the ability of learning while it permits personal configuration as well. So the assistant can be initialized in accordance with the user's preference, learn and accumulate knowledge during its service for the user. It gradually becomes the well-behaved delegate for the user to complete the effective information retrieval on the Web.

3.Personalized Web-based Education

Fundamentally speaking, education is a social operating and training. Internet provides more active and interactive modes in education. Through WWW, knowledge is no longer beaten into students as dull doctrines, but expressed in all kinds of lively experience, operation and even games. Web not only enriches the styles and quantum of available information greatly, but also bestows the users more options and freedom. One of the objectives of the Web-based distance education is the emphasis on teaching students in accordance with their aptitude. Our information assistant can serve for this personalized purpose in several ways.

The designers of the Web-based distance teaching system can use this information assistant in courseware collecting. Such a process is always arduous to be completed manually by the system designers and teachers. However, the information assistant can fulfill this task automatically and effectively. Making use of the intelligent data retrieving and filtering ability of the information assistant, designers may specify different searching scope and content focus to gather information from Web for varied courses. The personal character of the information assistant makes it quite good for meeting the variant requirements of different courses and different teachers.

The information assistant is also useful for Web students. There are more and more distance education sites in Web now and it may take the users extra work and time to locate, browse and choose these sites whenever they want

to have a class or a test. They can utilize the information assistants as their agents in selecting the educational sites, articles and exercises. Then the agents download suitable materials automatically and maintain the interaction with the original Web sites. By organizing the retrieved data into a logical virtual site, user may actually set up a private Web-classroom or even a Web-school consists of different disciplines. Such a classroom is highly flexible to satisfy the personal requirements and adapt itself t the shifting interest of individual users.

Thus, with the help of the personal information assistant, the idea of teaching students according to their aptitude and interests in education can be realized truly and easily. Education can really be a life-long process and care more about the learners' uniqueness and activity.

4.Future Work

In this new century, the amount of knowledge is increasing at the exponential speed. Knowledge individuals acquired by the means of traditional schools cannot accommodate to the need of one's whole life. A socialized, life-long, network-based, interactive and personalized education is the inevitable trend of the progressing society[4]. The personal information assistant introduced in this paper can provide help in personalized education because of its automatically information retrieval and filtering capacities.

However, there are still some aspects of our personal information assistant that need to be further developed. First, it should have more intelligence in the analysis of Web pages and user's profile. Such an improvement would ease the burden of user in the information retrieval. Second, the process should be extended to multi-protocol-purpose so that users can also collect educational materials from BBS and network databases directly. Still another improvement lies in the collaboration of the distributed information agents. Communicating mechanisms should be provided to let them share the fruits and interact with each other. Thus, the teachers and students may have a discussion conveniently by the help of their personal information assistants. With these problems solved and more sophisticated technology of agents, the personal information assistant will be a more powerful Web IR tool and help us to use Internet more effectively.

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