Department-Oriented Library Memory System Postprint for University Graduates

Authors: Li Feng, Li Shuning, Yu Jing

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Abstract

【Purpose】 Based on library usage data and oriented toward specific academic departments, design and develop a personalized memory system that displays graduates' library utilization.

【Application Background】 Graduation season activities in university libraries continue to innovate, with reader data mining becoming an effective means for innovative service models.

【Method】 Utilize reader data from different library systems to build a database, adopt JSP technology for platform development, and combine HTML5, CSS, jQuery and other technologies for front-end display.

【Results】 Graduates can browse and print library data through the system, including visit records, borrowing history lists, library seat usage information, study room reservation status, etc.

【Conclusion】 The system releases the value of foundational library data and provides humanistic care for graduates.

Full Text

Preamble

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A Department-Oriented Library Memory System for University Graduates
Li Feng, Li Shuning, Yu Jing
(Beijing Normal University Library, Beijing 100875, China)

Abstract

[**Objective**] Based on library usage data, this paper designs and develops a personalized memory system that showcases graduates' library engagement tailored

to specific academic departments. [**Context**] University libraries have continuously innovated their graduation season activities, with reader data mining emerging as an effective approach for developing novel service models. [**Methods**] We constructed a database using reader data from various library systems and developed the platform using JSP technology, combined with HTML5, CSS, and jQuery for frontend presentation. [**Results**] Graduates can browse and print their library data through the system, including visit records, borrowing histories, seat usage information, and study room reservation details. [**Conclusion**] The system unlocks the value of fundamental library data while providing humanistic care to graduates.

Keywords: Data mining; Library memory; Graduation season activities; Reader services
Classification Number: G250.7

Introduction

In recent years, university libraries have launched graduation season activities to provide humanistic care for departing graduates, with diverse and innovative formats emerging continuously. Creative websites based on reader data mining have become a distinctive feature of these activities, exemplified by Xiamen University Library' s "Library · Time" website in 2013, East China Normal University Library' s "Campus Memory of Library Life" album system in 2013, Jinan University Library' s "Jinan Memory · My Library Time" website in 2014, and Shanghai Jiao Tong University Library' s "Print · Trace" album activity in 2015. These websites and systems provide university-wide graduates with access to their library visit frequencies and reading records. However, after searching CNKI with the themes "graduation season activities" and "reader data mining," and analyzing the results, we found that current library data mining and presentation efforts target all graduates collectively, lacking personalized customization in copywriting and visual design for specific user groups. Related publications primarily focus on overall activity introductions, covering interface design, data integration, and practical effects, but rarely describe the technical implementation process in detail.

Since 2013, Beijing Normal University Library has conducted the graduation season-themed activity series "To Those BNU Years Accompanied by Books." In June 2015, responding to personalized demands from academic departments and collaborating with the student affairs office of the Faculty of Education, we launched a custom-built system titled "To Future Educators—Library Memory for Faculty of Education Graduates." This system integrates data from the library's integrated management system, access control system, seat management system, and study room reservation system, weaving the data into carefully designed copy and hand-drawn illustrations created by the faculty' s own students. The result is a fluid presentation that paints a precious portrait of library memories. Remarkably, the entire development and testing process took less than two weeks. This paper introduces the system' s rapid and convenient develop-

ment process from a technical implementation perspective, aiming to provide a reference for other university libraries building similar systems.

2.1 Problem Statement

As one of the most densely populated areas on campus, libraries hold many cherished university memories for "study enthusiasts" and "book lovers." As graduation approaches, many students wish to preserve a "library memory" documenting their library usage from enrollment to departure. "To Future Educators—Library Memory for Faculty of Education Graduates" emerged from such a personalized service request from students in the Faculty of Education. To fulfill this need, the library had to develop a system that integrates multi-source library usage data for presentation. Since this data originates from various vendor systems, two approaches are possible: if the vendor system provides data interfaces, technologies like Web Service can be used to retrieve data directly; if not, a graduate memory database must be designed and constructed to process and import exported data from different systems before programming data retrieval. Frontend interface design determines the data presentation effect, and a good visual experience can evoke warmth and emotion among graduates. The solution involves adopting current trends in presentation website design, using HTML5, CSS, and jQuery to achieve responsive layouts, ghost buttons, large background images, and scroll-dominant navigation effects.

2.2 System Design Approach

Based on the system objectives, we divided the development process into two phases. First, the **data preparation phase**: The system accesses data through two primary methods—real-time retrieval from various systems or pre-storing data in database tables. Since graduate data is scattered across multiple systems with varying degrees of openness (some provide third-party interfaces like the library integrated management system, but most do not), obtaining real-time data from all systems is challenging. Moreover, after graduates' borrowing privileges are terminated, much of the data to be displayed becomes static, and some data requires grouping and aggregation calculations. Preparing data in advance also improves overall system performance. Therefore, constructing a graduate memory database to store relevant data as backend support is necessary. However, due to the large volume of borrowing history records, which are unsuitable for storage in a single database field, and since the library integrated management system provides interface support, this particular dataset is retrieved in real-time from the integrated management system.

Second, the **graduate library memory system programming phase**: Since library usage data involves personal privacy, it should not be publicly displayed without graduate consent. Therefore, the system includes a reader authentication module, allowing access only after successful verification with library account credentials. Data query and presentation constitute the development

focus. The system extracts records matching the graduate' s account from the backend database and passes them to the frontend interface, implemented through JSP programs. The frontend presentation uses HTML5 and CSS to layout copy and images, with jQuery enabling dynamic sliding page-turn effects.

2.3 System Implementation

Following the design approach described above, the graduate library memory system uses the graduate memory database as backend support while implementing specific functions through the frontend interface. The system framework is shown in [Figure 1: see original paper].

Database Design

Based on preliminary requirements from faculty students, we investigated and analyzed data from various library systems and finalized the data to be stored in the graduate memory database, as summarized in . During the data preparation phase, we used the graduate information provided by the department as a blueprint. Excel forms containing graduate information and data exported from various systems using student IDs as keys were consolidated, calculated, and organized into a single form with the required database fields using Excel functions and macro commands. Data formats were preprocessed and saved as CSV format supported by MySQL. We then created the graduate memory database using MySQL and stored all data in a single table. For data import, to avoid Chinese character encoding issues, we used the NotePad++ editor to convert the CSV file encoding to UTF-8 without BOM format before performing the import operation.

Graduate Authentication Module

To protect graduate privacy, the system includes an authentication module where login credentials match those used for querying the library integrated management system. Beijing Normal University Library uses Ex Libris' s Aleph500 system, which provides an X-Server interface for third-party systems. The system receives reader-inputted account credentials through JSP' s Request object and uses Java' s HttpClient to send requests to X-Server. The specific workflow is shown in [Figure 2: see original paper].

Data Query Module

After successful authentication, the system queries the local database using the graduate' s ID to retrieve relevant library usage data. Borrowing history records are obtained directly from the library integrated management system through Aleph X-Server' s loan_{history} interface. The processing workflow is shown in [Figure 3: see original paper]. The X-Server interface returns data in XML format, which this system parses using JDOM to extract relevant fields. A sample Java implementation is as follows:

```
public class UseJDOMParseXMLloanhistory {
    List<Book> bb = new ArrayList<Book>();

    public UseJDOMParseXMLloanhistory() {
    }

    public List<Book> MyUseJDOMParseXMLloanhistory(String xmlStr) {
        // Instantiate a parser object
        SAXBuilder builder = new SAXBuilder();
        try {
            StringReader sr = new StringReader(xmlStr);
            InputSource is = new InputSource(sr);
            Document read_{doc} = builder.build(is);
            // Get root element
            Element stu = read_{doc}.getRootElement();
            String root = stu.getName();
            String sname = stu.getChildText("bor-name");
            // Get list of loan-item elements
            List<Element> list = stu.getChildren("loan-item");
            // Iterate through loan-item element list
            for (int i = 0; i < list.size(); i++) {
                // Get and display all child elements
                Element e = (Element) list.get(i);
                String due_{date} = e.getChildText("due-date");
                String z13_{title} = e.getChildText("z13-title");
                String z13_{{{call}}_{{no}}} = e.getChildText("call-no");
                Book book = new Book(z13_{{{call}}_{{no}}}, z13_{title}, due_{date}, sname);
                // Store in Book
                bb.add(book);
            }
        }
    }
}
```

Data Presentation Module

In terms of content, the primary focus is copywriting and image design. The library invited graduates from the Faculty of Education to participate throughout the entire process, designing copy from the perspective of teacher-training students and hand-drawing relevant illustrations. Centered on the theme "To Future Educators," the copy is divided into three chapters: "Teacher of People · Teacher as Model," "Recalling the Library," and "Staying True to Our Original Aspiration," describing graduates' library memories from enrollment to graduation in a literary style while conveying the library' s deep blessings for students entering education careers. For images, hand-drawn illustrations incorporate characteristic elements of Beijing Normal University, the Faculty

of Education, and the library: the wooden bell, Yingdong Teaching Building, bookshelves, self-service borrowing machines, and study seats. For the interface, to achieve optimal visual performance and provide viewers with a smooth visual experience, the system contains only two pages: a login page and a data display page. Two technical implementation approaches were considered: Flash, which offers dynamic effects but requires plugins, loads slowly, and has poor compatibility; and HTML+CSS+JavaScript, which separates content from presentation, loads quickly, and requires no plugins. This system adopts the second approach. The data display page consists of 13 segments, each encapsulating images and text using HTML5' s `<section>` tag, with transitions between segments implemented through jQuery. The jQuery framework jquery.min.js and the lightweight jQuery gallery plugin jquery.poptrox.min.js are imported into the page, enabling users to scroll or click page-turn buttons to navigate up and down. Additionally, the lightweight frontend framework Skel.js is used for responsive layout. HTML5+jQuery+CSS can achieve Flash-like animation effects while building responsive web pages, ensuring a good user experience across multiple devices including mobile phones, tablets, and PCs. The frontend interface is shown in [Figure 4: see original paper].

Data Sharing Module

In the new media environment, social networking sites are ubiquitous. Sharing functionality not only expands promotional reach and enhances activity impact but also provides graduates with convenient ways to preserve their library memories on their social platforms. Graduates can voluntarily choose to share the system' s webpages on personal Weibo, QQ Space, Renren, and other social networking sites. The data sharing module is implemented through the free social sharing tool bShare, which provides customization features allowing configuration of sharing button functions, styles, and platform popup sequences based on page characteristics.

Data Printing Module

While the system primarily provides online display of graduates' library usage, it also includes a data printing function. Graduates can download a library memory template from the system, which contains 14 pages total: a cover page plus 13 pages corresponding to the 13 memory segments in the system. Technically, Java programs output data directly into PDF templates using the Flying-Saucer+FreeMarker framework. Flying-Saucer can parse HTML and CSS to generate PDF format, provided that FreeMarker templates are written to generate HTML describing the PDF layout.

3.1 Application Effects

The system launched in early June 2015, featured on Beijing Normal University Library' s 2015 graduation season activity website, and promoted through the

faculty' s student affairs office and branch librarians to graduates of the Faculty of Education. It received excellent feedback and was well-received among graduates. According to website statistics, the Faculty of Education had approximately 560 undergraduate, master' s, and doctoral graduates. Between June 1 and June 30, the system recorded 1,122 total page views (PV) and 553 unique visitors (UV), with a peak of 270 unique visitors on June 8. Essentially all graduates used the system to generate and print their personal library memories.

3.2 System Features

Compared with similar service systems in other university libraries, this system exhibits the following characteristics:

1. **Department-specific orientation meeting personalized needs.** From initial copywriting and hand-drawn design to later promotion, the system collaborated closely with the academic department. The copywriting captures the educator aspirations of Faculty of Education graduates, while the illustrations incorporate department-relevant elements. The entire page presentation aligns with the emotional appeals of teacher-training students. This department-specific service for graduates is more novel, thoughtful, and resonant, yielding superior service outcomes.

2. **Adoption of convenient and rapid development technologies.** The system was developed in approximately two weeks, relying on JSP' s advantages in dynamic web development—easy to learn and implement using basic HTML and Java knowledge. Additionally, the frontend interface uses an HTML+CSS+JavaScript framework, requiring less development time than complex Flash animations.

3. **Implementation of responsive page design.** Considering that multi-screen services across terminal devices have become mainstream and mobile internet usage dominates among university students, this system uses HTML5 technology to achieve webpage adaptability.

From design to development, the "To Future Educators—Faculty of Education Graduate Library Memory System" focuses on details, closely integrating library reader data service innovation with the emotional needs of specific department graduates. It unlocks the value of fundamental library data while providing thoughtful personalized services that emotionally bridge the gap between the library and its readers. Building on this system' s experience, we plan to expand to other departments, launching themed graduate library memory systems such as "To Future Writers···" and "To Future Artists···" to create a signature service of personalized, humanistic, and meticulous library care.

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Author Contributions

Li Feng: Program design and development, manuscript drafting;
Li Shuning: Data collection and processing, manuscript revision;
Yu Jing: Department liaison, copywriting and illustration planning, manuscript revision.

Conflict of Interest Statement

All authors declare no conflict of interest.

Supporting Data

[1] Li F, Li S, Yu J. byjdata.xls. Graduate database fields.
[2] Li F, Li S, Yu J. byjdata.war. Program code.

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Note: Figure translations are in progress. See original paper for figures.