

Support System for Correcting Software Experiment Report using Revision Control

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Abstract Experiment report is an important part in the course of experiment which can deepen the understanding about experiment for students. Teachers will read and comment on students' reports and give proper advice. However, the traditional way of printing report out and submitting them is very inconvenient for teachers and students. Based on wiki concept, we designed this support system. Students write their reports on line in the form of web pages. Teachers can add comments on the pages by editing them. Report page is controlled by revision control. Differences between old version and new version page can be displayed. Teachers and students can easily grasp where there are comments and where has been modified.

Key words: Collaborative Work, Revision Control

版管理を用いた実験レポート添削支援システム

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あらまし 実験報告は実験の一つ重要な部分である。実験報告によって、学生は自分の実験結果や実験方法について、理解を深めることができる。また、教員は学生の実験報告を評価して、指導を行っている。しかし、実験報告を印刷して提出し、そこに教員がコメントを入れ、再提出させる方法は、以前のコメントや修正箇所を把握する上で、教員と学生の負担が重い。本研究で提案する支援システムは、wikiの理念を基盤したコラボレーションツールである。教員と学生の負担の軽減と協調作業の推進のために、このシステムを設計する。学生はこのシステムを使ってウェブページを作成するような形態で実験レポートを作成する。教員はオンラインでレポートページにコメントの記入ができる。実験報告は、修正の履歴が保存され、修正の差分を表示することが可能である。学生と教員は、修正箇所を把握することができる。また、教員はどのようなコメントをつけたのか、さかのぼって把握することができる。

キーワード 協調作業、版管理

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1. Introduction

Experiment is very important course for undergraduate students of engineering science during their academic years. At each experiment, students should submit experiment report to teachers to receive proper advice. This process will help students deepening their understanding about experiments and also improving their writing skill. However, the traditional method that is used for writing and commenting on report brings great burden to both students and teachers. Students print their report out and submit them to teachers. Teachers read and comment on each report and return the reports to students. According to comments, students will modify their report and resubmit to teachers for re-comment. Finding where teachers write comments, where students modify their report and what comments the modification is corresponding to is a very monotonous and onerous work. It is necessary to find such a way that will not only simplify the amount of work for teachers and students, but also effectively promote their collaboration.

In 1994, Ward Cunningham defined a new concept "WikiWikiWeb server" most often called simply "wiki". A wiki is a freely expandable collection of interlinked Web "page", a hypertext system for storing and modifying information - *a database*, where each page is easily editable by any user with a forms-capable Web browser client[1]. Wiki is an open authoring collaborative tool. Any

one at any time and at any where can access the web server to edit any wiki pages. This unique character produced great influence. Over the years, all kinds of wiki clone system are created in the Internet. An area where open collaboration and exchange of ideas is both natural and important is education. Professor Mark Guzdial of the College of Computing at Georgia Institute of Technology (Georgia Tech) successfully brought CoWeb[2], a wiki clone system, into classes of Georgia Tech. In a short time, this collaborative tool spread across the academic landscape of Georgia Tech, including Architecture, Chemical Engineering, Mathematics, English, Biology, and Computer Science.

The case of CoWeb in Georgia Tech illustrates that collaborative tool like wiki is feasible and useful to promote the collaboration in education. Based on these, we designed this support system.

2. Research Goals

With the development of Computer science and Internet Technology, more and more computer supported collaborative learning (CSCL) tool has been developed and applied into Education. Our research is such an attempt of application of CSCL too. Our research purpose is to alleviate the great amount of work of teacher and students, at the same time, reinforce the collaborative work of them. What we want to realize is listed as the followings:

- Teachers and students be able to easily

grasp on which part of the report be commented.

- Teachers and students can easily grasp which part of report is corrected and what the corresponding comments are.
- The modification history of students can be recorded.
- For teachers, they can easily grasp the rate of progress of report writing.

In this paper, we will introduce distinguish feature of the system, basic structure of system and how to use it.

3. System features

Conceptually based on the WikiWikiWeb, this system will inherit some functions from original wiki. But this system is designed to be a support tool for teachers and students to collaboratively finish report and guidance. This special purpose determines that it will have some different aspects with free-wheeling discussion-based context of wiki.

The system looks like a traditional web site. Users can use a regular web browser to access the system. The contents of report are dealt as wiki text that can be edited in an HTML text area without special applets and plug-ins. By wiki engine in our system, the data required by users can be changed into HTML format. Because figure and table are important component part of experiment report, the system support figure and table display. User can upload them to system.

Considering that there is a potential ethical

problem of invading the privacy of students if students' report can be publicly available to other students, we add user certification function into our system. To access the system, users must input user name and password and pass the system certification. Unlike wiki is open to any visitors and gives every user exactly the same capabilities as any other user, students can only view and edit their own report pages in this system. To be able to comment on students reports, teachers can check students' report page in comment mode. Each student forms a small group with teachers. Discussion and collaborative work between teachers and students is held in each groups

In original wiki, links can be automatically generated by typing wikiword formed by putting several capitalized words together. Unlike original wiki, the system does not support this function. In experiment report, there will be a lot of programming source code. Some programming languages have the name rule that requires the name of function or class to be capitalized words. Using the same way of creating links with wiki will make page management becoming difficult.

Report is control by revision control. The differences of old and new version report and the correcting history can be recorded. At any time, users can get these data.

4. Basic structure and supposed operation

We will generally introduce the basic

structure of system and some supposed operation in this section

4.1 Report structure

In this system, a report refers to four concepts: report page, section, user area and repository area. Report page is a component of report. A report page is regarded as a web page. It also represents a section of the experiment report. Students write contents of report into report pages. Each page has a title and section number. Section number will be automatically generated. User can add new section, move or delete sections. System automatically generates a table of contents for each report by collecting the section numbers and title. Whole pages regarded as one report are controlled by revision control. Each page has the same version number. Version number will be updated as any one page is edited. Only when students modify their report is report version updated. Fig. 1 shows an example of the report structure.

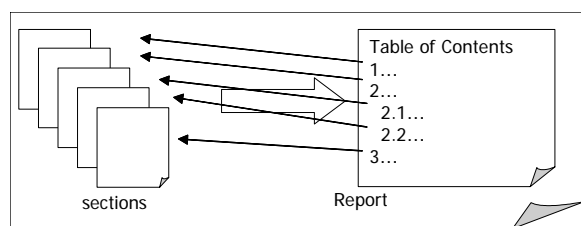


Fig.1 Report structure

Fig.2 illustrates two area concepts of the system. Students do the modification of report in user area. The modified report will be saved into user area first. To be commented and scored, students should commit their report to repository area.

Teachers do the work of comment and scoring in repository area. Information about report series and users will be saved in both areas, while comments, difference of two version reports and the history of students' modification will be saved into Repository area. The report that is in repository area is controlled by revision control. Both areas are located on web server.

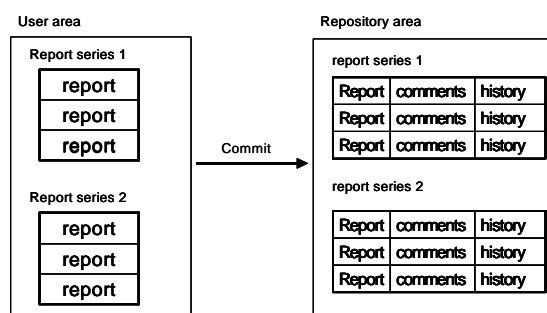


Fig.2 User area and Repository area

4.2 Writing report

Writing report is very simple in this system. System provides a set links at the top of every page which allow users to do various operations such as edit page, delete page and view history of the page. Clicking "Create" from the menu links will open an empty page in the edit mode. Each page mainly has two parts. One is for writing report and another for comments. Students can add the necessary report components into report part of this empty page, like programming list, figures and tables. The format of report is controlled by edit rule supported by system. According to these rules, students paste their report contents into report page. For example, using lines starting with "*" to create lists.

Putting words between “*” To emphasize some words. Using {{picture file name}} to display a figure.

4.3 Comments

For teachers, commenting on report is important but the most tired work during experiments. Simplifying the work of comment is a major purpose of this system. We designed a comment template for teachers to comment on reports. Before each experiment, teachers should input experiment requirements such as checking items and corresponding comments of each item. Then system will write the contents inputted into a comment template according to the pre-prepared schema, see Fig.3. Teacher can open the template and check the items to finish report comment

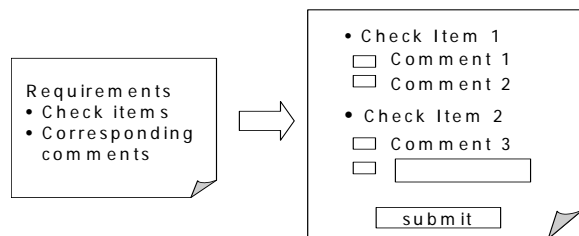


Fig.3 Comment template

The detailed operation for commenting is described in Fig.4. Teachers open students report page in comment mode. Under comment mode, system automatically inserts a checkbox before each line of the report contents. A paragraph will be regarded as a single line by the system. System will add a checkbox at the top of the contents. It will be used to comment on the whole page. Teachers can check the checkbox of the part which they want to

comment, then clicking next button on the page to open the comment template. After checking the necessary comments from the template and submit them, comments will be inserted into the report page in the form of links. The links will point to the parts of the report which is corresponding to the comments. System also provides a “comment” link in the menu links. Teacher can use it to comment on the whole report. Clicking the link will open the comment template. When teachers submit the comments from template, comments will be inserted into a new page. A link to this page will be added into the table of contents of the report automatically.

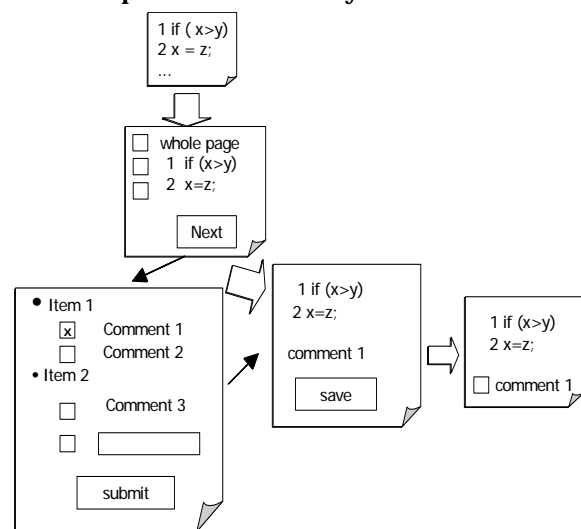


Fig.4 Operation of writing comments

4.4 Rewriting report

Fig 5 describes an example operation of rewriting report. According to the comments posted by teachers, students modify a report page at the edit mode. They should check the checkboxes added before the comments. After the students save the page, version of the report is updated and a difference page

will be created. Checked comments will be deleted from the report page and be inserted into the difference page with the difference of old version page and new version page automatically. This time, there will be “ok” and “not good” radio buttons behind the comments on the difference page. Teachers use these buttons to indicate students whether or not they should modify their report page again. The link to difference page will be inserted into the new version page.

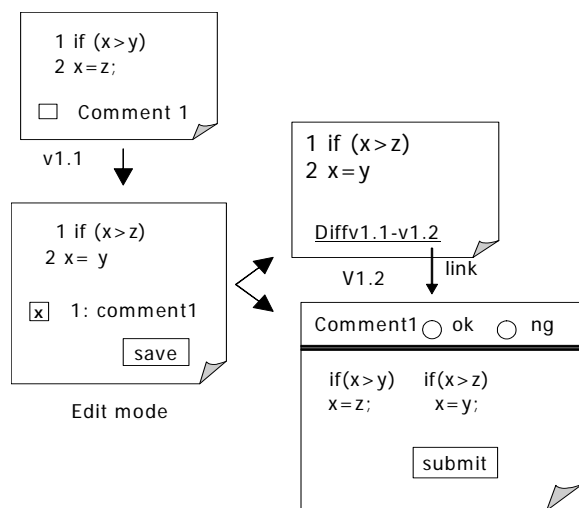


Fig.5 Operation of rewriting report

4.5 Evaluating result of rewriting

Fig. 6 describes how teachers evaluate the result of students' modification. Teachers open the difference page from the report page. Based on the difference displayed in this page, teachers check “ok” or “ng” buttons. The comment which is checked with “ng” will be inserted back to the report page. The comment that is checked with “ok” will remain on the difference page. Students should modify their reports until all of comments are checked with ok.

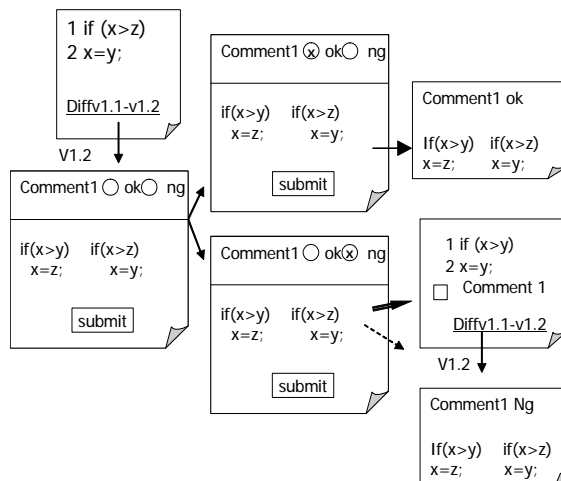


Fig.6 Evaluating result of rewriting

5. Summary

The system is still in the implementation. Evaluation of the system will be done in near future. Our system is an attempt of application of CSCL. It will increase the efficiency of report commenting by letting teachers be able to choose comments from template. By grasping how students' reports are going on, teachers can give proper advice to students. For students, they will receive teachers' advice in time without waiting for finishing and submitting their report again. The real time and asynchronous characteristics of the system effectively prompt the communication between teachers and students.

References

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- [2] Mark Guzdial: “ Swiki/CoWeb” Georgia Tech College of Computing, <http://coweb.cc.gatech.edu/csl/9>