Development of graduation research management system based on recent web technology

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1. Introduction

Nowadays web technology is revolutionizing traditional education pattern[1]. Many efforts using these technologies were made in daily education in universities. In our laboratory, a management system was developed in the past years to manage the students' graduation research. However, the system tends to response slowly and is lack of some necessary functions. This study aims to improve the speed of response and consummate functions by using the recent web technology such as Node.js and React.js. The data collecting function is also implemented for further analysis.

2. Graduation research management system

The system in this study possesses two characteristic functions, i.e., time record function and worklog/blog record function. The time record function aims to record total time for research of each student in his/her laboratory, while the worklog/blog record function is designed to collect and record contents of students' research and give feedback to teachers.

1) time record　　The time statistics function has been designed which can record the student's time in laboratory by login and logout this system. Students' login time and logout time are recorded into database, and finally system will calculate total time of each student.

2) blog and work record　　To manage students' research progress, the blog function was designed and added to the system, students can record their daily learning content by writing blog and submitting it to our system. It also helps teachers to have a grasp of students' research progress. The interface of this function is shown in Fig.1.

3. Approach of system development

Since the system is developed for all the students doing graduation research in our university, it is considered that the situation will occur frequently when large amounts of students use this system online at the same time, which will slow down the management system if it is operated by a conventional HTTP server such as apache. Therefore, we take use of Node.js in server-side to transmit data between the database and server-side. Node.js is based on V8 engine, which can bring us a high-performance, and concurrent programs uses asynchronous I/O with an event-driven programming model[2].

In the client-side of the management system, React.js which adopts the diff algorithm is used. It helps reduce the operation of HTML DOM(Document Object Modal) to the complexity of O(n). By using React.js, the response of the system will be much faster and better.

To record and show student's research time in laboratory and the number of blogs directly in visual form, some visualization methods were used such as histogram and line
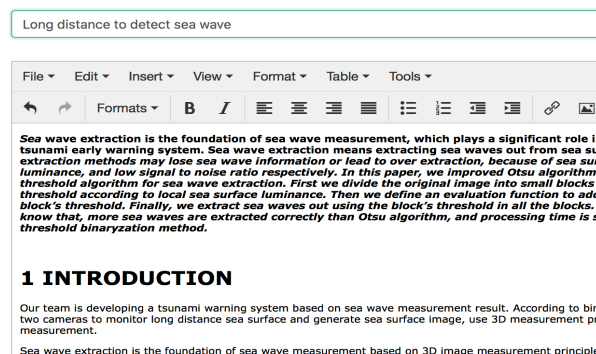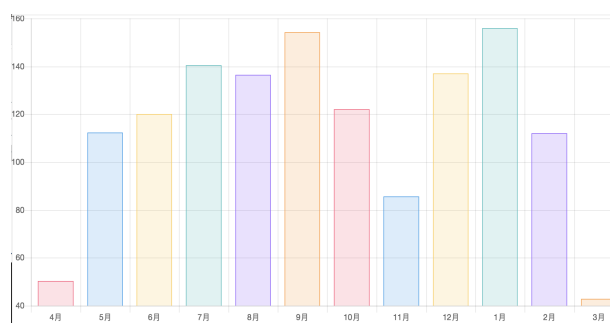

Fig. 1. The blog function interface

Fig. 2. One-year time distribution in lab.

chat. As the Fig.2 shows, students can get information about their total time distribution in laboratory during one year by bar chart, each bar represents the total time in laboratory of a month, and we also draw the line chart based on the time data to show the tendency of student's research time in laboratory during one year.

4. Conclusion

By using Node.js and React.js, the online operation fluency of our system is improved and graduation research management system becomes more efficient and automatic then before. The bar chart and line chart with time data can remind students of managing their learning time. Blog function records students ideas, considerations and achievements during their research, and in the future, machine learning will be used to automate text categorization that analysis the quality of blogs automatically, then send the result to every student and teacher[3].

References

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