

Review Article

Microlecture in the teaching of data structure

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Abstract: Microlecture is an approach to teaching, in which the teacher gives lectures in videos. Recently, microlecture is enjoying increasing popularity. This paper studies microlecture in the teaching of data structure. The author first points out current problems in data structure courses, describe how to prepare a microlecture, and then discuss how to make teaching more interesting and easy understanding by microlecture.

Keywords: microlecture, data structure, microlecture design

INTRODUCTION

Microlecture is first proposed by David Penrose in 2008[1]. From December 2012 to August 2013, China's National University Teachers' network training center of the Ministry of Education held the first microlecture contest[2]. Since then, microlecture is officially accepted in China.

Microlecture records in a video certain knowledge points that the teacher explains. A single microlecture is usually between 10 to 15 minutes. It is suitable for ubiquitous or self learning with mobile devices. Moreover, microlecture meets different needs of the students who will have more freedom in deciding which lecture(s) to learn.

Current problems in data structure teaching

Data structure is one of the most important courses in the education of computer skills. It is closely related to courses like operating system, compilation principle and software engineering, etc. Current problems facing the teaching of data structure fall into the followings[5].

First, the knowledge to be taught is highly abstract. For example, the logical structures of data are presented with abstract data types. Besides, algorithms are described with programming language similar to C, which leads to difficulty in understanding.

Second, class hours are limited. The teacher is supposed to explain quite a lot within a single lecture. This takes up the time designed for the students to practice. As a result, many students fail to understand the importance of data structure in software developing.

Third, available materials on the Internet are not enough. After class, students cannot rely on the Net to find satisfactory answers to their questions.

MICROLECTURE DESIGN OF DATA STRUCTURE

Microlecture selection

Microlecture is neither the splitting of an entire lecture nor the reducing of teaching videos. Instead, a microlecture should explain the most important and difficult points of a course so that students can better understand those points by watching and re-watching the videos where microlectures are given. Therefore, selection is the most important step in the production of a microlecture.

The teacher, in a limited period (10-15 minutes, as is mentioned above), is supposed to explain a single point and select several questions that are typical and representative.

Given the contents and important points of data structure course, the followings are available for microlectures. See chart 1.

Microlecture design

A microlecture should be interesting, short, to the point, and understandable. When it comes to a microlecture of data structure, the algorithms of which mostly originate from real life such as Critical Path and Topological Sort, it is recommended to lead in with examples from daily life[4]. In this way, students can realize the importance of algorithms in solving practical problems and will try their best to come up with a resolution.

For example, in the lecture *the Hanoi*, students are supposed to a) review points about stack and recursion, b) know the background of the Hanoi, and c) program

to solve related problems. Lecture design is presented below and the teacher is free to adjust the time limits recommended.

Chart. 1 Contents recommended

Chapter	Knowledge point
Introduction	the automation of bibliographic retrieval system
Linear Structure	Joseph Ring
Stack	Palindrome
Stack	Expression Evaluation
Stack	The Hanoi
Queue	The Maze
Tree	Traversing Binary Tree
Tree	Huffman Tree
Graph	Minimum Cost Spanning Tree——prim
Graph	Minimum Cost Spanning Tree——Kruskal
Graph	Topological Sort——syllabus design
Graph	Critical Path——project process
Graph	Shortest Path——Dijkstra
Search	Hash Table
Sorting	Quick Sort
Sorting	Heap Sort

Chart. 2 Microlecture contents

Content	Time limit	Knowledge point
Review: stack	2	Stack: definition, features and application
The Hanoi I	3	Introduction, regulations and problem description
The Hanoi II	6	Practical algorithm of the Hanoi
Program demonstration	2	Run and explain the program yielded
Exercise	1	Leave a question for exercise and summarize this microlecture

It has to be pointed out that, apart from lecture design, the teacher should pay attention to his/her PPT as well as the video. The PPT should be concise, and pictures/graphs, charts and flashes are recommended to demonstrate the algorithms. The video should be clear and the image in it should be of moderate size.

CONCLUSION

Microlecture is the product of modern technology. It is important for both the teacher and the student. On the one hand, the teacher may improve teaching skills. On the other hand, the student may study better by making good use of microlectures. Specifically, microlectures of data structure course will be a good teaching method which is supposed to arouse students' interest and facilitate their studies.

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