Ideas In The Teaching of Data Structures And Algorithms

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Abstract-For the non-computer professional students , the difficulty of facing problem in the learning of algorithms and data structures course, this paper, discusses some ideas teaching data structures and algorithms, like use an algorithm design methods as clues to introduce various types of algorithms, using logical structure of data as modules for organizing the course contents and using real life examples for improveing the interest of students , emphasis and application ability.

Keywords- non - computer professional , Data Structure, algorithm

1.1 Data File Structures, Algorithms Teaching Status and Problems in Non-computer professionals Interest of student in Learning is Not High

In the teaching process, the problem encountered is that interest of students is not high. This is caused by the following criteria:

1) The content of course is high logical as well as abstract, and if they are not cleared with the concepts of C language then it will be difficult for them to understand the concept of the logic.

2) The subject is too difficult to understand in the sense of practice and theory. Some of the students shows that they understood the theory but sometimes they also can't perform in practise sessions.C programming itself is not simple and easy language and if the core concept of this particular language is not cleared then it will be difficult for syudents to perform the programms.so in these type of cases non computer students will face difficulties in programming .

3) If student has some othe subject as major then they feel that there is no relation between their major and this subject and I tis of no use in future so their motivation to this subject is not high.The courses are generally set up as a basic core concepted course in the first or second grade so students don't understand their professional knowledge well and how they will establish the link between the course and their majors is also a teaching difficulty.

1.2 Main Features

A) Textbook:

1) Systematicness. Carry out the "three in one" thinking, constructing multi-level, all-round knowledge about system.

2) Progressiveness. By Strengthening the basic theory and concept and experimental things; adjustment to teaching focus on file organization and index so as to highlight the practical bygiving real time examples; weakening table structure extension teaching, increase introduction to algorithms design, complement new tree structure application; appropriate to add C++ knowledge in the relevant content.

3) Uniqueness. Use search, insert, delete operation as the main line, we introduce feature, storage method, time and space efficiency in table, tree, graph and other basic data structures. Because search, insert, delete operation is not only the most basic and most commonly used, and often also indivisible (usually joint use, is rarely used alone). The set of three operations constitute as a whole, we can reach a conclusion of space and time efficiency from the overall structures.

4) Application. Strengthening practice link, use in company with study, further digested teaching theoretical content, carry out the thought of learning in order to practice. Through multiple kinds of questions (for example, fill, single-choice, reading, algorithms design, computer practice, etc.), integrated exercise training of multiple difficulty levels (especially computer practice), effectively deepen students understanding of basic concept, strengthen the students' ability to design program. In addition, we give a part of reference answer to the exercises, which are instructive to the typical questions, it is convenient for the teachers teaching, but also for student self-learning, self-testing and review. In short, the overall structures, main contents and distribution, key and difficulty, exercises with aspects for consideration. Take into account both the gradual transition to difficult, also taking into account the systematic knowledge and integrity.

B) electronic teaching plan

Electronic teaching plan is courseware and the basic tools serve for the teaching, which should reflect the teachers'

teaching ideas, the points of knowledge grasp and clear teaching method, reflect the essence of material content. Electronic teaching plans are also available for students to review. Algorithms and data structures electronic teaching plan not only have these characteristics, but also links to images, animation, video and rich media material in some key or difficult the interpretation of knowledge, and effectively strengthen and enrich teaching contents.

C. network usage

Algorithms and data structures network criteria use modern network programming techniques to build, which provides an open, interactive, flexible, rich cube teaching environment. Online excution of programs are also there.Algorithms and data structures network course including Web, video teaching materials, algorithms animation, exercises, FAQ, notebook, homework, automatic test paper generation, auxiliary teaching books, teaching reference books, data structures development history and characters, which collect scientific knowledge and human education as a whole .

2.1 Solutions

Data File and Structures Algorithms (DFSA for short) is an implementation based subject. Many companies stress heavily on concepts from this course in their interviews. In order to master this course, you need to be strong with both the theory and implementation of various Data Structures and Algorithms.

Read. You should start reading Introduction to Algorithms by concept. The subject is little bit difficult to understand because the reference book are with heavy content and algorithms are very high in sense of concept. So you have to use the local books first to understand the core concept easily.
Implement the Data Structures you read about. While reading about them might give you a fair idea of they work, it is different from actual implementation where you will need to take care of variables we thake and methods we usein them and of course boundary lines of the algorithms. There will be cases where you forget null checks and mess up your entire code.first we have to declare the methods and then make its content so this will be enough to implement the concept.

Understand complexity. You need to be able to calculate the space complexity of various data structures, the time complexity of their operations and the time and space complexities of various algorithms. You have to take the iterative loops according to your requirements. Bythat You should be able to judge which algorithm works better under different conditions.

Practice. Solve problems from various online judges like code chef, hacker rank, top coder and spoj. This online executable code will help you to choose the optimal data structure or algo for a particular linear or nonlinear structures.

Remember. At last you have to remember all the concept of all the data structures so it will help you to successfully clear the course with highest marks.

2.2 Implement in Different languages

Data structures can also br implemented in all other languages like C++, java, .Net python etc. but as the core concept of all these languages, is C . so it will be take beneficial for you to implement the DFS concepts in C itself.

Comparison of all DS :

STACK	QUEUE	LINKED LIST	TREE	GRAPH
Stack uses last-in-first-out(LIFO) method.	Queue uses first-in-first-out method	Linked list contains two parts in its node that is data part and address part.	Tree is made up of parent-child relationship between the nodes. It is a hierarchy between nodes.	A Graph is an ordered set of vertices called as nodes and edges which represents the connection between them.
By using only one variable we can insert or delete an element in the stack that is TOP.	Two variables are used to insert or delete an element from the queue that is FRONT(delete) and REAR(insert).	Data part contains the information to be stored and address part contains address of the next node.	Inorder, Preorder and Postorder are the travesing techniques using which every node of the tree can be visited.	Breadth first search (BFS) and depth first search (DFS) are travesing techniques of any graph.
Stack and queue both can be implemented by using arrays or linked list.		Singly linked list, doubly linked list, circular and circular doubly linked list are the types of linked linear list.	Tree and graph both can be represented using array and linked list.Graph uses adjacancy matrix to store its vertices.	
- Recursion, - conversion of expression - tower of hanoi and bucket of plates are the examples of stack.	- MP3 player - playlist of the music player - ticket window of railway station etc are the examples of queue.	-Polynomial representation - webpages etc are application of linked list.	- Manipulate hierarchical data - Make information easy to search, Manipulate sorted lists of data - As a workflow for compositing digital images for visual effects - Router algorithms	- **Facebook:** Each user is represented as a vertex and two people are friends when there is an edge between two vertices. - **Google Maps:** Various locations are represented as vertices and the roads are represented as edges and graph theory is used to find shortest path between two nodes.

2.3 Conclusion

By Reviewing all the things about algorithms and comparing all the data structures it is shown that by knowing the core concept of the basic C language , and undestanding the steps of any algorithm, it is easy for non prifessional students to clear the subject with high rating.

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