COMP130004 DSA PROJECT1

Chinese-English Dictionary based on Binary Search Tree

# deadline : 2024-11-05 23:59:59

# submit all the source code and document based on analysis to elearning 数据结构与算法设计（郑骁庆）

# Any question, contact TA Zhibo Xu or Tianyuan Shi

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I. Summary

To better understand the tree data structures learned in this course, the project designed for you to use red-black tree and B-tree to implement an English-Chinese dictionary.

II. Percentage Point

Item		Cost	Description
Red-Black tree (30%)	Initialization	8%	Initialize the tree with init.txt
	Delete	6%	Delete the words with delete.txt
	Insert	5%	Insert new words with insert.txt
	Search	6%	All correct search
	Preorder print	5%	Print the tree in right format to rbt.txt
B – Tree (30%)	Initialization	8%	The same as read-black tree
	Delete	6%	
	Insert	5%	
	Search	6%	
	Preorder print	5%	Print the tree in right format to bt.txt
General		5%	Correct implementation
UI		10%	Friendly and easy to use
Document		20%	Full and detail. Reasonable analysis
Coding style		5%	Proper comment
bonus		5%	Creative thought.

III. Requirements

A. Functions

Implement red- black tree and B-tree by yourself.

(including **INSERT** 、**DELETE** 、**SEARCH**、**PREORDER_PRINT** methods)

ATTENTION: The branch number of B-tree should be easily changeable. And the initial branch number is suggested to be 10.

a) PREORDER_PRINT

Display the tree by PREORDER traversal to a file.

Here we give an example after insert into trees with number 7, 3, 5, 1, 6. We require you to print like that format. In this project, you are supposed to replace the number with words.

Print result for red-black tree

```
level=0 child=0 5(BLACK)
level=1 child=0 3(BLACK)
level=2 child=0 1(RED)
level=3 child=0 null
level=3 child=1 null
level=2 child=1 null
level=1 child=1 7(BLACK)
level=2 child=0 6(RED)
level=3 child=0 null
level=3 child=1 null
level=2 child=1 null
```

Print result for B-tree (Here we show the tree with branch number 4)

```
level=0 child=0 /5/
level=1 child=0 /1/3/
level=1 child=1 /6/7/
```

b) INSERT/DELETE

1. A batch of words which contain in a file. *The first line in the file represents which operation it will do and next lines are data.* Each time you operate with one file, please call your PREORDER_PRINT method in tree classes to print the tree to rbt.txt / bt.txt.

2. A single word.

c) SEARCH

1. Some words in range and give their meanings. E.g. we give a query: please search from ‘aa’ to ‘apc’, then you give the words between ‘aa’ and ‘apc’ as well as their meanings. The boundary values don’t have to be exactly words.

2. A single word. Just give its Chinese meanings.

Hint: You know that English words are in lexicographic order. So please use the word as key and build the trees.

B. Analysis work

Another work you should do in this project is to compare the operations like insertion and deletion for both trees.

Please call your methods in the following ways for each kind of tree, and analyses each time they spent.

Note: Don't change the files we have provided or disarrange the step order.

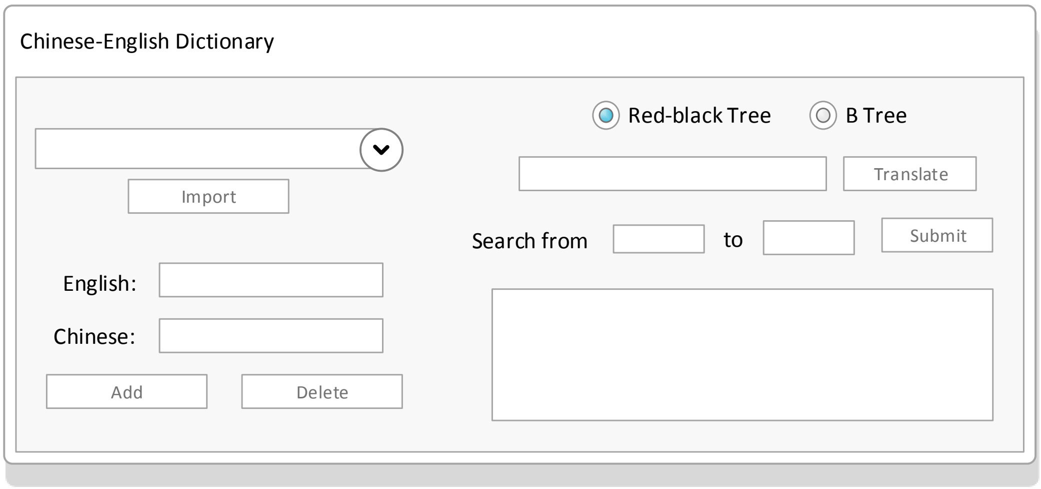
1. insert into trees the data in the file 1_initial.txt
2. delete the data in the file 2_delete.txt
3. Add the data in the file 3_insert.txt
4. Query a word
5. Query some words

For the first three steps, after each operation on 100 pieces of data, you should record the time used. And finally give a document based on this analysis and testing time should be attached on it.

IV. Design

To make your program more flexible, we don't recommend that you input the command files by hard-coding. We prefer that you provide an interface through which the user can import their files.

Here we provide a fine UI design graphic example. You can also simplify the interactive interface, but you need to provide sufficient operating instructions



Explanation

The left is the manage part

1. The user can select a file and choose a type between 'default' and 'test' and then execute the file. The default type asks the program execute the corresponding

operations.

2. The user can add or delete a single word. (delete use English only)

The right-top is choice part

It means which kind of tree you are using to implement the dictionary. The user can make the choice.

The right-bottom is look-up part

1. Just give a Chinese with the given English
2. Give the words and the paraphrases in the query range.