Data structures and Algorithms

A picture containing text

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B-Tree and Indexing

Timeline

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| --- | --- |
| **ID** | **NAME** |
| 19016063 | Omar Khairat Mohamed |
| 19015941  19017359 | Abdelaziz Mohamed Abdelaziz  Abdelmoneim Hany Abdelmoneim |
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**Time & Space Complexity**

IBTreeNode

|  |  |  |
| --- | --- | --- |
| Function | Time Complexity | Space Complexity |
| GetNumOfKeys() | O(1) | O(1) |
| setNumOfKeys() | O(1) | O(1) |
| isLeaf() | O(1) | O(1) |
| setLeaf() | O(1) | O(1) |
| getKeys() | O(n) | O(n) |
| setKeys() | O(n) | O(n) |
| getValues() | O(1) | O(n) |
| setValues() | O(n) | O(n) |
| getChildren() | O(n) | O(n) |
| setChildren() | O(n) | O(n) |

IBTree

|  |  |  |
| --- | --- | --- |
| Function | Time Complexity | Space Complexity |
| getMinimumDegree() | O(1) | O(1) |
| getRoot() | O(1) | O(1) |
| insert() | O(b logn) | O(n) |
| Search() | O(logn) | O(n) |
| Delete() | O(logn) | O(n) |

**Search Engine Code Design**

We indexed the Web Page by having B-Tree nodes with key = Document ID and value = Text Context of Document, saving Space Complexity. Then we search the tree for a Sentence by traversing the tree and accessing the value of the node and counting the occurrences of word and setting the rank of the node. If it’s a single word then the rank is the number of occurrences of word in text context, if we search for multiple words then we return the minimum number of occurrences of the words as the rank.

**Code Snippets**

Search Result class that implements ISearchResult.

Text

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Initialize Global B-Tree and list of search results.

Use Java Dom XML Parser to get meta data and insert the document as node in B-Tree with key: ID and value: Text Context.

Text

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Same as before but we index the whole directory and check for XML files. (Design Choice) => xml files must end with .xml or .XML .

Then we add all Document Nodes in Global B-Tree.

Text

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Same as before but we delete from B-Tree the indices of the doc elements in given file.

Text

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We use this method to count the number of occurrences in Text Context.Text

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We use this function to traverse the tree and add the search result element to the list.

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Here we use the previous functions to get our search results

Text, website

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