

CE205 Data Structures Week-10

Sorting Algorithms, Taxonomy and Comparisons

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1 CE205 Data Structures

2 Week-10

2.0.1 Advanced Tree Data Structures (Binary Search Tree, AVL Tree, B Trees and derivations, Red-Black trees, Splay Trees and Augmented Data Structures, van Emde Boas Trees, Binomial and Minimax Trees) and Comparisons.

Download DOC¹, SLIDE², PPTX³

2.0.2 Outline

- Trees
 - Binary Search Tree
 - * Search and Insertion
 - * Delete
 - * BST over Hash Table
 - * Construction and Conversions
 - * Check Smallest/Largest Element
-

2.0.3 Outline

- Trees
 - Red Black Tree and Threaded Binary Tree
 - AVL Trees
 - B Trees
 - * Definition of B Trees
 - * Basic operations on B tree
 - * Deleting a key from a B tree
 - 2 3 4 Trees
 - 2 3 Trees
 - B+ Trees
-

2.0.4 Outline

- Trees
 - R Trees
 - Red - Black Tree Datastructure
 - Splay Tree Datastructure
 - Augmenting Data Structures
 - * Dynamic order statistics
 - * How to augment a data structure
-

2.0.5 Outline

- Trees
 - Interval trees
 - van Emde Boas Trees
 - * Preliminary approaches

¹ce205-week-10-advanced-tree-structures.md_doc.pdf

²ce205-week-10-advanced-tree-structures.md_slide.pdf

³ce205-week-10-advanced-tree-structures.md_slide.pptx

- * A recursive structure
 - * The van Emde Boas tree
 - Binomial Trees
 - Comparison of Search Trees
 - Minimax Tree
-

2.0.6 Binary Search Tree

- http://www.btechsmartclass.com/data_structures/binary-search-tree.html
 - <https://visualgo.net/en/bst?slide=1> (Select BINARY SEARCH TREE)
 - <https://www.cs.usfca.edu/~galles/visualization/BST.html>
 - Search and Insertion
 - Delete
-

2.0.7 BST over Hash Table

- <https://www.geeksforgeeks.org/advantages-of-bst-over-hash-table/?ref=lbp>
 - Construction and Conversions
 - Check Smallest/Largest Element
-

2.0.8 Red Black Tree and Threaded Binary Tree

- <https://www.geeksforgeeks.org/threaded-binary-tree/>
-

2.0.9 AVL Trees

- http://www.btechsmartclass.com/data_structures/avl-trees.html
 - <https://visualgo.net/en/bst> (Select AVL)
 - <https://www.cs.usfca.edu/~galles/visualization/AVLtree.html>
-

2.0.10 B Trees

- http://www.btechsmartclass.com/data_structures/b-trees.html
 - <https://www.cs.usfca.edu/~galles/visualization/BTree.html>
-

2.0.11 Definition of B Trees

- <https://www.geeksforgeeks.org/introduction-of-b-tree-2/>
-

2.0.11.1 Basic operations on B tree

- <https://www.geeksforgeeks.org/insert-operation-in-b-tree/>
 - <https://www.guru99.com/b-tree-example.html>
-

2.0.11.2 Deleting a key from a B tree

- <https://www.geeksforgeeks.org/delete-operation-in-b-tree/>
-

2.0.12 2 3 4 Trees

- https://en.wikipedia.org/wiki/2%E2%80%933%E2%80%934_tree
-

2.0.13 2 3 Trees

- https://en.wikipedia.org/wiki/2%E2%80%933_tree
-

2.0.14 B+ Trees

- <https://www.geeksforgeeks.org/introduction-of-b-tree/>
 - <https://www.cs.usfca.edu/~galles/visualization/BPlusTree.html>
 - <https://www.geeksforgeeks.org/difference-between-b-tree-and-b-tree/?ref=rp>
-

2.0.15 R Trees

- <https://www.geeksforgeeks.org/introduction-to-r-tree/?ref=rp>
-

2.0.16 Red - Black Tree Datastructure

- http://www.btechsmartclass.com/data_structures/red-black-trees.html
 - <https://www.geeksforgeeks.org/red-black-tree-set-1-introduction-2/?ref=rp>
 - <https://www.geeksforgeeks.org/red-black-tree-set-2-insert/>
 - <https://www.geeksforgeeks.org/red-black-tree-set-3-delete-2/>
-

2.0.17 Splay Tree Datastructure

- http://www.btechsmartclass.com/data_structures/splay-trees.html
 - <https://www.geeksforgeeks.org/splay-tree-set-1-insert/?ref=rp>
 - <https://www.geeksforgeeks.org/splay-tree-set-2-insert-delete/>
 - <https://www.geeksforgeeks.org/splay-tree-set-3-delete/?ref=rp>
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2.0.18 Augmenting Data Structures

- http://cs.bilkent.edu.tr/~ugur/teaching/cs502/material/cs502_2_ADS.pdf
 - <https://iq.opengenus.org/augmented-data-structures/>
 - <http://staff.ustc.edu.cn/~csli/graduate/algorithms/book6/chap15.htm>
 - <http://www.facweb.iitkgp.ac.in/~sourav/Lecture-11.pdf>
-

2.0.19 Dynamic order statistics

- <http://www.facweb.iitkgp.ac.in/~sourav/Lecture-11.pdf>
-

2.0.20 How to augment a data structure

- <http://www.facweb.iitkgp.ac.in/~sourav/Lecture-11.pdf>
-

2.0.21 Interval trees

- <https://www.geeksforgeeks.org/interval-tree/>
-

2.0.22 van Emde Boas Trees

- <https://www.geeksforgeeks.org/van-emde-boas-tree-set-1-basics-and-construction/>
 - <https://web.stanford.edu/class/archive/cs/cs166/cs166.1146/lectures/14/Small14.pdf>
 - Preliminary approaches
 - A recursive structure
-

2.0.23 Binomial Trees

- <https://www.geeksforgeeks.org/binomial-heap-2/#:~:text=What%20is%20a%20Binomial%20Tree,as%20leftmost%20cl>
-

2.0.24 Comparison of Search Trees

- http://www.btechsmartclass.com/data_structures/comparison-of-search-trees.html
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2.0.25 Minimax Tree

- <https://www.geeksforgeeks.org/minimax-algorithm-in-game-theory-set-1-introduction/>
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