NPTEL MOOC, JAN-FEB 2015 Week 1, Module 1

DESIGN AND ANALYSIS OF ALGORITHMS

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Understanding Algorithms

- * Correctness
- * Efficiency
 - * Asymptotic complexity, O() notation
- * Modelling
 - * Graphs, data structures, decomposing the problem
- * Techniques
 - * Divide and conquer, greedy, dynamic programming

Expectations

- * Background in programming
 - * Any language (C, C++, Java)
- * Basic data structures
 - * Arrays, lists

Topics to be covered

- * Asymptotic complexity
- * Searching and sorting in arrays
 - Binary search, insertion sort, selection sort, merge sort, quick sort
- * Graphs and graph algorithms
 - * Representations, reachability, connectedness
 - * Directed acyclic graphs
 - * Shortest paths, Spanning trees

Topics to be covered

- * Algorithmic design techniques
 - Divide and conquer, Greedy algorithms,
 Dynamic programming
- * Data structures
 - Priority queues/heaps, Search trees, Union of disjoint sets (union-find)
- Miscellaneous topics
 - * Intractability, ...

Tentative schedule

January

- * Week 1: Motivation, asymptotic complexity
- Week 2: Searching and sorting
- * Week 3: Graphs and basic graph algorithms
- * Week 4: More graph algorithms, disjoint set
- * Week 5: Divide and conquer, heaps
- * Week 6: Search trees, greedy algorithms
- * Week 7: Dynamic programming
- * Week 8: Miscellaneous topics

4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

February

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

Evaluation

- * Continuous evaluation
 - * 8 Weekly quizzes
 - * 6 programming assignments
- * Certification exam

Requirement for successful course completion

- * 60% in quizzes, certification exam
- Submit at least 5 of 6 assignments
 - * At least 4 with nonzero marks

Textbooks

* Algorithm Design

Jon Kleinberg and Eva Tardos

* Algorithms

Sanjoy Dasgupta, Christos Papadimitriou and Umesh Vazirani