Graph SOC

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May 30, 2024

1 Tardos Notes

Chapter 1 - Introduction

List of problems Stable matching (and Perfect matching), Weighted interval scheduling, Bipartite matching, Independent set[1], Competitive facility location problem

Algorithms Gale-Shapely

Concepts Augmentation for network flow problems,

Chapter 3 - Graphs

List of problems s-t connectivity (maze solving),

Algorithms BFS, DFS

Concepts Adjacency list vs Adjacency matrix, Bipartiteness using BFS, Strong connectivity, Topological ordering↔DAGs

Chapter 4 - Greedy

List of problems Shortest path, MST, Huffman code construction, Minimum cost aborescence problem, Interval partitioning problem (Interval colouring problem), Multiple interval scheduling, Minimum spanning tree, Heirarchial agglomerative clustering (single link clustering), Minimum-cost aborescence

Algorithms Farthest in future, Djikstra, Kruskal, Prim (also in O(m)), Reverse-delete, Union find structure(update smaller O(klogk), pointer structure), Huffman

[1] Superset of Bipartite and Interval scheduling

Concepts Djikstra not for -ve (Bellman Ford there), Cut property and Cycle property,[2], optimisations in Union find (inverse Ackermann function), spacing of clustering

Implement Kruskal with Union find

Chapter 5 - Divide and conquer

List of problems Closest pair of points, Integer multiplication, Convolutions (FFT)

Algorithms

Concepts Collaborative filtering

Chapter 6 - Dynamic programming

List of problems Weighted interval scheduling, Segmented least squares

Algorithms

Concepts

[2]justification for greedy construction of MSTs using this