CE205 Data Structures

Week-6

Graph MST, Backtracking, Topological Sorting, Shortest Paths, Connectivity,Max Flow and Cycle Detection Algorithms.

Graph Isomorphism and canonization

Graph Cuts

Download PDF,DOCX, SLIDE, PPTX

Outline-1

- Graph Topological Sorting
- Graph MST
- Graph Backtracking
  - Tug of War
  - n-Queen's Problem
  - m Coloring Problem
  - Euler & Hamiltonian Path

Outline-2

- Graph Sortest Paths
- Graph Connectivity - SCC
- Graph Max Flow
- Graph Isomorphism
- Graph canonization
- Graph Cuts
  - Min Cut
  - Max Cut

Outline-3

- Alpha-Beta Pruning
- Hasse Diagrams
- Petri Nets
- Bipartite Graphs
- Cycle Detection
  - Brent's Algorithm
  - Hare and Tortoise Algorithm
- Bayesian Network

Graph Topological Sorting

- CE100
  - https://ucoruh.github.io/ce100-algorithms-and-programming-II/week-10/ce100-week-10-graphs/?h=topolo#directed-acyclic-graphs-dag
- Geeks for Geeks
  - https://www.geeksforgeeks.org/topological-sorting/

Graph MST

- CE100
  - https://ucoruh.github.io/ce100-algorithms-and-programming-II/week-10/ce100-week-10-graphs/?h=mst#minimum-spanning-tree-mst
- Geeks for Geeks
  - https://www.geeksforgeeks.org/prims-minimum-spanning-tree-mst-greedy-algo-5/

Graph Backtracking

- Tug of War
  - Geeks for Geeks
    - https://www.geeksforgeeks.org/tug-of-war/

Graph Backtracking

- n-Queen's Problem
  - Geeks for Geeks
    - https://www.geeksforgeeks.org/n-queen-problem-backtracking-3/?ref=lbp

Graph Backtracking

- m Coloring Problem
  - Geeks for Geeks
    - https://www.geeksforgeeks.org/m-coloring-problem-backtracking-5/
  - Tutorials Point
    - https://www.tutorialspoint.com/M-Coloring-Problem#:~:text=The problem is to find,is assigned on which vertex.

Graph Backtracking

- Euler & Hamiltonian Path
  - https://www.geeksforgeeks.org/mathematics-euler-hamiltonian-paths/

Graph Sortest Paths

- Single-Source Shortest Paths (SSSP)
  - https://ucoruh.github.io/ce100-algorithms-and-programming-II/week-11/ce100-week-11-shortestpath/
  - https://visualgo.net/en/sssp?slide=1

Graph Connectivity

- Strongly Connected Components
  - https://ucoruh.github.io/ce100-algorithms-and-programming-II/tr/week-10/ce100-week-10-graphs/?h=scc#strongly-connected-components-scc

Graph Max Flow

- Geeks for Geeks
  - https://www.geeksforgeeks.org/max-flow-problem-introduction/

Graph Isomorphism

- https://www.sciencedirect.com/science/article/pii/S0747717113001193
- https://www3.cs.stonybrook.edu/~algorith/implement/nauty/implement.shtml
- https://github.com/Mith13/Graphs-isomorphism

Graph Cuts

1. Min Cuts
2. Max Cuts

- Wikipedia
  - https://en.wikipedia.org/wiki/Cut_(graph_theory)#:~:text=In graph theory%2C a cut,said to cross the cut.

Graph canonization

- Wikipedia
  - https://en.wikipedia.org/wiki/ Graph_canonization

Cycle Detection

- https://ucoruh.github.io/ce100-algorithms-and-programming-II/week-10/ce100-week-10-graphs/#cycle-detection

Graph Coloring

- https://ucoruh.github.io/ce100-algorithms-and-programming-II/week-10/ce100-week-10-graphs/#graph-coloring

Alpha-Beta Pruning

- Geeks for Geeks
  - https://www.geeksforgeeks.org/minimax-algorithm-in-game-theory-set-4-alpha-beta-pruning/

Hasse Diagrams

- Geeks for Geeks
  - https://www.geeksforgeeks.org/discrete-mathematics-hasse-diagrams/

Petri Nets

- Wikipedia
  - https://en.wikipedia.org/wiki/Petri_net

Bipartite Graphs

- CE100
  - https://ucoruh.github.io/ce100-algorithms-and-programming-II/week-10/ce100-week-10-graphs/?h=bipartite#biparitite-checker
- Geeks for Geeks
  - https://www.geeksforgeeks.org/bipartite-graph/

Cycle Detection

- Brent's Algorithm
  - Geeks for Geeks
    - https://www.geeksforgeeks.org/brents-cycle-detection-algorithm/
- Hare and Tortoise Algorithm
  - Geeks for Geeks
    - https://www.geeksforgeeks.org/tag/tortoise-hare-approach/

Cycle Detection

- CE100
  - https://ucoruh.github.io/ce100-algorithms-and-programming-II/week-10/ce100-week-10-graphs/?h=bipartite#cycle-detection

Bayesian Network

- https://towardsdatascience.com/introduction-to-bayesian-networks-81031eeed94e

$$End - Of - Week - 6$$