Coverage

slides 11/3, 11/10, 10/31, 11/28 (~p14) 12/12 (p21)

3~5 problems

10/31

ch 16.

a matroid

proves ↑

16.5 unit task scheduling problem

16.4 graphic matroids.

MST ch23 → Greedy Alg 사용 가능해짐.

Safe edge Generic - MST ( )

1) prim's Alg

2) kruskal's Alg → ch21 a data structure disjoint set

① make set

② find set

③ union

ch24 connected components

ch16

DP, GA

0/1 knapsack → ~~Greedy~~

fractional " → Greedy

Ch22. 22.1 representation of graphs

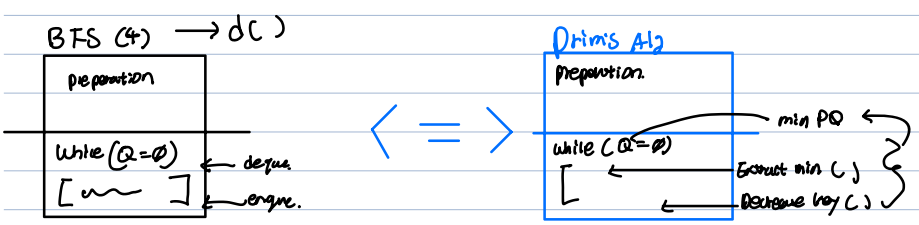
1) Adj matrix

2) Adj lists

Graph search

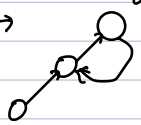
22.2 Breadth-first-search : Queue

22.3 Depth-first-search : Stack. → O(V+E)



Back-tracking Algorithm

→



Depth first search : time stamp.

Ch23 MSTP

optimization

selection of edges.

G
n nodes
n-1 edges

BFS — Queue
DFS — Stack.

Kruskal's Alg ≃ disjoint set DS ≡ connected components

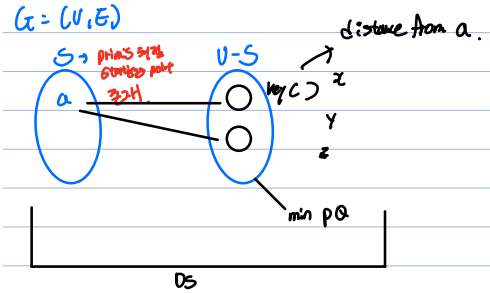
Prim's Alg = BFS = min PQ → repeated select from Q again, again

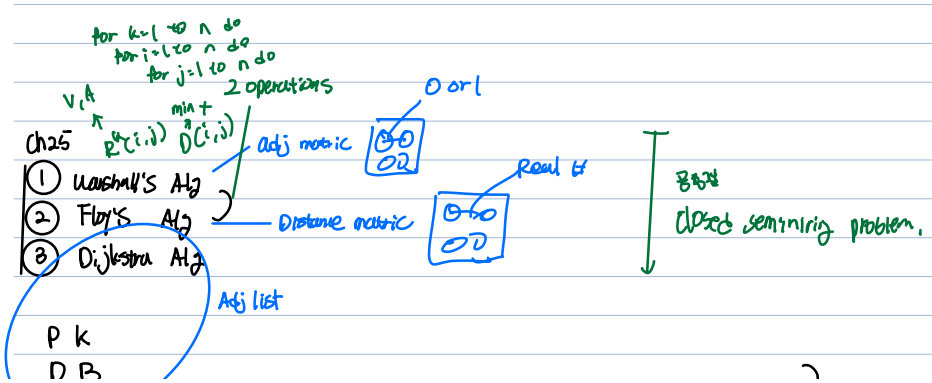
Prim (G-tgv)

need starting point

Dijkstra

$G = (V, E)$ w





$D(i,j) = \min(D(i,j), D(i,k) + D(k,j))$

Rechability Alg.

Warshall $R^0 \rightarrow R^1 \cdots \rightarrow R^n$

Transitive Closure of the input graph.

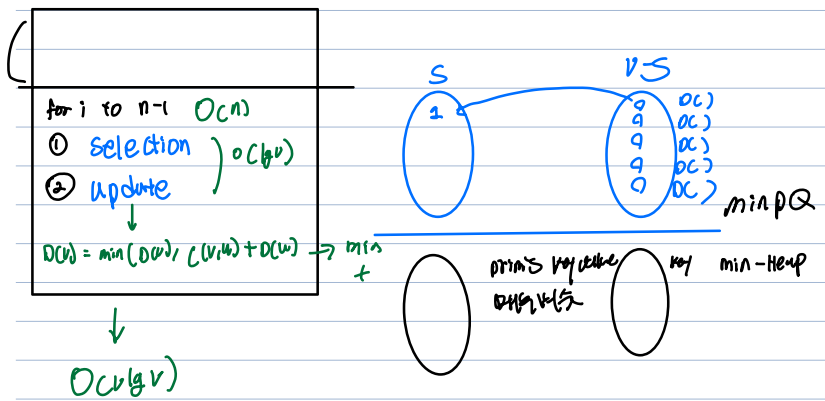
Floyd's

$D^0 \rightarrow D^1 \rightarrow \cdots D^n$

All pairs shortest distance problem.

Dijkstra's Alg

Single source shortest paths distances



O(VlgV)

11/10

ch34

Np - Hardness ch26 1) max flow problem A

NPC 2) max Bipartite graph matching. B

Reduction

$B \leq A$

↓

to reducible

flow network

Ch29

LPP - Linear programming problem

LPP & P

↓

Solve Based on simplex Algo

Simplex & P Theoretically Not efficient Alg used for P

~~interior point Alg~~
~~Ellipsoid Alg~~ } polynomial Algorithm $\subseteq P$

LPP
① Standard
② Slack ⟶ Simplex Alg)

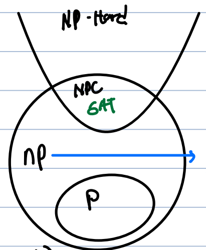
Pivot operation

Starts with { one LP , then convert
{ next "
{ next "
| polynomial time

↓
Basic - variable ⟲ change
non basic - variable

11/28

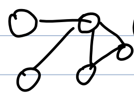
satisfiability problem
SAT = { ↑ }
the set of all satisfiable boolean formulas
SAT $\subseteq$ NPC



→ Nondeterministic polynomial time Alg

- non deterministic Alg
1) Guess part ——— 1 step DNA computer, Q c
2) verify part

Pg 5 of 11/28 slide
Ex) 3 coloring problem



(R B T) 3^n possibility
3^5

Guess : in 3^n 1개 성립하면
verify : Yes

conjunction (∧)
↓
3 CNF b. formula
↓
Normal form

3 literals ( )
ex) ϕ = ( ) ∧
3 literals ( ) ∧
( ) ∧
( )

a set of structures hold T ∈ NP if and only if T = { A | A ≠ ∅ }
ex) 3 coloring of T , SAT one of T

Pg 9
$x \in$ NPC
① $x \in$ NP }
② $x \in$ NP - Hard } x is NP - Hard
$\forall y \in NP \quad y \leq_p x$

k-clique
3CNF SAT $\leq$ k - clique

Diophantine – eq

SAT $\leq_p$ Hilbert's 10th problem → unsolvable = is NP-hard

input: Diophantine eq

output: Yes, if ∃ integer roots

No, otherwise

x :
y :
z :

$4xy + 8^2 + xz = 5$

Not solvable.

7.4.1 Quick-sot using substitute method.