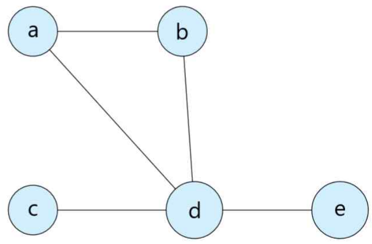
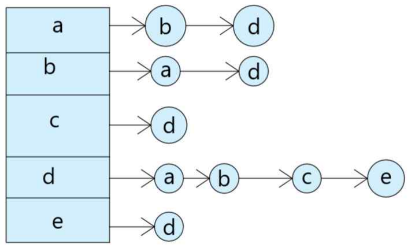
<Discrete Mathematics>

작성자_2018320161_송대선

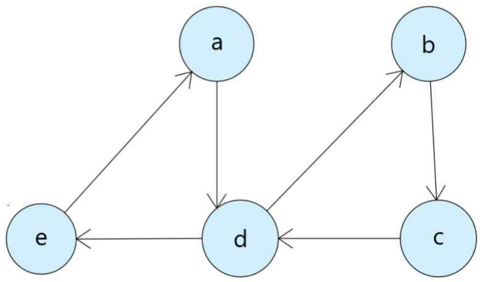
작성일_05_07

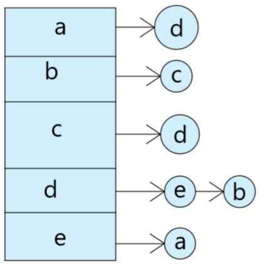
(1) an undirected graph





(2) an directed graph





The transitive closure -> tc()

(1) a binary relation R:

tc(R) = a binary relation R`

(2) a directed graph G:

tc(G) = transitive closure of G

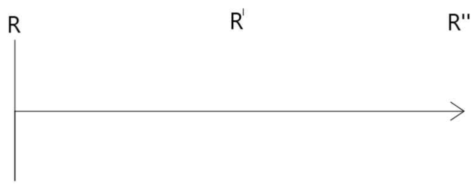
-> tc(R) and tc(G) are equivalent

R is a subset of AxA

with

1. R ⊆ R`,

2. R` is a transitive relation such that ∀(transitive relations on A that contains R) R` ⊆ R``



smallest R`이 무엇인지 아는 것이 가장

ex) A={a, b, c, d, e} -> |AxA| = 25

R={(a, b), (b, c)}: not transitive

-> tc(R)? R`?

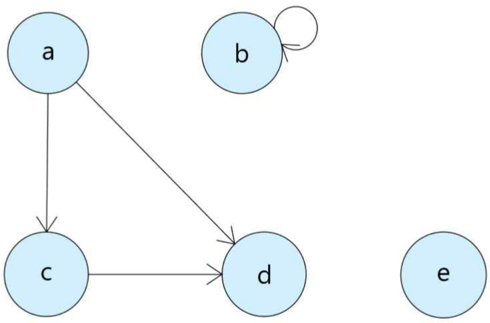
$R_1 = R \cup$ {(a, c)} -> transitive

$R_2 = R_1 \cup$ {(d, d)} -> transitive

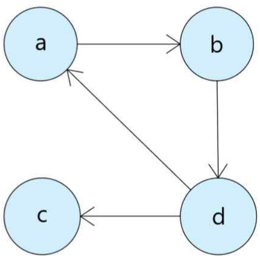
$R_3 = R_1 \cup$ {(a, a), (d, d)} -> transitive

ex) R={(a, c), (c, d), (a, d), (b, b)} -> already transitive TC(R)=R

V={a, b, c, d, e}이면,



ex) 4 nodes E={(a, b), (b, d), (d, a), (d, c)}, V={a, b, c, d}



TC(G) = $\begin{bmatrix} 1\,1\,1\,1 \\ 1\,1\,1\,1 \\ 0\,0\,0\,0 \\ 1\,1\,1\,1 \end{bmatrix}$: reachability information

$R^0 = \begin{bmatrix} 0\,1\,0\,0 \\ 0\,0\,0\,1 \\ 0\,0\,0\,0 \\ 1\,0\,1\,0 \end{bmatrix}$, $R^1 = \begin{bmatrix} 0\,1\,0\,0 \\ 0\,0\,0\,1 \\ 0\,0\,0\,0 \\ 1\,1\,1\,0 \end{bmatrix}$, $R^2 = \begin{bmatrix} 0\,1\,0\,1 \\ 0\,0\,0\,1 \\ 0\,0\,0\,0 \\ 1\,1\,1\,1 \end{bmatrix}$, $R^3 = \begin{bmatrix} 0\,1\,0\,1 \\ 0\,0\,0\,1 \\ 0\,0\,0\,0 \\ 1\,1\,1\,1 \end{bmatrix}$, $R^4 = \begin{bmatrix} 1\,1\,1\,1 \\ 1\,1\,1\,1 \\ 0\,0\,0\,0 \\ 1\,1\,1\,1 \end{bmatrix}$ =TC(G)

1. R^0

2. $R^k[i,j] = \vee (R^{k-1}[i,j]),(\wedge R^{k-1}[i,k], R^{k-1}[k,j])$으로 구한다.

-a closed semiring-

(S, +, •, 0, 1)

+, •-> binary operation

1. (S, +, 0) -> a monoid closed under + -> a+0=0+a=a

(S, •, 1) -> a monoid -> a•1=1•a=a

+ is associative a+(b+c)=(a+b)+c

0 is annihilator-> a•0=0•a=0

2. a+a=a, a+b=b+a

3. a・(b+c)=a・b=a・c

(b+c)・a=b・a=c・a

4. $\sum_{i}^{\infty} a_i$의 값은 존재하며, unique하다. (countably many +)

5. ・은 countably many sum에 distribute 가능하다.

-> $\sum_{i}^{\infty} a_i \cdot \sum_{i}^{\infty} a_j = \sum_{i,j}^{\infty} a_i \cdot a_j = \sum_{i}^{\infty} (\sum_{j}^{\infty} a_i \cdot a_j)$