Devoir

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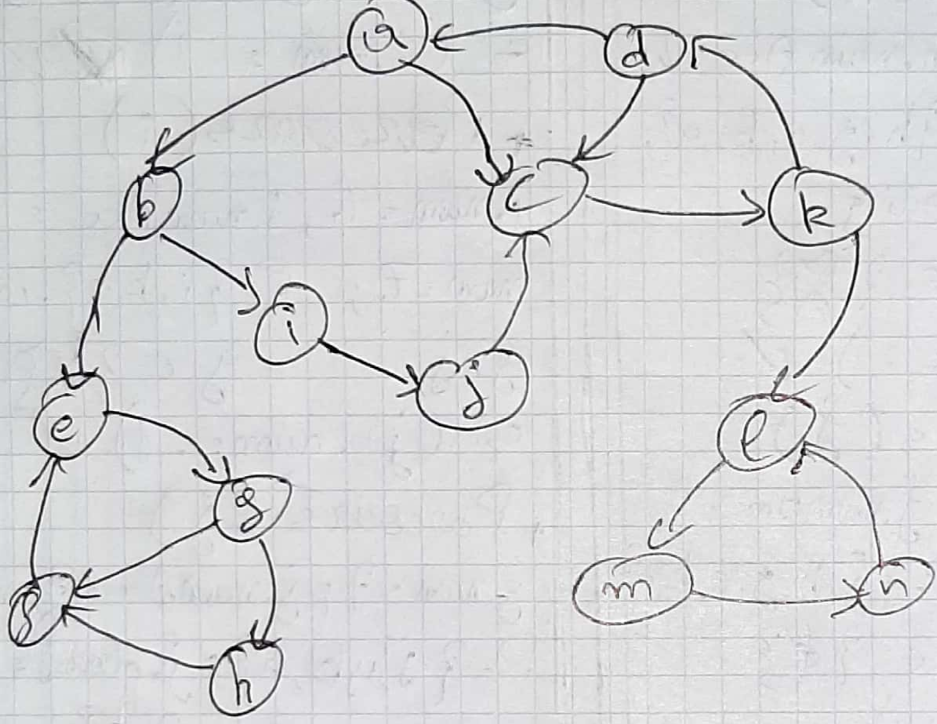
ILISI 1

Sujet : Appliquer les trois algorithmes de recherche de composante fortement connexe au graphe suivant :



I- Algorithme de R.E Tarjan

num = 0 ;

P = ∅ ;

partition = ∅ ;

Pour tout x ∈ X :

  x.num = -1 ;

Pour tout x ∈ X :

(x = a) : si (a.num = -1) ✓

+ Parcours (a)

a.num = 0 ; a.numAcc = 0

num = 1 ; empiler(a, P) ; {a}

a.dansP = oui ;

Pour tout y ∈ $\Gamma^+(a)$

(y = b) : b ∈ {$\cancel{b}$, c}

si (b.num = -1) ✓

+ Parcours (b)

b.num = 1 ; b.numAcc = 1 ;

num = 2 ; P = {b, a} ;

b.dansP = oui ;

y = e   y ∈ {$\cancel{e}$, i}

si (e.num = -1) ✓

+ Parcours (e)

e.num = 2 ; e.numAcc = 2 ;

num = 3 ; P = {e, b, a} ; e.dansP = oui

y = g   y ∈ {$\cancel{g}$}

si (g.num = -1) ✓

+ Parcours (g)

g.num = 3 ; g.numAcc = 3 ;

a b e g

num = 4; P = {g, e, b, a};
g.dansP = oui;
y = h   y ∈ {~~h~~, f}
si (h.num = -1) ✓

+Parcours(h)
h.num = 4; h.numAcc = 4;
num = 5; P = {h, g, e, b, a};
h.dansP = oui;
y = f   y ∈ {~~f~~}
si (f.num = -1) ✓

+Parcours(f)
f.num = 5; f.numAcc = 5
num = 6; P = {f, h, g, e, b, a}
y = e   y ∈ {~~e~~}
si (e.num = -1) ✗
sinon (e.dansP = oui) ✓
min (f.numAcc, e.num)
f.numAcc = 2;
si (f.numAcc = f.num) ✗

h
min (h.numAcc, f.numAcc)
h.numAcc = 2   min (4, 2)
si (h.numAcc = h.num) ✗

g
g.numAcc = 2;   min (3, 2)
y = f   y ∈ {~~h~~, ~~f~~}
si (f.num = -1) ✗
sinon si (f.dansP = oui) ✓
g.numAcc = 2;   min (2, 5)
si (g.numAcc = g.num) ✗

e
e.numAcc = 2;   min (2, 2)
si (e.numAcc == e.num) ✓

a b e

X' = {f, h, g, e}; P = {b, a}
Partition = {f, h, g, e}

b.num = 1;   min (1, 2)
y = i   y ∈ {~~e~~, ~~i~~}
si (i.num = -1) ✓

+Parcours(i)
i.num = 6; i.numAcc = 6;
num = 7; P = {i, b, a}; i.dansP = oui
y = j   y ∈ {~~j~~}
si (j.num = -1) ✓

+Parcours (j)
j.num = 7; j.numAcc = 7; num = 8
P = {j, i, b, a}; j.dansP = oui
y = c   y ∈ {~~c~~}
si (c.num = -1) ✓

+Parcours (c)
c.num = 8; c.numAcc = 8; num = 9
P = {c, j, i, b, a}; j.dansP = oui
y = k   y ∈ {~~k~~}
si (k.num = -1) ✓

+Parcours (k)
k.num = 9; k.numAcc = 9; num = 10
P = {k, c, i, b, a}; c.dansP = oui
y = d   y ∈ {~~d~~, f}
si (d.num = -1) ✓

+Parcours (d)
d.num = 10; d.numAcc = 10; n = 11;
P = {d, k, c, j, i, b, a}; d.dansP = oui

a b i j c k d

y = a   y ∈ {~~x~~, ~~a~~}
si (a.num = -1) ✗
sinon si (a.dansP = oui) ✓
d.numAcc = 0; min(10, 0)
y = c   y ∈ {~~x~~, ~~x~~}
si (c.num = -1) ✗
sinon si (c.dansP = oui) ✓
d.numAcc = 0; min(0, 8)
si (d.numAcc == d.num) ✗

k.numAcc = 0; min (0, 9)
y = l   y ∈ {~~x~~, ~~k~~}
si (l.num = -1) ✓

Parcours (l)
l.num = 11; l.numAcc = 11
num = 12; P = {l, k, c, j, i, b, a}
l.dansP = oui;
y = m   y ∈ {~~m~~}
si (m.num = -1) ✓

Parcours (m)
m.num = 12; m.numAcc = 12;
num = 13; P = {m, l, k, c, j, i, b, a}
m.dansP = oui
y = n   y ∈ {~~n~~}

Parcours (n)
n.num = 13; n.numAcc = 13;
num = 14; P = {n, m, l, k, c, j, i, b, a}
n.dansP = oui;
y = l   y ∈ {l}
si (l.num = -1) ✗
sinon si (l.dansP = oui) ✓
n.numAcc = 11; min(11, 13)
si (n.numAcc == n.num) ✗

a b i j c k l m

m.numAcc = 11; min (11, 12)
si (m.numAcc == m.num) ✗

l.numAcc = 11; min (11, 11)
si (l.num == l.numAcc) ✓
X' = {n, m, l}
P = {d, k, c, j, i, b, a}
Partition = {{n, m, l}, {f, h, g, e}}

k.numAcc = 0; min (0, 11)
si (k.num == k.numAcc) ✗

c.numAcc = 0; min (0, 8)
si (c.num == c.numAcc) ✗

j.numAcc = 0; min (7, 0)
si (j.num == j.numAcc) ✗

i.numAcc = 0; min (6, 0)
si (i.num == i.numAcc) ✗

b.numAcc = 0   min (1, 0)
si (b.num == b.numAcc) ✗

y = c   y ∈ {~~b~~, ~~a~~}
si (c.num = -1) ✗ sinon (c.danP = oui) ✓
a.numAcc = 0,   min (0, 0)
si (a.num = a.numAcc) ✓
P = ϕ ; X'' = {d, k, c, j, i, b, a}
Partition = {{d, k, c, j, i, b, a}, {n, m, l},
{f, h, g, e}}

x = b ;   si (b.num = -1) ✗
x = c ;   si (c.num = -1) ✗
⋮
x = l ;   si (l.num = -1) ✗

⟹ Fin

II- Algorithme CFC :

$CFC(G(X,U), a \in X)$

$X^+ = \{a\}$; $X^- = \{a\}$

Pour Tout $x \in X^+$

$(x = a)$

$u = (a,b) : X^+ = X^+ \cup \{T(u)\}$
$= \{a, b$

$u = (a,c) : X^+ = \{a,b,c\}$

$(x = b)$

$u = (b,e) : X^+ = \{a,b,c,e\}$

$u = (b,i) : X^+ = \{a,b,c,e,i\}$

$(x = c)$

$u = (c,k) : X^+ = \{a,b,c,e,i,k\}$

$(x = e)$

$u = (e,g) : X^+ = \{a,b,c,e,i,k,g\}$

$(x = i)$

$u = (i,j) : X^+ = \{a,b,c,e,i,k,g,j\}$

$(x = k)$

$u = (k,l) : X^+ = \{a,b,c,e,i,k,g,j,l\}$

$u = (k,d) ; X^+ = \{a,b,c,e,i,k,g,j,l,d\}$

$(x = g)$

$u = (g,h) : X^+ = X^+ \cup \{h\}$

$u = (g,f) : X^+ = X^+ \cup \{f\}$

$(x = j)$

$u = (j,c) :$ $c \in X^+$

$(x = l)$

$u = (l,m) : X^+ = X^+ \cup \{m\}$

$(x = d)$

$u = (d,c) :$ $d \in X^+$

$u = (d,a) :$ $a \in X^+$

$(x = h)$

$u = (h,f) : f \in X^+$

$(x = f)$

$u = (f,e) : f \in X^+$

$(x = m)$

$u = (m,n) : X^+ = X^+ \cup \{n\}$

$(x = n)$

$u\ (n,l) : l \in X^+$

$X^+ = \{a,b,c,e,i,k,g,j,l,d,h,f,m,n\}$

Pour Tout $x \in X^-$

$(x = a)$

$u = (d,a) ;$ $X^- = \{a,d\}$

$(x = d)$

$u = (k,d) ;$ $X^- = \{a,d,k\}$

$(x = k)$

$u = (c,k) : X^- = \{a,d,k,c\}$

$(x = c)$

$u = (d,c)$ $d \in X^-$

$u = (a,c)$ $a \in X^-$

$u = (j,c)$; $X^- = \{a,d,k,c,j\}$

$(x = j)$

$u = (i,j) : X^- = \{a,d,k,c,j,i\}$

$(x = i)$

$u = (b,i) ;$ $X^- = X^- \cup \{b\}$

$(x = b)$

$u = (a,b)$ $a \in X^-$

$X' = X^+ \cap X^-$

$X' = \{a,d,c,k,i,b,j\}$