23/07/2018 EX2

venerdì 1 gennaio 2021 11:05

Exercise 2 Given the following ASP program P:

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r(x,y) :- p(x,y,z).
s(x,y) :- p(z,x,y).
t(x,y) :- r(x,y), s(y,z).
v1(x,y,z) :- r(x,y), s(y,z).
v2(x,y,z) :- v1(x,y,z), not p(x,y,z).
w(x,y) :- t(x,y), not s(x,y).
w(x,y) :- t(x,y), not r(x,y).
w(x,y) :- t(x,y), not v1(x,y,z).
w(x,y) :- t(x,y), not v2(x,y,z).
p(a,b,c). p(b,c,d). p(c,d,e). p(e,f,g).
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(a) tell whether P is stratified;

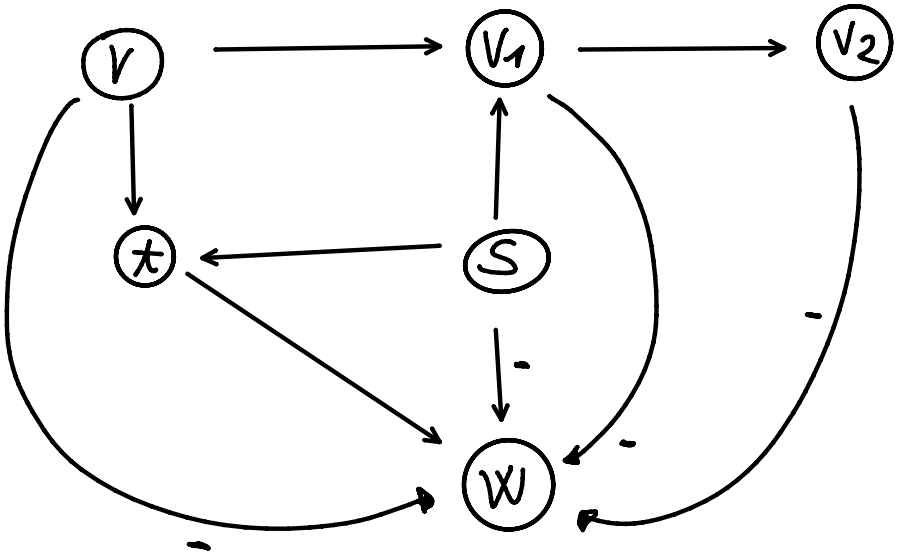
(b) compute the answer sets of P.

(a)

P is stratified IF the precedence graph does not contain cycles with negated edge

IDB = {v/2, s/2, t/2, v1/3, v2/3, w/2}

EDB = {p/3}



there are no cycles with negated edge so P is stratified

P is stratified so there is an unique answer set and it is coincide with minimal model of P

compute stratificaton

is coincide with minimal model of P.

Before computing MM(P) we need to compute stratification

$S_0 = \{r, s, t, v_1, v_2\}$

$S_1 = \{w\}$

$MM_0 = \{p(a,b,c), p(b,c,d), p(c,d,e), p(e,f,g)\}$

$P(S_0) = \{$

$r(X,Y) :- p(X,Y,Z).$

$s(X,Y) :- p(Z,X,Y).$

$t(X,Y) :- r(X,Y), s(Y,Z).$

$v_1(X,Y,Z) :- r(X,Y), s(Y,Z).$

$v_2(X,Y,Z) :- v_1(X,Y,Z), \text{not } p(X,Y,Z).$

$\}$

$I = \{p(a,b,c), p(b,c,d), p(c,d,e), p(e,f,g)\}$

$I' = T_P(I) = \{r(a,b), r(b,c), r(c,d), r(e,f),$
$s(b,c), s(c,d), s(d,e), s(f,g)\}$

$\Delta' I = \{\Delta' r(a,b), \Delta' r(b,c), \Delta' r(c,d), \Delta' r(e,f),$
$\Delta' s(b,c), \Delta' s(c,d), \Delta' s(d,e), \Delta' s(f,g)\}$

1-iteration

$\Delta P = \{$

$\Delta' t(X,Y) :- \Delta v(X,Y), s(Y,Z).$

$\Delta' t(X,Y) :- v(X,Y), \Delta s(Y,Z).$

$\Delta' v_1(X,Y,Z) :- \Delta v(X,Y), s(Y,Z).$

$\Delta' v_1(X,Y,Z) :- v(X,Y), \Delta s(Y,Z).$

$\Delta' v_2(X,Y,Z) :- \Delta v_1(X,Y,Z), \text{not } p(X,Y,Z).$

}

$I = I \cup \{ v(a,b), v(b,c), v(c,d), v(e,f), s(b,c), s(c,d), s(d,e), s(f,g) \}$

$\Delta I = \{ \Delta v(a,b), \Delta v(b,c), \Delta v(c,d), \Delta v(e,f), \Delta s(b,c), \Delta s(c,d), \Delta s(d,e), \Delta s(f,g) \}$

$\Delta' I = T_p(I \cup \Delta I) = \{ t(a,b), t(b,c), t(c,d), t(e,f), v_1(a,b,c), v_1(b,c,d), v_1(c,d,e), v_1(e,f,g) \}$

2- iterazione

$I = I \cup \{ t(a,b), t(b,c), t(c,d), t(e,f), v_1(a,b,c), v_1(b,c,d), v_1(c,d,e), v_1(e,f,g) \}$

$\Delta I = \{ \Delta t(a,b), \Delta t(b,d), \Delta t(c,d), \Delta t(e,f), \Delta v_1(a,b,c), \Delta v_1(b,c,d), \Delta v_1(c,d,e), \Delta v_1(e,f,g) \}$

$\Delta' I = \{ \}$

STOP

$MM_1 = MM_0 \cup \{ v(a,b), v(b,c), v(c,d), v(e,f),$

$MM_1 = MM_0 \cup \{ v(a,b), v(b,c), v(c,d), v(e,f),$
$s(b,c), s(c,d), s(d,e), s(f,g),$
$t(a,b), t(b,c), t(c,d), t(e,f),$
$v1(a,b,c), v1(b,c,d), v1(c,d,e), v1(e,f,g) \}$

$P(S_1) = \{$

$w(X,Y) :- t(X,Y), \text{not } s(X,Y).$
$w(X,Y) :- t(X,Y), \text{not } v(X,Y).$
$w(X,Y) :- t(X,Y), \text{not } v1(X,Y,Z).$
$w(X,Y) :- t(X,Y), \text{not } v2(X,Y,Z).$

$\}$

$MM_2 = MM_1 \cup \{ w(a,b), w(e,f), w(b,c), w(c,d) \}$

$MM(P) = \{ p(a,b,c), p(b,c,d), p(c,d,e), p(e,f,g),$
$v(a,b), v(b,c), v(c,d), v(e,f),$
$s(b,c), s(c,d), s(d,e), s(f,g),$
$t(a,b), t(b,c), t(c,d), t(e,f),$
$v1(a,b,c), v1(b,c,d), v1(c,d,e), v1(e,f,g),$
$w(a,b), w(e,f), w(b,c), w(c,d) \}$