13/10/25

Lab - 7

Unification Algorithm

~~Algorithm: Unify.~~

Solve the following

ii) Find Most General Unifier (MGU) of {Q(a, g(x,a), f(y)) and Q(a, g(f(b), a), x)}

Sol ⇒ a = a

g(x,a) = g(f(b),a) → x = f(b)

f(y) = x

~~{x/f(b), f(y)/x}~~

x → f(b)

y → b

MGU: {x/f(b), y/b}

iii) Find MGU of {h(f(a), g(y)), h(x,x)}

f(a) = x

g(y) = x ∴ f and g are different, so no unifier exists

iv) unify {prime(11) and prime(y)}

prime(11) = prime(y)

~~y = 11~~ y = 11

MGU: {y/11}

v) unify: {knows(John, x), knows(y, mother(y))}

knows(John) = y

y = John → John = y

knows(x) = knows(mother(y))

x = mother(John)

MGU: {y/John, x/mother(John)}

vi) unify: {knows(John, x), knows(y, Bill)}

knows(John) = knows(y)

y = John.

knows(x) = knows(Bill)

x = Bill

MGU: {y/John, x/Bill}

i) Find MGU of {p(b, x, f(g(z))) and p(z, f(y), f(y))}

b = z → z = b

x → f(y)

f(g(z)) = f(y) → g(z) = y

MGU: {z/b, x/f(y), y/g(z)}

Algorithm

Algorithm: Unify(Ψ_1, Ψ_2)

Step 1: If Ψ_1 or Ψ_2 is a variable or constant, then:

a) If Ψ_1 or Ψ_2 are identical, then return NIL

b) Else if Ψ_1 is a variable,

a. then if Ψ_1 occurs in Ψ_2, then return FAILURE

b. Else return {(ψ_1 / ψ_1)}

c) Else if ψ_2 is a variable,
   a. If ψ_2 occurs in ψ_1 then return FAILURE,
   b. Else return {(ψ_1 / ψ_2)}

d) Else return FAILURE

step 2 : If the initial Predicate symbol in ψ_1 and ψ_2 are not same, then return FAILURE

step 3 : IF ψ_1 and ψ_2 have a different number of arguments, then return FAILURE

step 4 : Set substitution set (SUBST) to NIL

step 5 : For i=1 to the number of elements in ψ_1

a) Call unify function with the ith element of ψ_1 and ith element of ψ_2, and put the result into s

b) If s = failure then returns Failure

c) If s ≠ NIL then do,
   a. Apply S to the remainder of both L1 and L2
   b. SUBST = APPEND (s, SUBST)

step 6 : Return SUBST

output (i)

MGU : {'b': 'z', 'x': ('f', 'y'), 'y': ('g', 'z')}