Intro to AI 2021 B Ex. 3

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(1)

A: Logic syntax

a. let a be Jane in town and b be John in town and let c be we will play tennis then the sentence will be $\neg(a \vee b) \rightarrow c$

b. let a be it will rain today and b be it will be dry today then the sentence will be $a \vee b$, not that if the intention was for $a = \neg b$ then the sentence ~~w~~ was $a \vee \neg a$.

c. let a be ~~pa~~ you will pass this course and b be you study then the sentence will be $\neg b \rightarrow \neg a$.

B:

a. ~~[illegible]~~

$\forall x \exists y$ action(x) ∧ reaction(y) ∧ equals(x,y) ∧ opposite(x,y)

b.

~~$\forall x \exists y$ loves(x,y) [illegible]~~

$\forall x \exists y \forall z$ loves(x,y) → loves(y,z).

c.

$\forall x \exists y$ We(x) ∧ earth(y) ∧ green(y) ∧ living_in(x,y).

C:

a. cant live with or without you.

b. you own Earth or ~~you can~~ for each color of the wind you can paint with this color and you own the Earth.

Most general unifier

(2)

a. MGU: {y\postman, x\Blue}

b. MGU: {y\F(A), x\F(F(A)), v\F(A)}

c. MGU: {x\y}

Resolution

(1) goal state $\alpha = \exists x (M(x) \wedge MC(x) \wedge \neg S(x))$

wher M stands for member, MC mountain climber

for convince $\alpha = \exists x (MC(x) \wedge \neg S(x))$ and more generally we will assume that any x is such that M(x). also will mark likes in L

knowledge Base

0. $S(x) \vee MC(x)$
1. $\neg MC(x) \vee \neg L(x, rain)$
2. $\neg S(x) \vee L(x, snow)$
3. $\neg L(porthos, x) \vee \neg L(Athos, x)$
4. $L(porthos, x) \vee L(Athos, x)$
5. $L(Athos, rain)$
6. $L(Athos, snow)$
7. $M(Athos)$
8. $M(porthos)$
9. $M(Aramis)$
10. $\neg MC(x) \vee S(x)$

we will use shortest clause heuristic, how ever we will skip 7, 8, 9

(Resolution)

~~{3.,6.} ⊢ ¬L(porthos, show)~~

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{a, 2.} → ¬S(porthos) b.

{b., ¬a} → ¬MC(porthos) c.

*{c., 0} → S(porthos) d.

but then b., d. contredict, thus a is true.

(2)

a. "Horses are animals" will translat $\forall_x$ Horse(x) → animal(x)
from we'll mark H(x), A(x). also let Head of be H_o
then "The head of a Horse is the Head of an animal
be $\forall_x \forall_y (H(x) \wedge H_o(y,x) \rightarrow \exists_z (A(z) \wedge H_o(y,z)))$

b. converting the premise will result in

$\boxed{\neg H(x) \vee A(x)}$ ⊛

Negate the conclusion

$\neg(\forall_x \forall_y (H(x) \wedge H_o(y,x) \rightarrow \exists_z (A(z) \wedge H_o(y,z))))$

$= \neg(\forall_x \forall_y (\neg(H(x) \wedge H_o(y,x)) \vee \exists_z (A(z) \wedge H_o(y,z))))$

$= \exists_x \exists_y (H(x) \wedge H_o(y,x) \wedge \forall_z (\neg A(z) \vee \neg H_o(y,z)))$

mark x = a, y = b constant

$= \boxed{H(a) \wedge H_o(b,a) \wedge (\neg A(z) \vee \neg H_o(b,z))}$ ⊛⊛

(Resolution 2)

C. ⊛ + ⊛⊛ ⇒ A(a)

sustitut z\a and we get (¬A(a) ∨ ¬H(b,a))

= (¬true ∨ ¬(true)) = False ∨ False = False in contradiction

thus the conclusion is following the premise. ∎