491 KNOWLEDGE REPRESENTATION

Tutorial Exercise

Defaults and exceptions with negation as failure

Question 1 *(from an example by Bob Kowalski)*

Represent the following sentences as a normal logic program (i.e., using negation as failure):

r1: Except as provided for by r2, all thieves should be punished.

r2: Except as provided for by r3, thieves who are minors should be rehabilitated and not punished.

r3: Any thief who is violent should be punished.

What conclusions does your representation give for the cases when John, who is a thief, is/is not a minor and is/is not violent ?

Question 2

Represent the following default rules using negation as failure:

- Europeans are typically civilised in behaviour, except that . . . .

- Football supporters are typically not civilised in behaviour, unless they are educated.

- Even educated football supporters, on the other hand, are not civilised in behaviour if they are drunk.

What conclusions does your representation give for the various possible combinations of relevant facts?

Question 3

Represent the following default rules as a normal logic program:

- A person who is big is assumed to be strong, unless there is reason to think (s)he is weak.

- A person who is small is assumed to be weak, unless there is reason to think that (s)he is strong, except that: a person who is small and muscular is assumed to be strong unless there is reason to think that (s)he is weak.

What conclusions does your representation give for the various combinations of big/small and muscular/not muscular?

(The last example has the same logical form as some common patterns of temporal reasoning, though this might not be apparent. Temporal reasoning will be covered later in the course.)

Question 4

Look again at Question 2 on the first Tutorial Exercise sheet ('Revision'). That question is about negation-by-failure.