491 Knowledge Representation

Tutorial Exercise

Logic databases (Revision)

Revision Question 1

Suppose x *likes* d holds when a person x likes a certain brand of beer d, b *serves* d when a pub/bar b serves the beer d, and x *frequents* b when a person x frequents (is a regular customer) of the pub/bar b.

(x *likes* d is syntactic sugar for $\mathit{likes}(x, d)$ where the binary predicate *likes* is written in infix notation. In Prolog, for example, *likes*/2 could be declared as a binary infix operator using Prolog's `op` command. And similarly for the binary predicates *serves* and *frequents*.)

Suppose we have a database of facts about *likes*, *serves* and *frequents*.

How would you represent in first-order predicate logic the following pieces of information:

- William frequents every bar that serves at least one of the beers he likes.
- Harry frequents any bar that does not serve a beer he does not like.
- Charles frequents every bar that serves all of the beers he likes.
- Camilla frequents every bar that Charles frequents, and also any bar that serves *Young's Special Bitter*.

Revision Question 2

Throughout the course you are strongly encouraged to implement the tutorial examples as Prolog programs where possible.

How would you represent the information in the previous question as Prolog clauses?

Revision Question 3

The following properties of material implication are sometimes referred to as 'parodoxes' of material implication.

- $A \rightarrow (B \rightarrow A)$
- $\neg A \rightarrow (A \rightarrow B)$
- $(\neg A \wedge A) \rightarrow B$
- $(\,(A \wedge B) \rightarrow C\,) \;\rightarrow\; (\,(A \rightarrow C) \vee (B \rightarrow C)\,)$
- $(A \rightarrow B) \vee (B \rightarrow A)$

Confirm, using any method you like, that the above are all indeed tautologies.