Massachusetts Institute of Technology

6.038 Artificial Intelligence in Practice

Problem Set 5A: Tuesday, March 3, 1998
DUE: Thursday, March 5, 1998

NB: For this assignment, we encourage (but do not require) you to work together in pairs and hand in a single solution per pair. Please select different partners than any from previous problem sets. You may retain the same partners for Part B of this assignment.

1 Background

In this problem set, we explore rule-based systems as a method for implementing a parser. We will later extend this parser substantially. In this assignment we start with the basics.

2 Files

The parser is built as a (simple) extension of a backward chaining rule system analogous to the one you saw in 6.034 (except that this one is more general). The parser runs in Scheme. The files can be found in `/mit/6.038/ps5/*.scm`. To load all the files, load the file `load.scm`. If you are using Scheme-to-C, comment out the first line (the `load-option` command) in the `load.scm` file. If you are running Scheme-to-C, we have also provided `/mit/6.038/bin/ps5-sci` which has the key files (except `grammar.scm`) compiled in.

Once all the files are loaded in (including `grammar.scm`), then you can parse some sentences by executing `(parse)`. This will go into a loop, reading a sentence — typed as a list — and printing out any assertions produced that indicate a sentence parse.

3 Understanding the grammar implementation

Note that the function `make-grammar-rules` takes the rule in the format in `grammar.scm` and converts them into rules for the backward chainer, using the form we have talked about in class. Print out the backward chaining rules produced for the simple grammar in `grammar.scm`, e.g. by using `(pp *rules*)` after doing `(make-grammar-rules)`.

Take the sentence "The boy that sleeps sleeps" and show how the parse is generated. Hand in an AND/OR tree (like you did in 6.034) showing the backward chainer rules used, the variable bindings and the subgoals generated.

4 Modifying the grammar

Add rule(s) to handle verbs that take two complements, as in "John gave Bill the book". Hand in your additional or modified rules as well as some example parses.