12_HOMEWORK1_extending_the_top_down_parser

April 8, 2021

0.1 Homework 1: extending the grammar and the top-down parser

Consider extending our grammar and the top-down parser with intransitive verbs like *sleeps*, as well as sentential-complement taking verbs like *believe*. That is, add the following phrase-structure and lexical-insertion rules to the grammar:

$$
\begin{array}{lcl}
\text{VP} & \rightarrow & \text{V} \\
\text{VP} & \rightarrow & \text{V CP} \\
\text{CP} & \rightarrow & \text{C S} \\
\text{V} & \rightarrow & \text{sleeps} \\
\text{V} & \rightarrow & \text{believes} \\
\text{C} & \rightarrow & \text{that}
\end{array}
$$

Add the new lexical items to declarative memory and add new production rules to procedural memory to encode the new phrase-structure rules.

Once your model is in place, parse the sentence *Mary believes that Bill sleeps*.

You can probably already see that the new parser might run into problems.

For example, the parser might get stuck when parsing the target sentence *Mary believes that Bill sleeps* if it decides to

- expand the first (matrix-clause) VP into V and NP, i.e., if it incorrectly expects a transitive verb instead of a sentential-complement taking verb
- or expand that same VP into just V, i.e., if it incorrectly expects an intransitive verb.

As already discussed, this is a typical issue with top-down parsing: categories and structures are hypothesized / predicted before seeing any evidence for them.

The extended top-down parser has several ways to expand VPs and it fails to parse the input if it uses a VP expansion rule that happens to be incompatible with the sentence to be parsed.

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