Solution Applications of Logic Programming

Exercise 1

Create a finite collection of definite clause grammar rules to check whether a sentence is grammatically correct. A sentence can be composed of the following words:

article `a`, `the`

noun `girl`, `boy`

pronoun `that`, `this`

auxiliary `is`

verb `sleeps`, `likes`.

A sentence must be in one of the following forms `subject-predicate` and `subject-predicate-object`.

- `subject` is formed out of either an `article` and a `noun`, or a `pronoun`. For example, `a girl` or `that`.
- `predicate` is either an `auxiliary` or a `verb`
- `object` is formed out of an `article` and a `noun`

In the `subject-predicate` form of a sentence, the `predicate` can be only `sleeps`. In the `subject-predicate-object` form of a sentence the verb can be either `likes` or `is`. If the `predicate` is `likes`, the `subject` is composed of an `article` and a `noun`. If the `predicate` is `is`, the `subject` is a `pronoun`.

Write a Prolog question to produce all correct sentences in the grammar.

You can test your program with the following examples:

```
this is a sleeps // False
this is a likes // False
the boy likes // False
that boy likes // False
a boy the the girl // False
this is a boy // True
that is the girl // True
the girl likes a girl // True
```

Answer:

```
sentence --> subjectpredicate.
sentence --> subjectpredicateobject.

subjectpredicate --> subject, verb1.
subjectpredicateobject --> article, noun, verb2, object.
subjectpredicateobject --> pronoun, auxiliary, object.

subject --> article, noun.
subject --> pronoun.
predicate --> auxiliary.
predicate --> verb.
object --> article, noun.

article --> [a].
article --> [the].
noun --> [girl].
noun --> [boy].
pronoun --> [that].
pronoun --> [this].
auxiliary --> [is].
verb1 --> [sleeps].
verb2 --> [likes].
```