University of St Andrews

Practical 2

Grammar Engineering

Student ID: 120022067

University of St Andrews

CS5012 Language and Computation

Contents

1 Interesting Grammar Choices

1.1 NP[NUM=pl] -> NP[NUM=?n] CC NP[NUM=?n]

In the example sentences, the largest number of proper nouns in a sentence is two. This rule allows sequence of three or more proper nouns. For example, **"Homer serves Lisa and Bart"** is accepted by the parser.

1.2 ARG[CAT=s] -> S

In some occasions, a verb can be followed by a whole sentence. For example, the sentence **"Lisa thinks Bart drinks milk on the table"** can be split into **"Lisa thinks"** and **"Bart drinks milk on the table"**. This rule was created to handle sentences like that.

1.3 S -> Wh_P AUX[NUM=?n] NP[NUM=?n] VP

This rule was created to handle the sentences listed below:

- when does Lisa drink the milk on the table
- when do Lisa and Bart wear shoes
- what does Homer drink
- what salad does Bart serve
- whom does Homer serve salad
- whom do Homer and Lisa serve

This rules is interesting because it can handle all questions that start with **"Wh"**. It can also detect incorrect sentence such as **"whom does Homer and Lisa serve"**.

2 Critical Reflection

Overall, the system developed is at satisfactory level. The grammar was able to accept some basic English sentences. However, there are limitation on the concept of time. For example, it accepts the sentence **"Bart laughs yesterday"** even though it is ungrammatical with regard to standard English.

Another interesting grammar rule that can be added in the future is linking words. They can be used to combine two different thoughts into one sentence. For example, **"Lisa likes music. She grew up in a musical family."** can be combined into **"Lisa likes music because she grew up in a musical family."**.

3 Extension

Extension involves creating new rules and lexicons to handle new types of sentences given in the specification. New lexicon such as modal (type of verb that is used to indicate modality) and gerund (verb form that functions as noun) are added. Example sentences that contain the two lexicons are shown in Figure 1 and Figure 2.

```
    Bart likes drinking milk
(S[]
  (NP[NUM='sg'] (ProperNoun[NUM='sg'] Bart))
  (VP[NUM=?n, SUBCAT='nil']
    (VP[NUM='sg', SUBCAT=[HEAD='np', TAIL='nil']]
      (V[NUM='sg', SUBCAT=[HEAD='np', TAIL='nil'], TENSE='pres']
        likes))
    (ARG[CAT='np']
      (NP[NUM=?n]
        (GER_P[] (GER[] drinking) (NP[NUM='sg'] (N[NUM='sg'] milk)))))))
```

Figure 1: Example sentence that contains gerund

```
    Lisa may have seen Bart drinking milk
(S[]
  (NP[NUM='sg'] (ProperNoun[NUM='sg'] Lisa))
  (VP[NUM=?n, SUBCAT='nil']
    (MOD_P[] (MOD[] may) (AUX[NUM='pl'] have))
    (VP[NUM=?n, SUBCAT=[HEAD='np', TAIL='nil']]
      (V[SUBCAT=[HEAD='np', TAIL='nil'], TENSE='pastpart'] seen))
    (ARG[CAT='np']
      (NP[NUM='sg']
        (ProperNoun[NUM='sg'] Bart)
        (GER_P[] (GER[] drinking) (NP[NUM='sg'] (N[NUM='sg'] milk)))))))
```

Figure 2: Example sentence that contains modal

"NUM" is also an important property which handles singular and plural nouns and verbs. it plays an important role in catching out incorrect sentences such as **"Bart laugh"** and **"tables is blue"**.