CMP670 ASSIGNMENT 2 REPORT

Context Free Grammar (CFGs) and Parsing

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Part 1: Language Generation with CFG

In this part a random sentence generator which generates sentences radomly according to defined grammar. The grammar is defined with CFG rule. In my code the grammar is below:

S -> NP VP

PP -> P NP

VP -> V NP | VP PP

NP-> NP PP | "astronomers" | "ears" | "telescope" | "stars"

'P -> "with"

V -> "saw"

“randSentence.py” generates random sentences whcih suit this grammar rule defined inside itself. Some random sentences generated are as below:

- Telescope saw astronomers
- Ears saw astronomers with stars with ears
- Astronomers saw astronomers

As it can be seen a few sentences are meaningfull but most of sentences are meaningless. I think it can be because of defined grammar rule. And also by generating more sentences we can increase the probability of generating meaningful sentences.

After running code one times 10 sentneces are generated and written in “random-setence.txt”.

Part 2: Parsing Sentences with CYK Parser

In this part, a CYK parser that reads the grammar rule from text file and determine the given input sentence is correct according to this grammar. The grammar is defined in “grammar.txt” and the file name that will be read is given in main function of “parse.py”. The grammar is same with the grammar used in part1. The input sentence is given in main function of “parse.py”. The grammar and an example of parsing a sentence is shown below:

Grammar:

S -> NP VP

PP -> P NP

VP -> V NP

VP -> VP PP

NP-> NP PP

NP -> astronomers

NP -> ears

NP-> telescope

NP -> stars

P -> with

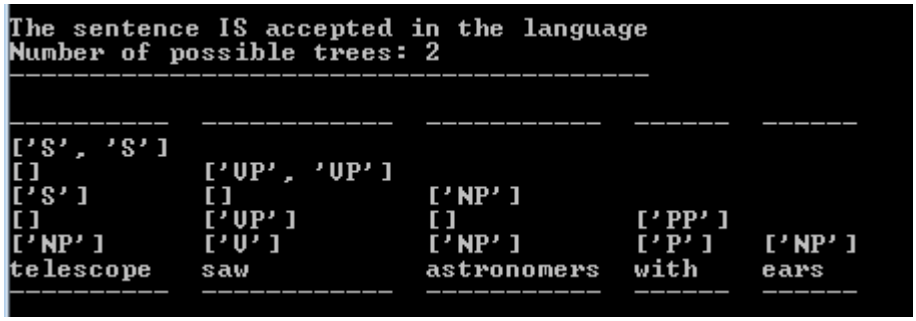
V -> saw

Input sentence : “telescope saw astronomers with ears”

The code that must be changed to try multiple examples is below:

```
if __name__ == "__main__":
    g = Grammar('grammar.txt')
    g.parse('telescope saw astronomers with ears')
    g.print_parse_table()
```

Output :



The sentence that is generated randomly according to the defined grammar rule is parsed and checked whether is correct according to the same rule again, as result is shows that the input sentence is accetped for the langauge.

When we change the sentence so that it does not suit the grammar rule, then we expect the parser say this sentence is not accepted. I change the input sentence as “telescope saw astronomers with with” and the parse result is below: