Project Three Report

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I modified the parse code to allow the program to generate and parse multiple sentences at a time. There is a class field in the genarator.java file that determines the number of sentences generated and parsed. Feel free to play around with it. I have brought it up to 1,000 sentences without a problem. For now I left it at 5 sentences.

Exercises:

- How can you modify the production frequencies so that longer sentences can be generated? Explain how and why.

To increase the chances of generating longer sentences you would increase the production frequencies of the non-terminal or pre-terminal generating rules. This means increasing the production frequencies of the recursive rules. For example if we increase the likelihood of Noun -> Det Noun compared to Noun -> terminal then our generator will be more likely to generate a longer sentence. In our small grammar there aren't many recursive rules but in a larger grammar there would be many.

- Is every sentence generated by the grammar can be parsed by the CYK algorithm using the same grammar? Give your intuition.

Yes. The CYK parser might find more than one viable parse tree but it will always find the original generative tree. This is because the generator is using the same grammar as the CYK parser. Since the parser is able to parse every possible parse tree for a given sentence it is guaranteed to generate the original tree. This might be the only tree the parser finds or the parser might find additional trees as well.

Results:
Five generates sentences in their original trees (from sentence.txt).

```
(ROOT(S(NP(Det every) (Noun(Adj pickled) (Noun sandwich) ) ) (VP(Verb understood)
(NP(Det a) (Noun sandwich) ) ) )  !)

(ROOT(S(NP(Det a) (Noun(Adj fine) (Noun sandwich) ) ) (VP(Verb ate) (NP(Det a) (Noun
pickle) ) ) )  !)

(ROOT(S(NP(Det a) (Noun sandwich) ) (VP(Verb kissed) (NP(Det the) (Noun(Adj delicious)
(Noun sandwich) ) ) ) )  !)

(ROOT(S(NP(Det a) (Noun staff) ) (VP(Verb kissed) (NP(Det every) (Noun(Adj pickled) (Noun
floor) ) ) ) )  !)

(ROOT(S(NP(Det every) (Noun floor) ) (VP(Verb wanted) (NP(Det the) (Noun pickle) ) ) )  !)
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The same sentences in their parse trees after going through the parser (from parse.txt).

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(ROOT (S (NP (Det every) (Noun (Adj pickled) (Noun sandwich) ) ) (VP (Verb understood) (NP
(Det a) (Noun sandwich) ) ) )  !)

(ROOT (S (NP (Det a) (Noun (Adj fine) (Noun sandwich) ) ) (VP (Verb ate) (NP (Det a) (Noun
pickle) ) ) )  !)

(ROOT (S (NP (Det a) (Noun sandwich) ) (VP (Verb kissed) (NP (Det the) (Noun (Adj
delicious) (Noun sandwich) ) ) ) )  !)

(ROOT (S (NP (Det a) (Noun staff) ) (VP (Verb kissed) (NP (Det every) (Noun (Adj pickled)
(Noun floor) ) ) ) )  !)

(ROOT (S (NP (Det every) (Noun floor) ) (VP (Verb wanted) (NP (Det the) (Noun pickle) ) ) )
!)
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