HACETTEPE UNIVERSITY

COMPUTER SCIENCE AND ENGINEERING

CMP670 – STATİSTİCAL NATURAL LANGUAGE PROCESSİNG

ASSIGNMENT-2

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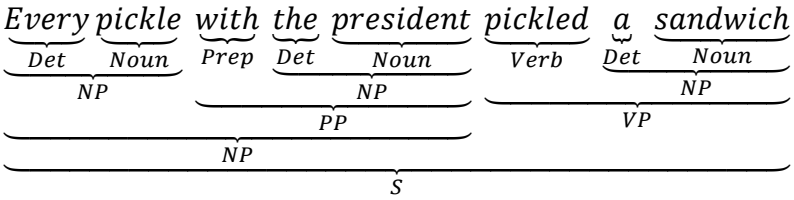
1. Language Generation with CFG

The output of the first program (random-sentence.py) is given below. Each sentence is analyzed separately according to given grammar rules.

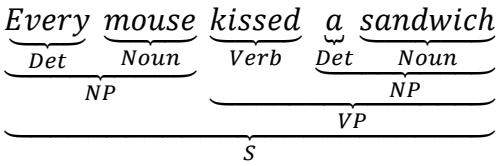
*** 0 . sentence is generated ***

Every pickle with the president pickled a sandwich



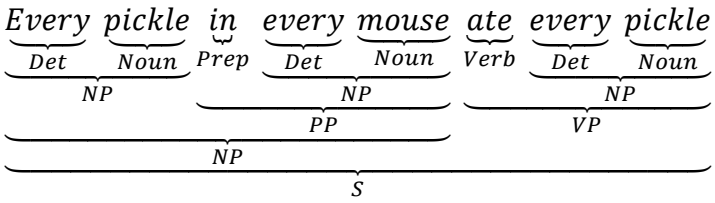
*** 1 . sentence is generated ***

Every mouse kissed a sandwich



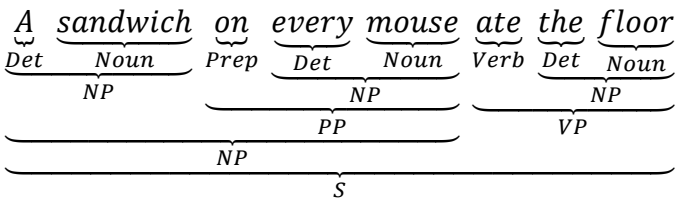
*** 2 . sentence is generated ***

Every pickle in every mouse ate every pickle



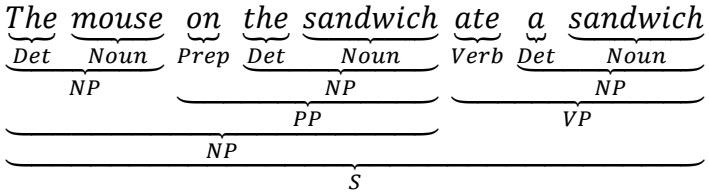
*** 3 . sentence is generated ***

A sandwich on every mouse ate the floor



*** 4 . sentence is generated ***

The mouse on the sandwich ate a sandwich



As it has been seen each sentence is grammatically correct. However, if we checked it according to semantic structure, there is no meaning in many of them. For example, first sentence, 'Every pickle with the president pickled a sandwich,' means that each pickle which has a president or leader pickled a sandwich; that is, there is a sandwich pickle which is senseless. On the other hand, if we consider the last sentences, 'The mouse on the sandwich ate a sandwich,' is very sensible. It means that the sandwich which has a mouse on is eaten by that mouse.

2. Parsing Sentences with CYK Parser

The tried sentences and the output of this sentences in the second program (parse) are given below.

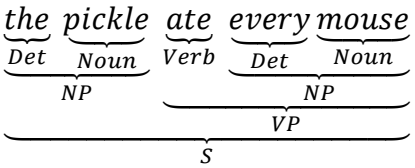
1. sentence:

the pickle ate every mouse

The output of the program:

"The sentence is given that 'the pickle ate every mouse' <u>is grammatically correct</u> according to given grammar rules."

Analysis of the sentence:



Discussion: Given sentence is grammatically correct; however, when we checked the semantically, it has no meaning.

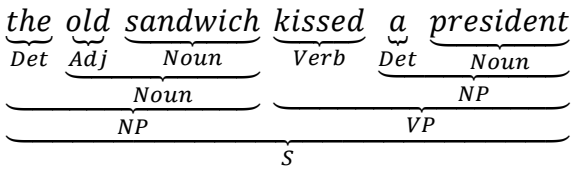
2. sentence:

the old sandwich kissed a president

The output of the program:

“The sentence is given that 'the old sandwich kissed a president' <u>is grammatically correct</u> according to given grammar rules.”

Analysis of the sentence:



Discussion: Similar to previous sentence, even though it forms a correct sentence according to rules, it has no meaning.

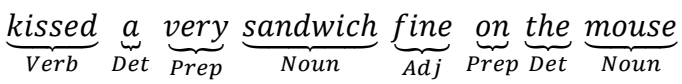
3. sentence:

kissed a very sandwich fine on the mouse

The output of the program:

“The sentence is given that 'kissed a very sandwich fine on the mouse' <u>is not grammatically correct</u> according to given grammar rules.”

Analysis of the sentence:



Discussion: Since noun of the sentences can start with a ***verb*** according to the given grammar rules, this sentence is not grammatically correct.

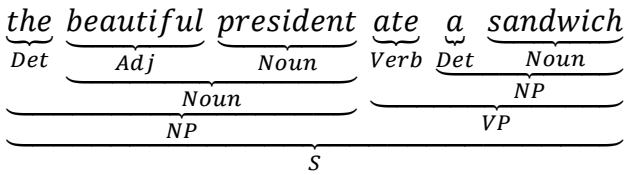
4. sentence:

the beautiful president ate a sandwich

The output of the program:

“The sentence is given that 'the beautiful president ate a sandwich' <u>is grammatically correct</u> according to given grammar rules.”

Analysis of sentence:



Discussion: Despite the first two sentences, this sentences is correct grammatically as well semantically.

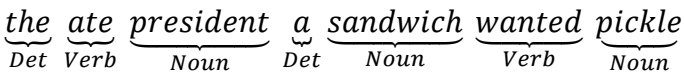
5. sentence:

the ate president a sandwich wanted pickle

The output of the program:

"The sentence is given that 'the ate president a sandwich wanted pickle' <u>is not grammatically correct</u> according to given grammar rules."

Analysis of sentence:



Discussion: According to the rules given in the file, after ***'det'*** must come ***'noun'.*** So, it is not a correct sentence.

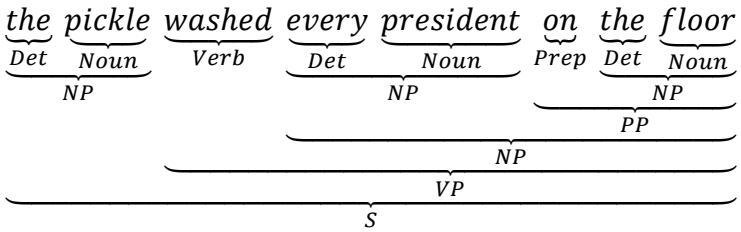
6. sentence:

the pickle washed every president on the floor

The output of the program:

"The sentence is given that 'the pickle washed every president on the floor' <u>is grammatically correct</u> according to given grammar rules."

Analysis of sentence:



Discussion: Even though it generates a correct sentence under the given rules, it has nonsense meaning.

As it is seen from the outputs, the program has only checked the grammars, not checked the semantic structure. Each sentence has been discussed separately.