

Homework 3

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1.1 Algorithm

In order to get the actions by simulating parsing procedure based on a given dependency tree we follow following steps:

1. Define stack(initially empty) and buffer(filled with all the tokens)
2. Dequeue the buffer and push the element into the stack, i.e. Shift action.
3. If number of element is less than two in stack and buffer is not empty repeat 2.
4. Pop 2 elements from stack and check for RightArc(column 7 value $>$ column 1 value) and LeftArc(column 7 value $<$ column 1 value) .
5. Push back the elements if they have more dependencies(for edge case) else ignore them.
6. If number of element is less than two in stack and buffer is empty terminate the algorithm, else, repeat from 2.

Additionally a count of all the incoming and outgoing links is maintained to keep check on dependencies.

1.2 Output for sentences

Output file attached separately.

2 Question

2.1 Actions

1. Shift:
Dequeue one token from Input buffer and add it to stack.
2. Replace
Replace top element from stack with value from the grammar.
3. Combine
Pop 2 elements from stack, combine them according to the grammar and push result to the stack.

2.2 Action Sequence

| Stack | Buffer | Actions |
|--------------|--------------------|---------|
| () | (the, man, sleeps) | Shift |
| (the) | (man, sleeps) | Replace |
| (DT) | (man, sleeps) | Shift |
| (DT, man) | (sleeps) | Replace |
| (DT, NN) | (sleeps) | Combine |
| (NP) | (sleeps) | Shift |
| (NP, sleeps) | () | Replace |
| (NP, VI) | () | Replace |
| (NP, VP) | () | Combine |
| (S) | () | |

Therefore sequence of actions is as follow:
(*Shift, Replace, Shift, Replace, Combine, Shift, Replace, Replace, Combine*)