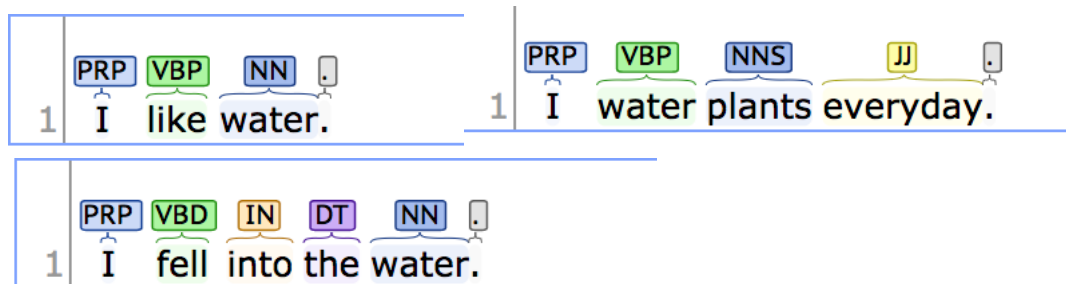
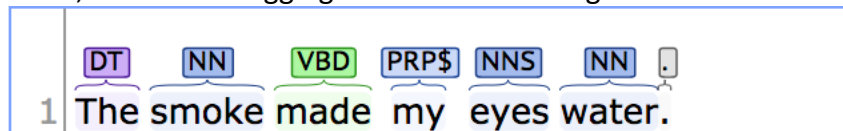


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NLU HW2

4. I like water. -> Here water is a noun.
I water plants everyday. -> Here water is a verb
I fell into the water. -> Here water is a noun.



The smoke made my eyes water. -> Here water is a verb but the POS tagging shows it to be a Noun, hence POS tagging in this case is wrong.



5. Who saw you?

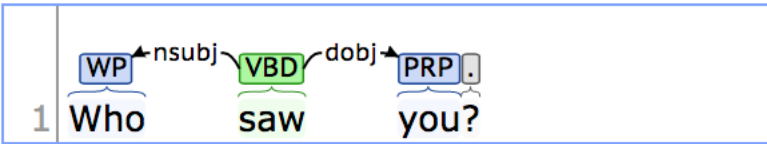
PTB –

Parse

```
(ROOT
  (SBARQ
    (WHNP (WP Who))
    (SQ
      (VP (VBD saw)
        (NP (PRP you))))
    (. ?)))
```

Dependency Phrase -

Basic Dependencies:



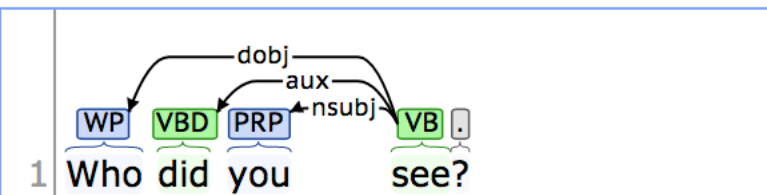
Who did you see?

Parse

```
(ROOT
  (SBARQ
    (WHNP (WP who))
    (SQ (VBD did)
      (NP (PRP you))
      (VP (VB see)))
    (. ?)))
```

Dependency Phrase –

Basic Dependencies:



Here the difference between the first and second sentences have different tags for subject and the object. In the first sentence – “Who” is the subject and “you” is the direct object. In the second sentence – “you” is the subject and “Who” is the direct object. This is clearly visualized in the dependency phrase, whereas PTB doesn’t capture this difference explicitly.

6.

1) The dog ate the pie.

Universal Dependency parse-

Basic Dependencies:



Enhanced Dependencies:



PTB

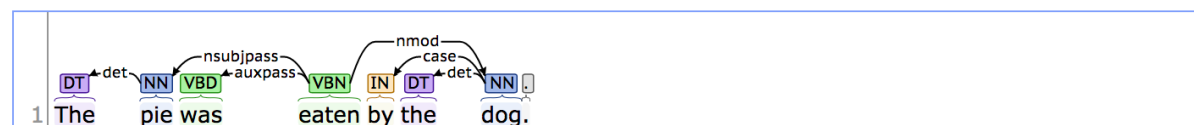
Parse

```
(ROOT
  (S
    (NP (DT The) (NN dog))
    (VP (VBD ate)
      (NP (DT the) (NN pie)))
    (. .)))
```

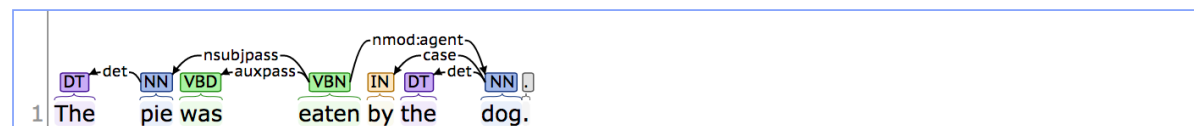
2) The pie was eaten by the dog.

Universal Dependency parse

Basic Dependencies:



Enhanced Dependencies:



PTB

Parse

```
(ROOT
  (S
    (NP (DT The) (NN pie))
    (VP (VBD was)
      (VP (VBN eaten)
        (PP (IN by)
          (NP (DT the) (NN dog))))))
    (. .)))
```

In my view, both the parses give hints about the semantic link between active and passive sentence.

- a. In the UD parse, the passive sentence always has a VBN (verb past participle) and an auxpass link to the verb. Similarly in the PTD, there is always VBN splitting from a Verb Phrase type.
- b. UD parse can be improved by mentioned the nmod:agent to show what job or activity is performed by the agent or to show the relation between activity and the agent. For example the agent dog performed the activity of eating (“eaten”). This will make easy to show semantic link between active and corresponding passive sentence as the nsubj performing the activity in the active sentence will correspond to nmod:agent in the passive sentence.

7. NNPS (plural noun) -> VBP (plural verb)
NP (singular noun) -> VBZ (singular verb)

8.

Q8. I saw the man with the telescope.

Case 1. I saw the man with the telescope.
PTB tree structure:

```
(ROOT
  (S
    (NP (PRP I))
    (VP (VBD saw)
      (NP
        (NP (DT the) (NN man))
        (PP (IN with)
          (NP (DT the) (NN telescope))))))
    (. .)))
```

Dependency Structure:

```
nsubj (saw-2, I-1)
root (ROOT-0, saw-2)
det (man-4, the-3)
dobj (saw-2, man-4)
case (telescope-7, with-5)
det (telescope-7, the-6)
nmod (man-4, telescope-7)
```


Case 2: I saw the man with the telescope.

PTB Structure:

```
( ROOT
  ( S
    ( NP ( PRP I ) )
    ( VP ( VBD saw )
      ( NP ( DT the ) ( NN man ) )
      ( PP ( IN with )
        ( NP ( DT the ) ( NN telescope ) ) ) ) )
    ( . . ) ) )
```

Dependency structure:

```
nsubj( saw-2, I-1 )
root( ROOT-0, saw-2 )
det( man-4, the-3 )
dobj( saw-2, man-4 )
case( telescope-7, with-5 )
det( telescope-7, the-6 )
nmod( saw-2, telescope-7 )
```

9. Yes, because the model has annotations and thus the translation would be better, otherwise the model has to learn the annotations on its own. However, in the case where the annotations given by parser are ambiguous or wrong, example in the water case above in Q4, it is better to just train the data with no annotations.

10. The dependency parse tree can be used to improve the sentiment analysis. For example, a sentence can be divided into parts using a parse tree. Each part can be assigned a positive or negative sentiment and then a cumulative effect can be taken of all the parts. Let's consider a sentence: "The first 30 minutes were boring, but by the end I really enjoyed the lecture". Here, the first half of the sentence has negative sentiment because of the word "boring", but second half is positive because of the word "word", making the overall sentence to have a positive sentiment.

Reference:

<https://www.aaai.org/ocs/index.php/FLAIRS/FLAIRS14/paper/viewFile/7869/7837>

<https://datascience.stackexchange.com/questions/1034/what-features-are-generally-used-from-parse-trees-in-classification-process-in-n>