

Assignment 3

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1. How to run our code?

- Our code is written in Python 3.4
- Since the Python version we use is different from the class, we changed a little bit of the code provided in the class, most of which involves print function. So, please use the code we hand in, not the original one.
- Just run main.py, like 'python main.py', without any arguments. The code will automatically finish all the tasks and output the final files 'parse_dev.out' and 'try.out' in 'PA3_data' subdirectory.
- Since we can't change evaluate.py appropriately to run it in Python 3.4, we evaluated our work in another computer with a command 'python eval_parser.py try.key try.out'. This is not included in our code. But we output the evaluation file 'try.out' in 'PA3_data' subdirectory.

2. Our code will output 'list_rare.counts' in 'PA3_data' directory. It shows all the rules related to '_rare' and their frequencies. The rules and corresponding frequencies are as follows:

```
1      UNARYRULE NP+DET _rare_
31     UNARYRULE ADVP+ADV _rare_
106    UNARYRULE VP+VERB _rare_
76     UNARYRULE NUM _rare_
17     UNARYRULE DET _rare_
2      UNARYRULE CONJ _rare_
2      UNARYRULE WHADVP+ADV _rare_
47     UNARYRULE NP+NUM _rare_
7      UNARYRULE PRT+PRT _rare_
37     UNARYRULE ADV _rare_
8      UNARYRULE NP+PRON _rare_
1      UNARYRULE S+VP+VERB _rare_
7      UNARYRULE PRON _rare_
1      UNARYRULE PP+NOUN _rare_
18     UNARYRULE ADJP+ADJ _rare_
477    UNARYRULE VERB _rare_
526    UNARYRULE ADJ _rare_
1      UNARYRULE PRT _rare_
1      UNARYRULE WHNP+PRON _rare_
7      UNARYRULE . _rare_
1      UNARYRULE NP+VERB _rare_
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2      UNARYRULE  ADVP+ADJ _rare_
39     UNARYRULE  ADP _rare_
2702  UNARYRULE  NOUN _rare_
3      UNARYRULE  NP+ADJ _rare_
17     UNARYRULE  X _rare_
526   UNARYRULE  NP+NOUN _rare_
3      UNARYRULE  NP+X _rare_

```

3. The 3 examples are as follows:

- In the 7th sentence, our tree parses ‘Yaroslavl’ as a verb.
- In the 12th sentence, ‘Docklands’ is parsed as a verb while ‘constructed’ as a noun.
- In the 14th sentence, ‘murder’ is parsed as a verb while ‘last’ as an adj.

Many of the mistakes involve the incorrect assignments of NOUN and VERB. One reason is that the incorrectly parsed words are regarded as _rare_ words due to their low frequencies. We can see from the _rare_ list that the frequencies of NOUN tag is the top tag. And it is much higher than any other tags. So it is very likely to incorrectly parse _rare_ words as NOUN. Another possibility is that some words are lack of sufficient training data while they are very ambiguous. ‘last’, for example, has multiple POS tags. But in the count file, there is only one rule for ‘last’ to be parsed as adj. Actually, it is also commonly parsed as VERB.

4. Final evaluation result

Type	Total	Precision	Recall	F1-Score
ADVP	1	1.000	1.000	1.000
NP	66	0.636	0.742	0.685
PP	25	0.778	0.840	0.808
S	1	0.000	0.000	0.000
SBAR	1	0.000	0.000	0.000
SBARQ	25	1.000	1.000	1.000
SQ	25	0.920	0.920	0.920
VP	18	0.800	0.222	0.348
WHADJP	2	1.000	1.000	1.000
WHADVP	4	1.000	1.000	1.000
WHNP	21	0.900	0.857	0.878
total	189	0.790	0.778	0.784

None