

Assignment1 – SymNLProj: Parsing with GF

The goal of this assignment is to get you acquainted with GF, the Grammatical Framework, and to develop grammars that we can use in the next assignments.

You can develop and submit your solutions either as a collection of GF files or as Jupyter notebook(s). Include some examples to demo your implementation.

Task 1.1 (Fragment 1)

Implement a GF grammar for fragment 1. You should have two concrete syntaxes: one for English and one for PLNQ. This should allow you to translate between English and PLNQ:

```
> parse --lang=Eng "Ethel is happy and it is not the case that Prudence read the book" | linearize --lang=PLNQ  
(happy'(ethel') ∧ ¬read'(prudence', thebook'))
```

Note: You do not have to worry about spaces in the output or the capitalization of the first letter of a sentence. That could be handled by a simple pre-/post-processing step, but we are not going to worry about that here. Furthermore, you can use a limited lexicon (something like three words per category).

Task 1.2 (A larger grammar)

Implement the grammar of three other fragments. We will deal with the logic and semantics construction in the next assignments. The fragments are:

- the **core fragment**: basically a reduced fragment 1; semantics will be in PLNQ,
- the **NP fragment**: adds complex noun phrases to the core fragment; semantics will use first-order logic and description,
- the **PP fragment**: adds prepositional phrases to the core fragment; semantics will be event-based.

The PP fragment should not include the NP fragment (or vice versa).

Details on core fragment Here are a few example sentences that should be supported by the core fragment:

- *Peter doesn't poison Prudence and Prudence laughs*
- *Peter screams*
- *Prudence laughs and Ethel doesn't scream and Peter doesn't scream and Prudence doesn't scream*
- *Ethel poisons Peter*

Ungrammatical sentences like these should be rejected:

- **Prudence laugh*
- **Prudence doesn't doesn't laugh*
- **Prudence watch*
- **Prudence watchs Peter*

Details on NP fragment Here are a few example sentences that should be supported by the NP fragment:

- *Prudence and Prudence watch the cake and every dog doesn't scream and Peter laughs*
- *all dogs watch the crazy cake*
- *some mouse screams*
- *all mice scream*
- *all happy dogs laugh*
- *Ethel and Prudence don't scream*

Ungrammatical sentences like these should be rejected:

- **Ethel and Prudence screams*
- **all mouses scream*
- **Ethel and Prudence doesn't scream*

Details on PP fragment Here are a few example sentences that should be supported by the PP fragment:

- *Peter screams with Ethel*
- *Ethel laughs with Peter behind Prudence*
- *Peter poisons Prudence with Peter*

Basically, the PPs (prepositional phrases) can be attached to the verb phrase. This might seem a bit odd right now, but it will allow us to do simple experiments with event semantics in the next assignment.

Note: We intentionally do not specify the grammar in detail – the examples should be sufficient, and if unsure you can always ask us. If you want to make the grammar more complex, you should do that in a separate GF module (otherwise the next assignment might suddenly become much harder).

Important: The handling of singular and plural forms should be done in the concrete syntax. So you should have a single category for noun phrases and a single category for verb phrases, but in the concrete syntax, they can have additional information etc.

Submission and Points

At the deadline, you have to submit:

1. All your code,
2. a README file that
 - (a) explains briefly how to use your grammar (what files are relevant for what, etc.)
 - (b) shows a few example commands for testing your grammar (if you use Jupyter, you can also put these in your notebook)

You can get up to 100 points for this assignment – 50 for the first problem and 50 for the second problem.