csc485 A2

Wilson Wei-Sheng Hsu

June 2020

Q1

All code/gralej files submitted.

Q1 Implementation Details

Q1 (a) is pretty much copy and pasting the types and rules from handout to my file.

Q1 (b) however has some change, where I added a new type `num` which has subtype: `sg`, `pl`, and also group the types (`n, v, np, vp`) that are affected by number together under another subtype called `has_num` and introduce a feature `number` that tells us whether this type is singular or plural. With the new feature introduced, we require significantly less rules in part (b) compare to part (a). For example: we can combine `S -> NPsg VPsg`, `S-> NPpl VPpl` into `S -> NP VP` with the corresponding features to match. Other than changes to the rules, we also set the features in lexicon to the correct one.

Limitation: Since these two grammar has a fairly simple specification and no recursive rules, it can only form small sentences.

Q1 Testing Strategy

Beside from the four sentences given, I came up with some sentence or phrase of my own to test my grammar.

Test subject-verb agreement:

- fred feeds the dog with the biscuits. **(accepts)**

- biscuits feed the puppies. **(accepts)**

- fred feed the dog **(rejects)**

Test if "the" is added in front of singular nouns: (`fred` is singular NP)

- the dog feed fred with puppies. **(accepts)**

- dog feeds the puppies. **(rejects)**

- the puppies feed dog with biscuits. **(rejects)**

Beside from seeing if my grammar correctly accepts or rejects a sentence or phrase, I also look into the parsed trees to ensure that all feature is set to the correct one (sg or pl).

Q2

All code/gralej files submitted.

Q2 Implementation Details

After watching Lecture 5a video and reading over A2 tutorial video and slides, I tried to imitate the thematic roles and subcat feature for my grammar. After implementing `np -> det n`. I started to list out the possible forms and important points I can think of for `sentence, verb phrase, infinitive clause`:

Sentence:

- `s -> np vp` form.

Verb Phrase:

- `vp -> v` form.

- `vp -> v inf` form.

- `vp -> v np` form. (Only for "promised", "requested")

- `vp -> v np inf` form. (Only for "promised", "requested")

- Main verb in a verb phrase should be in past tense.

- There cannot be anything after "slept".

- "requested" and "promised" can be followed by a noun phrase, and that noun phrase would be the beneficiary for the two verbs.

- If the main verb is "requested" and there is a noun phrase right after, any infinitive clauses' right after that noun phrase has its agent/experiencer points to that noun phrase.

- If the main verb is "promised" and there is a noun phrase right after, any infinitive clauses' right after that noun phrase has its agent/experiencer points to the noun phrase before "promised".

Infinitive Clause:

- `inf -> to v` form.

- `inf -> to v np` form.

- `inf -> to v inf` form. Recursive purposes.

- `inf -> to v np inf` form. Recursive purposes.

- Verb in an infinitive clause should be in present tense.

- A sentence cannot end on "to tend".

- There cannot be anything after "to sleep".

- "to request" and "to promise" can be followed by a noun phrase, and that noun phrase would be the beneficiary for the two verbs.

- If there is contiguous infinitive clauses, the ones behind are the theme of the first one.

- For contiguous infinitive clauses, all agent/experiencer for verbs in those infinitive clauses are the same.

After listing them out, everything became easy.
For infinitive clauses that use "promise, request", beneficiary can be set right away (either empty or the `np` that follows, and therefore beneficiary is discarded from infinitive clauses' subcat at the first step. After discarding `beneficiary` from subcat, we can set the `theme` right away to any infinitive clauses that follows the current one. At last, we can discard one of agent or experiencer, since only one of them is needed for each verb, therefore all there is in our `inf_clause`'s subcat list is [Agent/Experiencer]. Similar idea goes with `vp`'s subcat list.
Then it depends on the main verb for the (`vp`) later on to decide when to bind those agent/experiencer.
Since each verb has different thematic roles, I made a new subtype containing "tend, promise and request", the three that has `agent, theme` (beneficiary is already dealt with), so I do not have to write too many identical rules.

Limitation: My current grammar only deals with grammatically correct sentences that use "to" as `toinf` and not as a preposition. The sentence has to be in past tense and uses only the words listed in the assignment handout.

Testing Strategy

Beside from the four sentences given, I came up with some sentence or phrase of my own to test my grammar.
Tests the tense:

- the teacher slept **(accepts)**
- the teacher sleep **(rejects)**
- to request **(accepts)**
- to promised **(rejects)**

Tests the form:

- to request **(accepts)**
- the slept **(rejects)**
- to tended **(rejects)**
- to teacher **(rejects)**
- the student promised the teacher to sleep **(accepts)**
- the teacher tended to promise the to sleep **(rejects)**

Tests sentence that makes sense and out of scope sentence:

- the student slept to appear **(rejects, makes no sense)**
- the teacher requested to tend **(rejects, makes no sense)**
- the teacher requested to the student **(rejects, out of scope of this assignment)**
- the promise **(rejects, out of scope)**

Tests the contigous infinitive clauses:

- the teacher appeared to tend to promise to sleep **(accepts)**
- the student requested the teacher to promise the student to appear to tend to sleep **(accepts)**

Beside from seeing if my grammar correctly accepts or rejects a sentence or phrase, I also look into the parsed trees to ensure that all the thematic roles are correctly assigned.

CSC485, Summer 2020: Assignment 2

Family name: Hsu
First name: Wilson wei-sheng
Student Number: 1004146970
Date: May 20, 2020

I declare that this assignment, both my paper and electronic submissions, is my own work, and is in accordance with the University of Toronto Code of Behaviour on Academic Matters and the Code of Student Conduct.

Signature: Wilson Hsu