

Natural Language Processing Homework 5

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README

1 (Q3) Simplify

1.1 John and Mary

Given $f(\text{John} = \text{loves}(\text{Mary}, \text{John}))$

- $(\lambda x \text{loves}(\text{Mary}, x))(\text{John})$
- $\text{loves}(\text{Mary}, \text{John})$ or alternatively, depending on semantics, "Mary loves John" or "John loves Mary".

1.2 part b

$\lambda y \text{loves}(\text{Mary}, y)$

1.3 part c

- $(\lambda j \forall x \text{woman}(x) \Rightarrow \text{loves}(x, j))$
- Assuming that we will continue with the given semantic that $\text{loves}(\text{Mary}, \text{John})$ means that John loves Mary.
f : for all x, if x is a woman, then j loves x.
f(John) : for all x, if x is a woman, then John loves x.

1.4 part d

$f = \lambda y \lambda x \text{ Obviously}(y(x))$

In order to construct "Sue obviously loves Mary", let $y = (\lambda x \text{ loves}(\text{Mary}, x))$. This maintains the encapsulation of the λx within the Obviously() semantic.

1.5 part e

$f = \lambda m(\lambda j(\lambda e \text{ act}(e, \text{loving}), \text{lovee}(e, m), \text{lover}(e, j))))$

1.6 part f

$g = \lambda f \lambda y \lambda e f(y)(e), \text{manner}(e, \text{passionate})$

1.7 part g

i. $f = \lambda x \forall y \text{ woman}(y) \Rightarrow x(y)$

ii.

For all y, if y is a woman then y loves Mary.

x loves Mary.

For all y, if y is a woman then x(y).

1.8 part h

i. $g = \lambda f \lambda x \forall y f(y) \Rightarrow x(y)$

ii. "Every"

1.9 part i

i. $\lambda y y(\text{Papa})$

ii.

2 Q4

3 Q5

Included in the submission is the file

question5english.gra

which includes the changes to accommodate for mass nouns.

Also included is a small sentence file (question5english.sen) with three sentences that can be built with buildattrs and one that cannot.

We are able to say that "someone ate the caviar". However, due to semantics, we can't say "someone ate caviar", since mass nouns do have to be able to represent both single and plural nouns in a way. While this sentence works grammatically for plural nouns, it doesn't work for singular nouns.

This grammar works with the sentence "All caviar is delicious".

4 Q6 : english-fullquant.gra

4.1 attr

For *two*, we are ensuring that the two things that we are quantifying are not the same thing, with the *first* and *second* quantifiers on the *dom* and *pred* variables. Otherwise, we can end up counting a given something twice, which in reality then doesn't mean that we have two, but rather that we just counted one thing twice.

The singular *the* has semantics that ensure that, while there are two objects *t* and *u*, the object that this 'the' determinant is operating on is *t* and not on *u*.

For example, let *t* = a book, and let *u* = a book, where *t* != *u*. We want to identify a specific book *t*, and no other book.

The plural *the* has semantics that states that the determinant applies to the exhaustive set of objects of which we want to apply *the* on.

Taking the book example again, we are applying *the* to a whole set of books (within reason, ie. all of the books on a bookshelf).

4.2 ???

Edited in english-fullquant.par.

Used overleaf.com to generate LaTeX document.