SNS COLLEGE OF ENGINEERING

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Department of Artificial Intelligence and Data Science

Course Name – 19AD601 – Natural Language Processing

III Year / VI Semester

Unit 4 – SEMANTICS

Topic 3- Semantic Attachment

Semantic attachment

Extend every grammar rule with `instructions' on how to map components of rule to a semantic representation, e.g.

- S -> NP VP {VP.sem(NP.sem)}
- We'll accomplish this by attaching semantic formation rules to our syntactic CFG rules
- Abstractly

Semantic Attachment

Example:

McDonalds serves burgers

- Associating constants with constituents
  - ProperNoun McDonalds {McDonalds}
  - PluralNoun burgers {burgers}

- Defining functions to produce these from input
  - NP → ProperNoun {ProperNoun.sem}
  - NP → PluralNoun {PluralNoun.sem}
  - Assumption: meaning representations of children are passed up to parents when non-branching (e.g. ProperNoun.sem(X) = X)

Semantic Attachment

Language for semantic attachments

Lambda calculus or Lambda Notation

Extends First Order Predicate Calculus (FOPC) with function application.

- A simple addition to FOPC
- Take a FOPC sentence with variables in it that are to be bound.
- Allow those variables to be bound by treating the lambda form as a function with formal arguments
- λ x P(x): λ + variable(s) + FOPC expression in those variables.

Semantic Attachment

Example

Nouns represented by constants
Prop-n -> AyCaramba {AyCaramba}
N -> meat {meat}

- Phrase semantics is function of SA of children
  - E.g. NP -> Prop-n {Prop-n.sem}
  - NP -> N {N.sem}

- More complex functions are parameterized
  - E.g. Verb -> serves

Semantic Attachment

- More complex functions are parameterized
  - E.g. Verb -> serves

$$\{\lambda x \lambda y \exists e\ Isa(e, Serving) \wedge Server(e, y) \wedge Served(e, x)\}$$

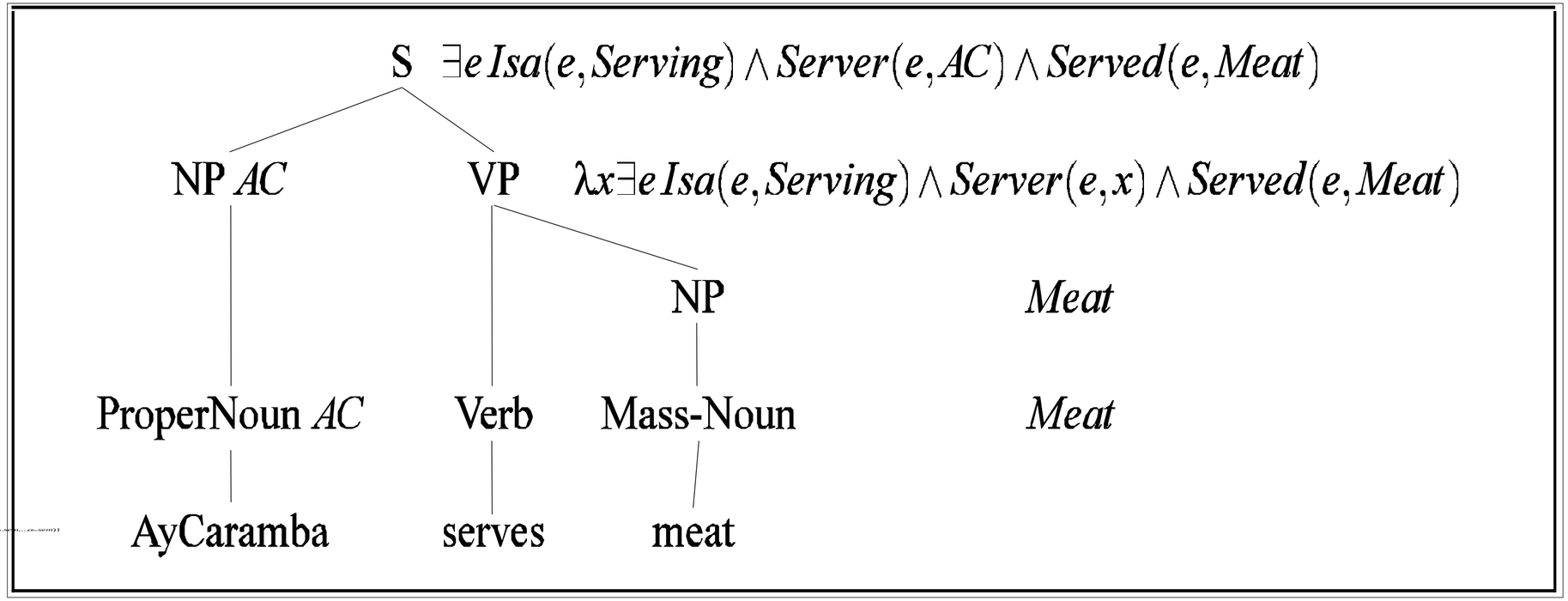
  - VP -> Verb NP {V.sem(NP.sem)}
    - Application=

$$\lambda y \exists e\ Isa(e, Serving) \wedge Server(e, y) \wedge Served(e, Meat)$$

  - S -> NP VP
  - Application=

$$\exists e\ Isa(e, Serving) \wedge Server(e, AyCaramba) \wedge Served(e, Meat)$$

Semantic Attachment



THANK YOU