SNS COLLEGE OF ENGINEERING

Kurumbapalayam(Po), Coimbatore – 641 97
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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 2- Syntax-Driven Semantic analysis

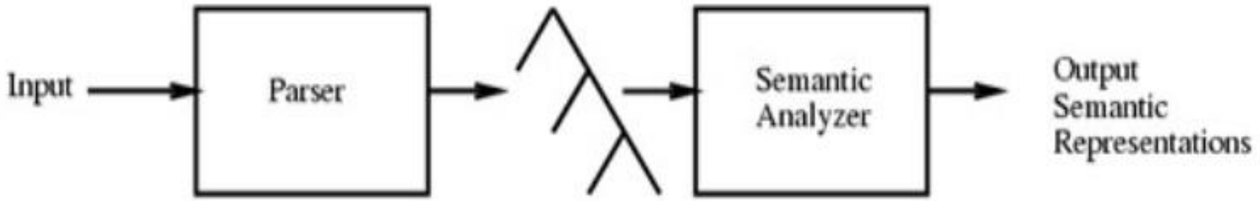
Syntax-Driven Semantic analysis

- One of the approaches to semantic analysis is syntax driven approach.
- It is based on the principle of compositionality. The key idea of the principle of compositionality is that the meaning of a sentence can be composed from the meanings of its parts.
- However, this idea should not be literally interpreted.
- The meaning of a sentence is not just based on the meaning of the words that make it up, but also on the grouping, ordering and relations among the words in the sentence.

Syntax-Driven Semantic analysis

Assumption

- Do not resolve the ambiguities arising from the previous stages.



Semantic Analysis

Syntax-Driven Semantic analysis

Turns out this representation isn't quite as useful as it could be.

Giving(John, Mary, Book)

Better would be one where the "roles" or "cases" are separated out. E.g., consider:

$$\exists x, y\ Giving(x) \wedge Giver(John, x) \wedge Given(y, x)$$
$$\wedge Givee(Mary, x) \wedge Isa(y, Book)$$

Syntax-Driven Semantic analysis

Note: essentially Giver=Agent, Given=Theme, Givee=To-Poss

Predicates

The notion of a predicate just got more complicated…

In this example, think of the verb/VP providing a template like the following

$$\exists w,x,y,z Giving(x) \wedge Giver(w,x) \wedge Given(y,x) \wedge Givee(z,x)$$

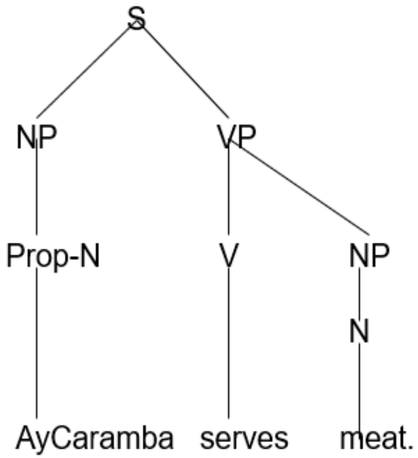
The semantics of the NPs and the PPs in the sentence plug into the slots provided in the template

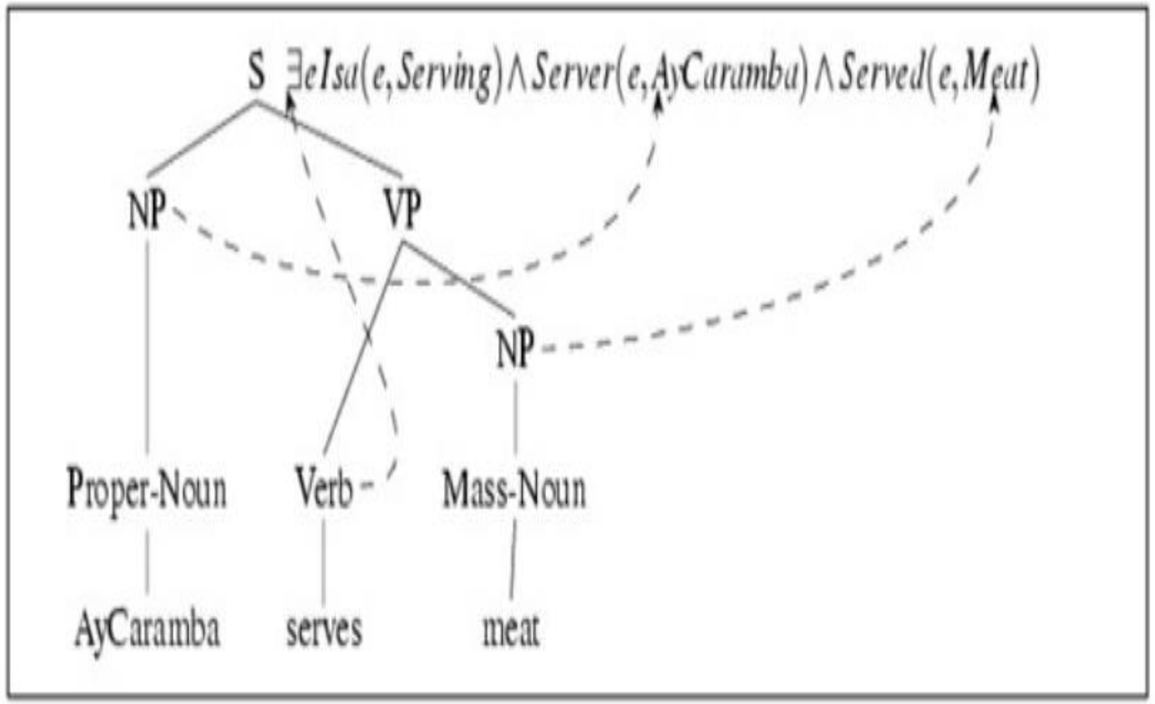
Syntax-Driven Semantic analysis

Example

AyCaramba serves meat.

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





Syntax-Driven Semantic analysis

Example

Goal: Link syntactic structures to corresponding semantic representation to produce representation of the ‘meaning’ of a sentence while parsing it.

Specific vs. General-Purpose Rules

- Don’t want to have to specify for every possible parse tree what semantic representation it maps to
- Do want to identify general mappings from parse trees to semantic representations

One way:

- Augment lexicon and grammar
- Devise mapping between rules of grammar and rules of semantic representation
- Rule-to-Rule Hypothesis: such a mapping exists

THANK YOU