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 3 – SYNTACTIC ANALYSIS

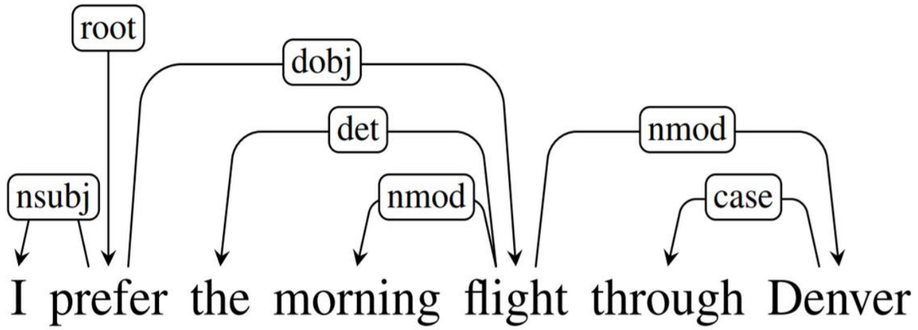
Topic 4- Dependency Grammar

Dependency Grammar

- Dependency Parsing (DP) refers to examining the dependencies between the words of a sentence to analyze its grammatical structure.
- Based on this, a sentence is broken into several components. The mechanism is based on the concept that there is a direct link between every linguistic unit of a sentence.
- These links are termed dependencies.
- Dependency grammar provides a representation of a language as graphs. Nodes are words, and edges are dependencies.
- In this process, it is assumed that there is a direct relationship between each linguistic unit in a sentence.
- The relationships between each linguistic unit, or phrase, in the sentence, are expressed by directed arcs called dependency structures.

Dependency Grammar

- Example – Dependency Structure



Consider the following statement: “I prefer the morning flight through Denver.”

In a written dependency structure, the relationships between each linguistic unit, or phrase, in the sentence are expressed by directed arcs.

The root of the tree “prefer” varies the pinnacle of the preceding sentence, as labelled within the illustration.

Dependency Grammar

Dependency Formalisms

- A dependency structure can be represented as a directed graph G=(V;A), consisting of a set of vertices V, and a set of ordered pairs of vertices

- A, which we'll call arcs. The set of arcs, A, captures the headdependent and grammatical function relationships between the elements in V.

Dependency structures or a dependency tree is a directed graph that satisfies the following constraints:

- They have a single designated root node that has no incoming arcs.
- Each node has one incoming edge except the root node.
- There is a unique path to each node from the root node.

Dependency Grammar

A dependence tag indicates the relationship between two phrases. For example, the word “flight” changes the meaning of the noun “Denver.”

As a result, you may identify a dependence from flight -> Denver, where flight is the pinnacle and Denver is the kid or dependent. It’s represented by nmod, which stands for the nominal modifier.

Each relationship:

- Has one head and a dependent that modifies the head.
- Is labeled according to the nature of the dependency between the head and the dependent.

These labels can be found at Universal Dependency Relations.

Dependency Grammar

Transition-Based Dependency Parsing

In transition-based parsing we'll have a stack on which we build the parse, a buffer of tokens to be parsed, and a parser which takes actions on the parse via a predictor called an oracle.

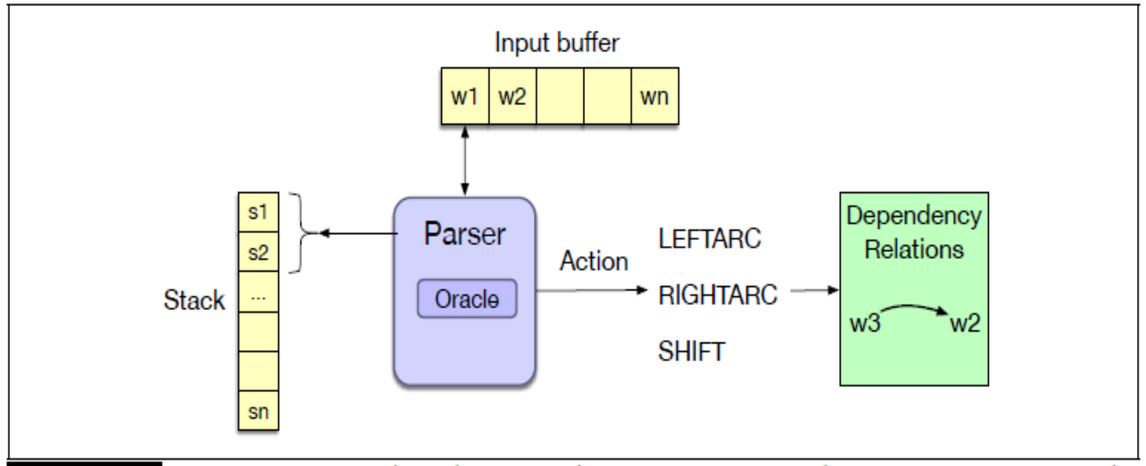


Figure 18.4 Basic transition-based parser. The parser examines the top two elements of the stack and selects an action by consulting an oracle that examines the current configuration.

THANK YOU