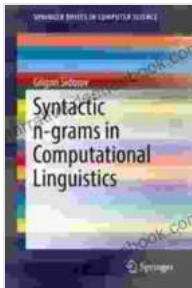


Syntactic Grammars in Computational Linguistics: SpringerBriefs in Computer Science

Syntactic grammars are a fundamental tool in computational linguistics, used to describe the structure of natural languages. They are based on the idea that natural languages can be described in terms of a set of rules that specify how words can be combined to form sentences. These rules can be used to generate new sentences, parse existing sentences, and perform other natural language processing tasks.

There are many different types of syntactic grammars, each with its own strengths and weaknesses. Some of the most common types include:



Syntactic n-grams in Computational Linguistics

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★★★★★ 5 out of 5

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- **Phrase structure grammars:** These grammars use a set of rules to specify how phrases can be combined to form sentences.
- **Dependency grammars:** These grammars use a set of rules to specify how words are related to each other in a sentence.
- **Tree adjoining grammars:** These grammars use a set of rules to specify how trees can be combined to form larger trees.

Syntactic grammars are used in a wide variety of natural language processing applications, including:

- **Natural language generation:** Syntactic grammars can be used to generate new sentences that are grammatically correct and meaningful.
- **Natural language parsing:** Syntactic grammars can be used to parse existing sentences into their constituent parts.
- **Machine translation:** Syntactic grammars can be used to translate sentences from one language to another.

Syntactic grammars are a powerful tool for natural language processing. They provide a way to describe the structure of natural languages and to perform a variety of natural language processing tasks.

Formal Languages

Before we can discuss syntactic grammars, we need to introduce the concept of formal languages. A formal language is a set of strings that can be generated by a set of rules. The rules are typically defined in terms of a formal grammar.

There are many different types of formal grammars, but the most common type is the context-free grammar. A context-free grammar consists of a set of non-terminal symbols, a set of terminal symbols, and a set of production rules. The non-terminal symbols are used to represent the categories of words in the language, the terminal symbols are used to represent the actual words in the language, and the production rules are used to specify how the non-terminal symbols can be combined to form sentences.

For example, the following context-free grammar can be used to generate the language of all sentences that consist of a noun phrase followed by a verb phrase:

S → NP VP
NP → Det N
VP → V NP
Det → the
N → dog | cat | bird
V → barks | meows | sings

This grammar can be used to generate sentences such as "The dog barks", "The cat meows", and "The bird sings".

Generative Grammar

Syntactic grammars are based on the idea of generative grammar. Generative grammar is a theory of language that states that all languages can be described in terms of a set of rules that generate all and only the sentences of that language.

The most well-known generative grammar is Chomsky's Universal Grammar. Universal Grammar is a set of principles that are common to all human languages. These principles include the following:

- All languages have a finite set of rules.

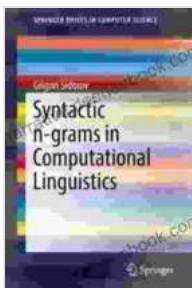
- These rules can be used to generate an infinite number of sentences.
- All sentences are well-formed.
- The meaning of a sentence is determined by its structure.

Syntactic grammars are a way of representing the rules of a generative grammar. They provide a way to describe the structure of sentences and to generate new sentences.

Syntactic grammars are a fundamental tool in computational linguistics. They provide a way to describe the structure of natural languages and to perform a variety of natural language processing tasks.

If you are interested in learning more about syntactic grammars, I recommend the following resources:

- Lecture on syntactic grammars
- Tutorial on syntactic grammars
- Book on syntactic grammars



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