"EFFICIENT CONSTRUCTION OF SUITABLE TREES FOR SYNTACTIC ANALYSIS OF UZBEK SENTENCES "

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Abstract: *This article is devoted to the process of syntactic analysis of the Uzbek language sentence using context-free grammar and algorithms for the effective construction of suitable trees.*

Keywords: *tree-prominent structures, syntactic analysis, semantic analysis, algorithm, binary tree.*

Natural language processing is the general direction of artificial intelligence and mathematical linguistics. It studies the problems of computer analysis and synthesis of natural languages. In general, the process of analyzinga natural language sentence is as follows: splitting the sentece into syntactic units — words and phrases; determining the grammatical parameters of each unit; determining the syntactic relationship between units.

When defining and implementing translations, it is often more convenient to consider a translation as a composition of two simpler mappings. The first of them, called syntactic mapping, associates with each input (a program in the source language) some structure that serves as an argument for the second mapping, called semantic. It is not immediately clear that there should be some kind of structure that helps to translate, but almost always the structure that is useful to give the input program is a labeled tree. Without delving into the theory of linguistics about why this is so, this will require algorithms for efficiently constructing suitable trees for input programs.

As an example of how tree-like structures are built for chains, let's consider the division of any Uzbek sentence into syntactic categories according to grammatical rules.

For example

«*Men qizil gulni ko'rdim»*

it has a grammatical structure represented as a tree in Figure 1. To represent the syntactic connection in a sentence, a binary tree is used, where the leaves are words (terminals) with a set of grammems, and the nodes are rules (preterminals). The root is a sentence (nonterminal).

The non-terminal vertices of this tree are marked with syntactic categories, and the terminal vertices are leaves,

Figure-1.

The tree-like structure of the syntactic analysis of an Uzbek sentence is marked with terminal or terminal symbols, which in this case are Uzbek words. Similarly,

a program written in a programming language can be divided into syntactic components in accordance with the syntactic rules governing this language.

For example, a chain a + b * c it can have a syntactic structure specified by the tree

Figure 2.

The process of finding the syntactic structure of a given sentence is called syntactic analysis or parsing. The syntactic structure of the sentence helps to understand the relationship between the different parts of the sentence. The term syntax of the language will be called a relation that connects some syntactic structure with each sentence of the language . Then the correct sentence of the language can be defined as a chain of characters, a syntactic structure that corresponds to the category <sentences>.

Figure 3.

Arithmetic Expression Tree

The second part of the translation is called semantic mapping; it maps structured input to output, which is usually a program in a machine language. The term language semantics will be called a mapping linking the syntactic structure of each input chain to a chain in some language (possibly in the same one) considered as the meaning of the original chain. The task of language semantics is a very difficult problem that is still far from a complete solution, especially for natural languages such as Uzbek, Cossack or Kyrgyz .

In conclusion even specifying the syntax and semantics of a programming language is not a trivial task. Although there are no universally applicable methods, there are two concepts in language theory that can be used to develop part of the necessary description. Syntactic structures moreover, a context-free grammar provides a description that is accurate enough so that it can be used as part of the definition of the compiler itself.

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