Semantic Web Technologies and Augmented Transition Network (ATN): Cognitive and Linguistic Implementation

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Abstract

In ATN sentences and its constituents are generalized. Special signs are introduced to define categories of words and their parameters. ATN is expedient for the frame analysis system, the result of which can be transited as frame transformations based on both cause-and-consequence relations and the fields of concepts. A frame system can be presented as a tree on the top of which the basic data are accumulated with the sub-frames.

Keywords: frame; database; conception; mini-semantic unit; transition; implicit quantifiers

Introduction

Semantic web technologies perceived as the cluster of information easily processed by machines, must present itself as a database, searched (on the basis of concrete schemes) and used by everyone, when such a necessity arises. One of the approaches aimed at making these technologies work is the conception of "Fuzzy Grammar" (1) based on flexibility of notions and their interrelation with other notions shaped on models reflecting various aspects of the perception of the world. Semantic unity is identified through a logical test, serving to correlate the SCORE scale with the database. Proposition (1) is seen as a semantic unity.

The Aim of the Research

The aim of the research is to present frames in the interdependence and correlation, in which translations and transformations could be interpreted under the sliding angle of associative ties in the complexity of such notions as: agent, action, dynamism of force, cause, etc.

Methodology

In our experimental work we followed Minsky's conception (2) which, in particular, envisages comparative matching, in which the concrete information package is compared with previous frames – the process resulting from the knowledge of the whole frame system proposed and the whole information attached to it. All logical procedures should identify the transformations signalling a concrete frame considered.

Mini-semantic Unit Element

Any mini-semantic unit element suits this or that structure to a certain degree within the scale "zero–one", where "zero" is false and "one" is true. The interrelation of mini-semantic units is presented in the context of various grammatical phenomena (elements, categories, structure) – all of them important in the language's cognitive system.

All the constituents of the fuzzy grammar are looked upon as a semantic multitude, but only some segments of this multitude are analysed. We take a proposition as a mini-semantic unit element. The semantic unit is analysed on the basis of frames. To analyse frames correctly test-conditioning procedures are provided (see procedures presupposed in Table 1).

Number of steps	Procedures
1.	The creation of frames (or frame constituents);
2.	Test-conditioning procedures, correlated with the database;
3.	The results of these procedures are accumulated to the vector measuring the given semantic unit and concrete elementary frame on the scale (from "zero" to "one")

Table 1: Truth conditioning steps and procedures

Procedural Semantics and ATN

Procedural semantics should be aimed at describing all the procedures involved in order to present all the semantic shades in syntactic units (derivational units, phrases, sentences) – attached to semantics, which is based on an augmented transition network (ATN). In ATN there are constituents, from morphological units (as the smallest meaningful ones) to sentences (correlated with underlying propositional structures), the latter exposing predicates and arguments. Special signs are introduced to define categories of words. Resource calls are envisaged in order to provide access to the multitude of categories. The ATN system is aimed at analysing syntactic units in their hierarchy and their interdependence and correlation, with the syntactic interpretation of every unit attached. On the basis of data related to the language structure the text is processed. Having gained the experience in the functioning of this system, we must involve a syntax-related system ensuring its effective functioning and presupposing the limited number of modules in order to prevent any possible misunderstanding.

Data Presenting and Data Search

Data inquiry is necessary in order to attach meanings to all terminal slots: in the computer system they should be either marked or unmarked. Computer processing must take into account the cognitive analysis of the propositional structure of the sentence and its constituents: subject, predicate, object and other proposition-related units. For performing all the procedures, symbols are introduced for nouns (with the marker "animate"), verbs (with the marker "transitive"), grammatical indices ("active" versus "passive"), quantifiers and connectors; symbols – for nuclear underlying syntactic structure (subject, predicate, object) with optional syntactic expansion – semantic components of the propositional structure of the sentence (cause and effect, the aim, local and temporal semantic components). These units in their interrelation are of importance for the linguistic analysis of the proposition. Symbols involved for indicating nuclear underlying structures are in the strict consequence of frames with the frame of two constituents (subject and predicate) on the top.

The process of data search must be controlled to avoid false steps on part of the user, not exceeding the definite number of modules, above each the process of search would be more complicated and less clear and distinct.

Results and Perspectives

As the result of data processing it is possible to elaborate scripts answering the most typical situations; the number of scripts might be unlimited. Above all this, semantic web technologies based on cognitive and linguistic implementation are available for processing in computer systems. The major problem which arises is to envisage formal procedures to avoid deadlocks, i.e., the lack of data which usually prevents further search. So it is important to analyse stereotypes which could be concentrated around a semantic subject-object model, answering everyday situations typical for various social groups. The final aim is to find the most significant referential points closely connected with associative memory and semantically created major data type models.

References

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