Logic, Language and Information - functional and structural integration without competence overstepping

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Abstract. Logic, language and information integration is one of areas broadly explored nowadays and at the same time promising. Authors use that approach in their 8 years long research into Structured Semantic Knowledge Base System (SKB). Natural language processing in the context of logics or information processing is ineffective, not to say pointless in the means of certainty. It is simply caused by the fact, that natural languages has been formed long time ago as the main communication channel, rather than for automatic information processing. Due to that logic has been founded as the universal language of mathematics and formalized communication in more extensive sense. Information processing however brought more sophisticated problems, that mathematics could not smoothly solve, what made a chance for computer science to appear. Studies over artificial intelligence revealed even more complex issues to solve. The unity of those three areas: logics, language and information is a necessity to acquire complementarity and synergy. This approach requires however to take into consideration natural, structural and functional limitations of each of them. As natural languages should not be used to information processing or its storage, logics will never become efficient in human-system communication. Each element has its own fields of implementation and the problem is in building adequate unity.

The solution proposed by the authors has three layers of data storage, named: conceptual, information and language layers. Each of them has its own functionalities. Some of those functionalities are internal operations, whereas others are interfaces between layers. Taking other points of view, the structure of the SKB is quite complex. There are specialized modules: Ontological Module (Ontological Core + Structural Object Module), Behavioral Module, Time and Space Module, Linguistic Module, Semantic Network Module. The last listed module is the most important in the aspect of logics implementation and formalized information processing. This module is based on, extended by authors, semantic network idea, using roles, quantifiers, multiplicity, certainty, error margin over the structure of operators and operands. Taking the modules and the layers described authors created the system where each of the fields represented by logic, language and information is strictly imposed in the structure and functionalities.

Keywords: artificial intelligence, semantic network, ontology, computer linguistics, semantic knowledge base, knowledge base, information processing

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