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Logical Design

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Abstract

The article examines the technology of logical construction as a new direction in the construction of logical justifications and algorithms. An analysis of the logical construction introduced by B. Russell and the evolution of this concept is given. The emergence of the concept of "logic in natural language" is noted. The emergence of an evolutionary chain is highlighted: formal logic; natural language logic; logic of ontologies; logic of thought. The connecting factor in this chain is the theory of "correspondence of meaning." Consideration of the logical construct as an agent-oriented model leads to the concepts of an evolutionary and self-developing algorithm. It is noted that the concept of logic is related to logical construction and information construction. Floridi's "conceptual logic." The article proposes a new model of logical construction applied to the information field. A new term "logical information construction" has been introduced for it. The area of existence of the new model is only the information field. The logical construct is considered as a derivative model of the information construct model. The concept of "logical construction" is defined. In the development of the concept of logical information construction, the term and model "logical informational" construction have been introduced. The content of this technology is revealed. The basis of logical information construction is the "correspondence of meaning". This correspondence includes other types: informational correspondence, semantic correspondence, ontological correspondence, topological correspondence, and others. The introduced models expand the range of tasks of analysis and logical analysis.

Keywords: logic, construction, logical construction, logical constructions, computer science.

1. Introduction

Logical design is a new direction in information modeling, the construction of logical schemes and algorithms. In name, logical construction is related to logic, but it is broader than logical constructions. Logical construction uses different kinds of logics: spatial, algorithmic logic, multivalued logic, modal logic, temporal logic. In terms of content, logical construction uses information modeling. Logical design uses different types of information modeling and information models. In the process of logical construction, it is necessary to apply analysis. Logical construction uses different types of analysis: systemic, dichotomous, oppositional. Logical construction is not a formal logical technology. It uses different kinds of argumentation. Logical construction is closely related to information construction (Tang et al., 2019). In view of this, by analogy with an information construct, it is expedient to introduce the concept of logical construction. Logical construction is closely related to logical construction and defines the

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principles of logical construction. However, the term logical construction was introduced a long time ago in philosophy, logic, and the attempt to write theories. In this paper, a new interpretation of this concept is given. But for comparison, it is expedient to consider the existing concept of logical construction.

2. Discussion and results

Logical constructions in line with B. Russell's approach

The term "logical construction" was used by Bertrand Russell to describe philosophical theories. Since the 1920s, philosophers have debated the meaning of the concept of "logical construction." One interpretation considered this concept as a method in analytic philosophy (Linsky, 1996). Russell contextually defined the expressions of class entities as "incomplete symbols" and the entities themselves as "logical fictions." Russell distinguished logical constructions by explicit definition or contextual definition. Constructs that use contextual definitions are called "incomplete symbols," and constructs like class theory are called "fictions." Russell introduced the concept of "definite descriptions", with which he designated logical constructions, which he describes as "incomplete symbols". The definition of definite descriptions and indefinite descriptions was an example of the philosophical distinction between superficial grammatical form and logical form. In attempting to construct logical constructions, Russell investigated the logic of relations (Russell, 1901a; Russell, 1901b) and the logic of the philosophy of logical atomism. (Russell, 2009)

Russell's writings and ideas laid the foundations for logical construction (Sainsbury, 1980; Stebbing, 1931). These studies have led to the concept of "logical space" (Pinkal, 1989). The development of Russell's ideas led to an analysis of the concepts of "logical structure" and logical comparison (Pinkal, 1989). The concept of "natural language law" has emerged. On the one hand, it can be transformed into a logical formalism, if necessary. These are interrelated on two levels. On the other hand, it is based on semantics and semantic correspondence. The second side can be defined as content logic or correspondence logic. This enables advanced logical analysis in natural language. This makes it possible to construct logical constructions in natural language. This makes it possible to do information modeling in natural language. In this case, it is possible to use information modeling in natural language. In this case, it is important to note that this is not the case. Despite a large number of works, B. Russell has not given a clear definition of the concept of "logical construction" (Linsky, 1996).

The development of the idea of studying the relations of logical analysis and logical constructions (Linsky, 2007) led to the method of replacing all incomplete symbols in sentences with the names of possible objects of cognition. The logical construction was interpreted as part of an epistemologically motivated reduction. Consideration of logical construct as an agent-based model (Sierra-Santibanez, 2014), which studies emergence and evolution, leads to the concepts of an evolutionary and self-evolving algorithm. Further development of informal logic led to the concepts of "ontology logic" and "contingentism" (Stalnaker, 2022).

Multivalued logic and multivalued logical constructions can be noted (Miller et al., 2022). In this way, formal logic evolved into the logic of language, into the logic of ontologies, and then into the logic of thought (Gamut, 2020). The most important in this chain is the conclusion about the need for a theory of "correspondence of meaning." This is reflected in the construction of logical structures. Related to logical construction and informational construction is the concept of L. Floridi's "conceptual logic." According to his view (Floridi, 2019), that "conceptual logic focuses on formal features that do not depend on specific realizations or idiosyncratic contingencies, on types rather than lexemes, on invariants and their relationships, and on transitions between states that can be generalized». However, there is a common drawback in all the considered approaches: the failure to consider the information field and information methods in the construction of logical structures.

Logical informational construct.

In the field of the information field, a logical construction is a derivative of the model of an information structure. An information construct in the information field is defined as a conceptual model that purposefully reflects the phenomenon of reality (system, object, process, regularity) with the help of a system of interrelated, informatively defined parameters

By analogy, a "logical construct" in the information field is defined as a conceptual information model that reflects the phenomenon of explicit/implicit regularity or sequence, as well

as a system of relations or connections using a system of interrelated, informationally determined logical operators and variables. The informational aspect in the description of this model gives grounds to call such a model a "logical information construction".

It should be noted that this model belongs to the field of the information field, it is expressed with the help of an information model. If the informational construct reflects the phenomenon of reality, then the logical construct reflects the patterns and systems of relations. Systems of relations are part of an informational construct that purposefully reflects the object of reality. There's a reflection aspect to that. A logical construct singles out a part of the information structure that characterizes connections, sequences, and a system of relations.

Logical construction is systematic, since it uses systems of interrelated parameters for its construction. In the information field, such systems are called systems of information units (Ozhereleva, 2014).

An information construct displays concepts and conceptual parameters. A logical construct highlights and displays sequences and patterns. That is, it has more abstraction compared to the information construct. The qualitative difference between the logical construct in the information field and the previously existing logical constructs is its representation in the information model. Such a model includes information-defined parameters. In the field of the information field, a logical construction is a logical description of a pattern or structure in the form of an information-logical model.

Logical information construction.

By analogy with information modeling, the concept of logical construction can be introduced. Logical construction allows for argumentation and cognitive logic. Based on the definition of logical information construction, logical information construction should be considered as a process of forming patterns and sequences, including algorithms.

At the same time, it is possible to use the concepts that are accepted in the process of studying logical construction: "logic in natural language", "correspondences of meaning", "conceptual logic", "logical space", logical comparison, logic of content, logic of correspondence, "logic of ontologies". You can use these concepts to organize your design. These concepts can be used to construct logical constructions in a broad sense, not just as expressions of formal logic.

Logical construction is a model Logical information construction is a process in the information field. A close analogue of logical information construction is information modeling. The purpose of logical information construction is to model or construct a logical sequence in a broad sense.

Logical information construction uses an extended interpretation of the concept of algorithm. Algorithms are used not only for calculations, but also for other purposes, such as describing patterns of behavior or reasoning. An algorithm in a broad sense can be thought of as a logical construct. Logical construction is the process of constructing sequences that includes logical reasoning. Logical information construction is an object of modeling and formation. The formed logical information construction is a procedural entity that forms a result from the initial data.

Logical information construction is used to construct a result in the form of a sequence of "logicians natural language", "conceptual logic," correspondence logic, "ontology logic."

The main thing in logical construction is the "correspondence of meaning" between the initial data and the result of the construction. As auxiliary factors, logical information construction uses "logical space", logical comparison, and cognitive logic.

"Correspondence of meaning" includes informational correspondence, semantic correspondence, ontological correspondence. In solving some problems, topological correspondence (mapping), morphological correspondence (spatial modeling) and categorical correspondence are additionally used.

This extended interpretation of the concepts of logical construction makes it possible to solve problems that cannot be solved or described by the methods of formal logic. For example, a well-known model of a cognitive map falls into the definition of a logical construct.

3. Conclusion

In this paper, logical information construction is considered not as an object of philosophy, but as a model of the information and cognitive field. A new interpretation of the term logical constructions in relation to information constructions and the information field is given. The new

concept of logical construction, as a model, covers a large number of objects and helps to compare and systematize them. The new concept of logical construction allows you to create a description of patterns and sequences that have different qualities and categories. The proposed models of logical construction and logical construction make it possible to expand logical analysis in the field of information field and information technologies.

The proposed models of logical construction and logical construction make it possible to apply logical analysis to objects described by different logics: cognitive, conceptual, and multivalued.

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