

Metagrammars Search Method in a Big Data Arrays of Cartographic Information

O. Atakishchev¹, I. Kostogryzov², A. Zaichko³, O. Atakishchev⁴, G. Emelianov⁵

¹Southwest State University, Kursk, Russia

²Research Institute of Applied Mathematics and Certification, Moscow, Russia

³Roscosmos, Moscow, Russia

⁴NFTS Center Capital, Kursk, Russia

⁵Southwest State University, Kursk, Russia

Currently, for solving a wide class applications tasks based on remote sensing data a variety of search methods (SM) are used for different kinds of objects [1,2] in arrays of heterogeneous "big map data" (HBMD) [3].

SM, based on statistical, structural-statistical and algebraic structural review methods of the search space is used to truncate the search space, reducing the complexity of the algorithms which can have structural, temporal and statistical characteristics of the space and the search object.

In [4-5] the particular application the metagrammar theory (MG) is discussed for searching and recognition objects in large arrays of complex data in the framework of structural algebraic approach. At the same time, questions of application metagrammars methods for search various types of structured data objects in a dynamically replenished large arrays of diverse map data in the prior art were not considered.

In order to fill this gap the features of the application of the most promising classes metagrammatics methods to deal with this rather new and complex class of searching problems are discussed in the report.

A common feature of these methods is the use of models and metagrammar methods oriented on recognition and management review of the search space. The metagrammar subclass based on models linked to the grammatical network (GN) systems production rules in a single recursive form describing the lexical, syntactic and semantic structure of the object and the search space is isolated. It is suggested to combine the developed models into a single form which can be represented in the following general way:

$$G_{FO} = \langle \{G_{Oii}\}, \{G_{IIIk}\}, \{H_{mn}\}, F \rangle,$$

$\{G_{Oii}\}, \{G_{IIIk}\}$ — the set of a certain type of GN (in most cases — stochastic fuzzy attribute or attribute) describing the objects and the search space,

F — set of coordination rules GN, determining, as a network, the rules of coordination between GS (a certain kind of control and generating mappings between GN);

$\{H_{mn}\}$ — set of matching rules for grammars included in the above private GN.

The report covers the features of the application, developed methods to parse metagrammatics as a procedural framework of the proposed methods of search. The possibility of usage of structural and statistical features in models of heterogeneous metagrammar cartographically referenced data and remote sensing data source, implement effective procedures for parsing MG to control the direction of interconnected by layers of cells and structures enumeration of the search space .

The concrete examples of the search methods based on MG-formalisms and methods of parsing are observed. In comparison with existing methods on specific tasks MG method is more effective in 3.4-4.2 times while maintaining the required parameters the of risk and increase not more than 1.2-1.3 times in the complexity of the search algorithms.

All this leads to the conclusion about the perspectives of further development metagrammars search methods and their application for specific tasks of searching in a big data arrays of cartographic information.

Bibliography.

1. Stefan Edelkamp, Stefan Schrödl Heuristic search: theory and applications. — Morgan Kaufmann Publishers, 2012. — 712 c.
2. Stewart Russell, Peter Norvig Artificial Intelligence: A Modern Approach Artificial Intelligence: A Modern Approach. - 2nd ed. - M: Williams, 2006. — 1408 c.
3. Google Reveals "Hummingbird" Search Algorithm, Other Changes At 15th Birthday Event.
4. Atakishchev O.I. Metagrammars

applications for information and analytical treatment of monitoring data. Proceedings of SouthWest State University, 2014 №1(52), p.16-27.

5. Atakishchev O.I., Atakishchev A.O. Choices of signs in general classification of search methods. Proceedings of SouthWest State

University, 2014 №3(54), p.23-29.

6. O.I.Atakishchev [et.all] The use of structural linguistic methods for processing of vector geo-information data in the SXF format. Telecommunications and radio engineering. Begell House Inc., USA. vol.62, 2004. P.9-21.