

Foreword

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Abstract—This thematic issue presents articles on various topics in artificial intelligence. Each manuscript submitted has been peer reviewed at least twice. The articles accepted for publication have been substantially revised based on the reviewers' remarks.

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Machine learning has been the last decade's leading trend in artificial intelligence research. The present issue opens with D.V. Vinogradov's survey of research on algebraic machine learning. The main emphasis is on computational complexity as well as on the use of lattice theory and probabilistic algorithms based on Markov chains. Three more articles deal with applications of machine learning methods in various fields. S.A. Shumskii discusses an approach to creating "strong" artificial intelligence and describes the hierarchical architecture of an artificial mind model using deep reinforcement learning. A.O. Iskhakova, D.A. Vol'f, and R.V. Meshcheryakov consider the use of learning methods based on convolutional neural networks to assess the emotional state of a person by their speech. An approach to data preprocessing that increases the training efficiency is proposed. In the article by A.I. Panov, the problem of joint behavior planning and teaching a cognitive agent to make decisions in a dynamic environment is posed and studied. A new algorithm for learning actions in a partially observed external environment is proposed. A model example is described, and the agent operation principle when driving an unmanned vehicle is shown.

Two articles deal with data analysis problems. T.V. Afanasieva proposes an approach to multidimensional time series granulation and applies it to a descriptive analysis of the socio-economic indicators of regions of the Russian Federation. In the article by D.A. Egurnov and D.I. Ignatov, the 3D data triclustering problem is considered in terms of formal concept analysis. Two methods for solving this problem are proposed, and numerical experiments confirming the advantages of these methods are carried out.

K.S. Yakovlev, A.A. Andreichuk, Yu.S. Belinskaya, and D.A. Makarov consider the problem of wheeled robot motion control in an environment with static and dynamic obstacles. A rapid robot trajectory planning method aimed at avoiding collisions with the obstacles is developed. Experimental studies are conducted showing the efficiency of the method.

In the article by O.P. Kuznetsov, the signal attenuation effect in a chain of neural threshold elements with certain relations between the element switching on and off transients is investigated. The conditions for a signal to pass through the circuit are found.

The article by I.S. Proskurkin and V.K. Vanag continues the research on the construction of networks of pulse-coupled spiking microoscillators based on the Belousov–Zhabotinsky oscillating chemical reaction. A network of microoscillators capable of randomly responding to an external signal is constructed and experimentally studied.

The article by A.Ya. Fridman describes an experience in using artificial intelligence methods when creating applied situational modeling and control systems.

It can be seen that the articles in this issue cover topics that are fairly diverse in research methods as well as areas of application, thus showing that artificial intelligence is not limited to machine learning.