

Opening Remarks by the Program Committee of the Conference “Intelligent Data Processing. Theory and Applications” (IDP-2020)

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Abstract—The special issue presents selected papers of the 13th International Conference “Intelligent Data Processing. Theory and Applications” (IDP-2020), held December 8–11, 2020.

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The IDP conference is a forum for researchers and professionals working in the field of intelligent data analysis. It is a platform for discussing, disseminating, and promoting advanced ideas, achievements, and developments. The conference aims at facilitating the exchange of ideas between representatives of science and industry. The conference was organized by representatives of the Russian scientific school of machine learning and is aimed at expanding interaction between Russian and foreign researchers and representatives of high-tech IT business.

For the first time, the IDP conference was held in 1989, and it has been biennial since 2000. In 2020, the conference was held online. Over the years, the field of research has undergone significant changes. Another “winter of artificial intelligence” is over. The problem of “pattern recognition” is gradually expanding and has moved to “machine learning.” Under the influence of exponentially growing volumes of data and the rapidly expanding field of applications, new practical areas have appeared, including data mining (business-intelligence) and big data analytics. With the development of deep neural networks, the term “artificial intelligence” (AI) came back into use and is no longer associated with pipe dreams. Machine learning is now recognized as the mainstream of AI and as a part almost equal to the whole. The umbrella term “data science” has emerged to reflect the increased scope of this field of research, now claiming the right to be called a separate science. Modern trends were regularly reflected in the topics of the IDP conference. The tradition of the conference remains a balanced combination of theoretical mathematical research, engineering developments, and solving practical problems of data mining in various subject areas.

In 2020, the IDP conference was attended by 243 researchers; 115 reports were made in the following scientific areas:

- Biomedical data analysis and bioinformatics.
- Big data analytics.
- Computational complexity and approximate methods.
- Industrial applications of data science.

- Intelligent optimization and efficient management.
- Geospatial data mining.
- Data mining in information security problems.
- Information retrieval and text analysis.
- Machine learning.
- Mathematical modeling methods in data mining.
- Optimization techniques for data mining.
- Neural networks and deep learning.
- Processing and analysis of images and signals; computer vision.

The Program Committee of the conference selected papers fitting into the scope and requirements of the journal “Automation and Remote Control” for publication in a special issue of the journal.

Based on the discussion of the reports, papers were selected for publication in issues 10 and 11 of “Automation and Remote Control.”

This 10th issue of the journal presents papers devoted to the study of strategies for combining feasible solutions to the three-index axial assignment problem, which can be used as a supplement to heuristic or approximate solution algorithms instead of the generally accepted step of choosing a record among the feasible solutions found (L.G. Afraimovich and M.L. Emelin); the problem of data analysis with elements from the Cartesian product of finite partially ordered sets (I.E. Genrikhov and E.V. Djukova); consideration of knowledge-oriented models for constructing routes in complex networks by traveling salesmen representable in the form of pseudo-Boolean optimization models with separable objective functions and constraints by disjunctive normal forms (M.S. Germanchuk, M.G. Kozlova, and V.A. Lukianenko); the study of the method for detecting and identifying anomalous effects in a signal of complex structure based on nonlinear approximating schemes in a dictionary of wavelet packets (V.V. Geppener and B.S. Mandrikova); consideration of approaches to solving convex min-min problems with smoothness and strong convexity in only one of two groups of variables (E.L. Gladin, M. Alkusa, and A.V. Gasnikov); consideration of three new approaches to solving scheduling theory problems, viz., metric, interpolation, and combined (A.A. Lazarev, D.V. Lemtyuzhnikova, and A.A. Tyunyatkin); the study of the problem of optimizing the operation of a queuing system in which the number of working channels of service can be changed in a controlled manner at equispaced control times (V.A. Lapin and A.S. Mandel); the study of the problem of visual odometry by the sequence of video frames formed using a camera directed perpendicularly downward (V.A. Fursov, E.Yu. Minaev, and A.P. Kotov); the study of a new approach to the construction of k-means clustering algorithms, in which the Mahalanobis distance is used instead of the Euclidean distance (Z.M. Shibzukhov); the study of a lightweight noise-canceling filtering neural network that implements the filtering stage in the algorithm for tomographic reconstruction of convolution and backprojection (A.V. Yamaev, M.V. Chukalina, D.I. Nikolaev, A.V. Sheshkus, and A.I. Chulichkov).

Each manuscript was blind peer reviewed by at least two referees and approved for publication by the Program Committee of the conference and the Editorial Board of the journal.