Portfolio of scientific supervisors of the participants of the postgraduate track of the International Olympiad of the Global Universities Association

University	Siberian Federal University
Level of English proficiency	C1
Educational program and field of the educational program for which the applicant will be accepted	2.3.1 Systems analysis, control and information processing, statistics
List of research projects of the supervisor (participation/ leadership)	Head of the project “Fast approximate nearest neighbor search for vector databases” (for the Huawei company, 2024-2025). Head of the project “Adaptive methods for synthesis and design management of components of complex systems” (state assignment of the Ministry of Education and Science of the Russian Federation FEFE-2023-0004, 2023-2025). Project manager “Adaptive methods for synthesis and design management of components of complex systems” (state assignment of the Ministry of Education and Science of the Russian Federation FEFE-2023-0004, 2023-2025). Head of the project “Methods for constructing predictive and recommender systems based on evolutionary calculations, logical and cluster data analysis” (grant of the President of the Russian Federation NSh-421.2022.4 for state support of scientific schools, 2022-2023). Member of the project team “Hybrid methods of modeling and optimization in complex systems” (Mega-grant of the Ministry of Education and Science of the Russian Federation 075-15-2022-1121", 2022-2024).
List of the topics offered for the prospective scientific research	• Algorithms for automatic grouping of industrial products, with the pre-defined efficiency of division into groups • Mathematical models for automatic classification of industrial products • Clustering methods for managing data storage systems • Improved clustering methods in vector database management systems • Evolutionary algorithms for automatic grouping of objects with an unknown number of groups • Parallel automatic grouping algorithms • Evolutionary algorithms for placement theory problems

Research supervisor:

Lev A. Kazakovtsev,

Doctor of Science

Computer and Data Sciences

Supervisor's research interests:

The scope of scientific interests includes (but is not limited to) the development of optimization algorithms and machine learning (artificial intelligence), in particular methods of cluster analysis (automatic grouping of objects), as well as problems of facility location theory.

The scope also includes methods of factor analysis, forecasting theory, logical analysis of data, self-configuring optimization algorithms, in particular evolutionary algorithms, as well as the application of these methods in technical systems, medicine, economy etc.

Research highlights:

Close interaction with research centers in Serbia (University of Nis), Russia (Novosibirsk, Moscow, Kemerovo) and other countries. We expect that work is carried out on behalf of large telecommunications corporations, and therefore work with decent pay is possible.

Supervisor's specific requirements:

Computer programming skills, in any language

Supervisor's main publications:

1. K-means genetic algorithms with greedy genetic operators / L. Kazakovtsev, I. Rozhnov, G. Shkaberina, V. Orlov // Mathematical Problems in Engineering. – 2020. – Vol. 2020. – P. 8839763. – DOI 10.1155/2020/8839763.
2. Self-adjusting variable neighborhood search algorithm for near-optimal k-means clustering / L. Kazakovtsev, I. Rozhnov, A. Popov, E. Tovbis // Computation. 2020. Vol. 8, No. 4. – DOI 10.3390/computation8040090.
3. Reducing the James–Stein Shrinkage Estimator for Automatically Grouping Heterogeneous Production Batches / F. G. Akhmatshin, I. A. Petrova, L. A. Kazakovtsev, I. N. Kravchenko // Journal of Machinery Manufacture and Reliability. 2024. Vol. 53, No. 3. P. 254-262. – DOI 10.1134/S1052618824700043.
4. Mosić, D., Stanimirović, P.S. & Kazakovtsev, L.A. Application of m-weak group inverse in solving optimization problems. Rev. Real Acad. Cienc. Exactas Fis. Nat. Ser. A-Mat. 118, 13 (2024). https://doi.org/10.1007/s13398-023-01512-9.
5. Machine Learning Algorithms of Relaxation Subgradient Method with Space Extension / V. N. Krutikov, V. V. Meshechkin, E. S. Kagan, L. A. Kazakovtsev // MOTOR: International Conference on Mathematical Optimization Theory and Operations Research: Proceedings, Irkutsk, 05–10 июля 2021 года. – Irkutsk: Springer Link, 2021. – P. 477-492. – DOI 10.1007/978-3-030-77876-7_32.

	Results of intellectual activity: 1. Software module for intelligent analysis of electroencephalogram data based on stacking / Egorova L.D., Kazakovtsev L.A., Kuzmich R.I. Certificate of registration of the computer program RU 2023682024, 10/20/20232. 2. Software complex for solving problems of automatic object grouping using massively parallel systems / Orlov V.I., Kazakovtsev L.A., Rozhnov I.P., Shkaberina G.Sh., Masich I.S. Certificate of registration of the computer program RU 2020663109, 10.22.2020. 3. Software module of an evolutionary algorithm of the greedy heuristics method for operational planning in the production of plastic products / Kozlovskaya E.B., Kazakovtsev L.A., Rozhnov I.P., Tsepkova M.I., Kuzmich R.I. Certificate of registration of the computer program RU 2022665385, 08/15/2022.