INTELLIGENT METHODS FOR SOLVING OPTIMIZATION PROBLEMS

Contact details

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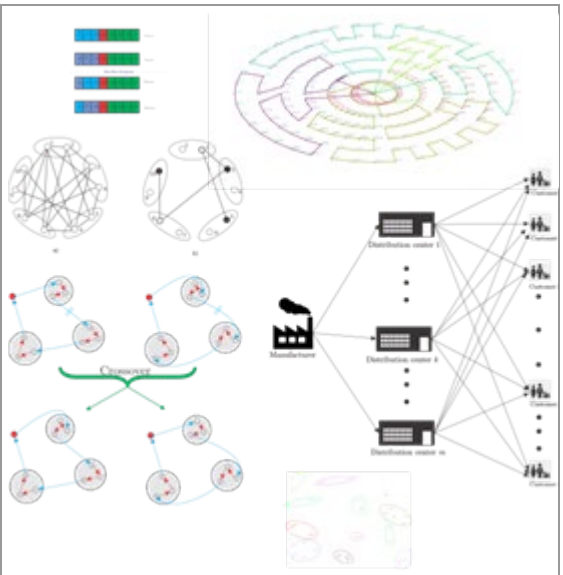

Areas of expertise

Combinatorial Optimization
- Complexity aspects; Mathematical modelling; Exact approximation, heuristic and hybrid algorithms; Relaxation techniques

Metaheuristic Algorithms
- Genetic algorithms; Ant colony optimization; Variable neighborhood search; Memetic algorithms; Hybrid algorithms

Team

Prof. Dr. Petrica Pop Sitar, Prof. Dr. Oliviu Matei, Assoc. Prof. Dr. Corina Pop Sitar, Assoc. Prof. Dr. Andrei Horvat Marc, Assoc. Prof. Dr. Ovidiu Cosma, Assoc. Prof. Dr. Camelia Pintea, Assoc. Prof. Dr. Ioana Zelina, Assoc. Prof. Dr. Cosmin Sabo, Lecturer. Dr. Mara Hajdu- Macelaru, Lecturer Adrian Petrovan.

Representative projects

Collaborative Framework for Smart Agriculture – COSA, Romania's National Recovery and Resilience Plan PNRR-III-C9-2022-I8, under grant agreement 760070, 2023-2026.
"Building Trust in Ecosystems and Ecosystem Components", EUROPEAN COMMISSION Horizon 2020 - Research and Innovation Framework Programme, https://www.bieco.org/ 2020-2023
"Collaborative Environment for Design of AmI enhanced Product-Services Integrating Highly Personalized Innovative Functions with Minimal Ecological Footprint along Life Cycle and of their Production ", ProSeCo, European FP7 project, http://proseco-project.eu/ (2013-2017)
"New hybrid metaheuristic methods for solving network design problems", PN-II-RU-TE-2011-3-0113, www.cunbm.utcluj.ro/meta-hibrid, 2011-2014.
"Hybrid Bi-level Optimization Approaches for Generalized Network Design Problems", bilateral project Romania – Austria, 2014-2015
"Selective graph coloring problem", grant PHC Bosphore 26284RB, EGIDE, 2012-2013.
"Research, development and implementation of organizing the documents", ANCS, 2010-2013.
"Algorithmical methods for solving combinatorial optimization problems", project CEEX, ET34, 2006-2008, http://ceex-et34.ubm.ro

Significant results

The most representative publications of the past 10 years:

1. P.C. Pop, O. Cosma, C. Sabo, C. Pop Sitar, A comprehensive survey on the generalized traveling salesman problem, European Journal of Operational Research, Vol. 314(3), pp. 819-835, 2024.

2. A. Petrovan, P.C. Pop, C. Sabo, I. Zelina, Novel two-level hybrid genetic algorithms based on different Cayley-type encodings for solving the clustered shortest-path tree problem, *Expert Systems with Applications*, Vol. 215, 119372, 2023.
3. P.C. Pop, The generalized minimum spanning tree problem: an overview of formulations, solution procedures and latest advances, *European Journal of Operational Research*, Vol. 283(1), pp. 1-15, 2020.
4. O. Cosma, P.C. Pop and D. Danciulescu, A novel matheuristic approach for a two-stage transportation problem with fixed costs associated to the routes, *Computers and Operations Research*, Vol. 118, art. no. 104906, 2020.
5. O. Cosma, P.C. Pop and D. Danciulescu, A parallel algorithm for solving a two-stage fixed-charge transportation problem, *Informatica*, Vol. 31(4), pp. 681-706, 2020.
6. O. Cosma, D. Danciulescu and P.C. Pop, On the two-stage transportation problem with fixed charge for opening the distribution centers, *IEEE Access*, Vol. 7(1), pp. 113684-113698, 2019.
7. Pintea, C.-M., Calinescu, A., Pop Sitar, C., Pop, P.C., Towards secure & green two-stage supply chain networks, *Logic Journal of the IGPL*, Vol. 27(2), pp. 137-148, 2019.
8. O. Cosma, P.C. Pop and C. Pop Sitar, An efficient iterated local search heuristic algorithm for the two-stage fixed-charge transportation problem, *Carpathian Journal of Mathematics*, Vol. 35(2), pp. 153-164, 2019.
9. P.C. Pop, O. Matei, C. Sabo, A. Petrovan, A two-level solution approach for solving the generalized minimum spanning tree problem, *European Journal of Operational Research*, Vol. 265(2), pp. 478-487, 2018.
10. P.C. Pop, L. Fuksz, A. Horvat Marc and C. Sabo, A novel two-level optimization approach for clustered vehicle routing problem, *Computers & Industrial Engineering*, Vol. 115, pp. 304-318, 2018.
11. A. Horvat Marc, L. Fuksz, P.C. Pop and D. Danciulescu, A decomposition-based method for solving the Clustered Vehicle Routing Problem, *Logic Journal of IGPL*, Vol. 26(1), pp. 83-95, 2018.
12. P.C. Pop, C. Sabo, B. Biesinger, B. Hu and G. Raidl, Solving the Two-Stage Fixed-Charge Transportation Problem with a Hybrid Genetic Algorithm, *Carpathian Journal of Mathematics*, Vol. 33, No. 3, pp. 365-371, 2017.
13. J. Suto, S. Oniga and P.C. Pop, Feature analysis to human activity recognition, *International Journal of Computers, Communications & Control*, Vol. 12, No. 1, pp. 116-130, 2017.
14. O. Matei, D. Contras, P.C. Pop and H. Valean, Design and Comparison of Two Evolutionary Approaches for Automated Product Design, *Soft Computing*, Vol. 20, Issue 11, pp 4257-4269, 2016.
15. P. Pop, O. Matei, C. P. Sitar, and I. Zelina, A hybrid based genetic algorithm for solving a capacitated fixed-charge transportation problem, *Carpathian Journal of Mathematics*, vol. 32, pp. 225-232, 2016.
16. S. Fidanova and P.C. Pop, An improved hybrid ant-local search for the partition graph coloring problem, *Journal of Computational and Applied Mathematics*, Vol. 293, pp. 55-61, 2016.
17. P.C. Pop, C.M. Pintea, C. Pop Sitar and M. Hajdu-Macelaru, An efficient reverse ditribution system for solving a supply chain network design problem, *Journal of Applied Logic*, Vol. 13(2), Part A, pp. 105-113, 2015.
18. C.M. Pintea, P.C. Pop and I. Zelina, Denial jamming attacks on wireless sensor network using sensitive agents, *Logic Journal of IJPL*, Vol. 24(1), pp. 92-103, 2016.
19. C.M. Pintea and P.C. Pop, An improved hybrid algorithm for capacitated fixed-charge transportation problem, *Logic Journal of IJPL*, Vol. 23(3), pp. 369-378, 2015.
20. O. Matei, P.C. Pop, I. Sas and C. Chira, An improved immigration memetic algorithm for solving the heterogeneous fixed fleet vehicle routing problem", *Neurocomputing,* Vol. 150, Part A, pp. 58-66, 2015.
21. P.C. Pop, O. Matei and C.-A. Comes, Reducing the bandwidth of sparse matrix with a genetic algorithm, *Optimization*, Taylor & Francis, Vol. 63(4), pp. 1851-1876, 2014.
22. M. Demange, J. Monnot, P.C. Pop and B. Ries, On the complexity of the selective graph coloring problem in some special classes of graphs, *Theoretical Computer Science*, Vol. 540-541, pp. 82-102, 2014.
23. P.C. Pop and O. Matei, A memetic algorithm for solving the multidimensional multi-way number partitioning problem, *Applied Mathematical Modelling*, Vol. 37, Issue 22, pp. 9191-9202, 2013.
24. P.C. Pop, O. Matei and C. Pop Sitar, An improved hybrid algorithm for solving the generalized vehicle routing problem, *Neurocomputing*, Vol. 109, pp. 76-83, 2013.
25. O. Matei, P.C. Pop and H. Valean, Optical Character Recognition in Real Environments using Neural Networks and k-Nearest Neighbor, *Applied Intelligence*, Vol. 39(4), pp. 739-748, 2013.

The offer addressed to the economic environment

Research & development in core areas	Elaboration of new intelligent methods for solving complex optimization problems. Development of new nature inspired algorithms based on group intelligence, extension and improving the existent methods and hybridizing the metaheuristic algorithms with exact methods based on integer programming.
Research & development in applied fields	Proposal of new intelligent methods for solving complex optimization problems such as network design problems, facility and location problems, transportation problems, scheduling problems, etc. Document and information flows, indexing of documents, knowledge organization, real time applications.
Consulting	The research team has the necessary abilities for providing the necessary consulting activities to the beneficiaries for implementing the research results in the proposed field of research. These abilities are confirmed by the previously obtained results.

Last update on January 2024