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Heuristic Algorithm for the Cardinality Constrained Portfolio Optimization Problem

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In the paper we consider the cardinality constrained portfolio optimization problem. Constraint on the number of assets in portfolio leads to the mixed integer optimization problem. Effective frontier is constructed using the metaheuristic approach by genetic algorithm.

Key words: mixed-integer optimization, genetic algorithms, portfolio optimization problem.

References

1. Chang T.-J., Yang S.-C., Chang K.-J. Portfolio optimization problems in different risk measures using genetic algorithm. *Expert Systems with Applications*, 2009, vol. 36, pp. 10529–10537.
2. Markowitz H. Portfolio selection. *J. of Finance*, 1952, vol. 7, pp. 77–91.
3. Moral-Escudero R., Ruiz-Torrubiano R., Suarez A. Selection of optimal investment portfolios with cardinality constraints. *Proc. of the 2006 IEEE Congress on Evolutionary Computation*, 2006, pp. 2382–2388.
4. Woodside-Oriakhi M., Lucas C., Beasley J. E. Heuristic algorithms for the cardinality constrained efficient frontier. *European Journal of Operational Research*, 2011, vol. 213 (3), pp. 538–550.
5. Holland J. H. *Adaptation in Natural and Artificial Systems: An Introductory Analysis With Applications to Biology, Control, and Artificial Intelligence*. Ann Arbor, MI, USA, University of Michigan Press, 1975.
6. *Search Methodologies: Introductory Tutorials in Optimization and Decision Support Techniques*. Eds. E. K. Burke, G. Kendall. Berlin, Springer, 2005.
7. *Local Search in Combinatorial Optimization*. Eds. E. H. L. Aarts, J. K. Lenstra. Princeton, USA, Princeton Univ. Press, 2003.
8. Beasley J. E. Population heuristics. *Handbook of Applied Optimization*. Eds. P. M. Pardalos, M. G. C. Resende. Oxford, Oxford University Press, 2002, pp. 138–157.
9. Mitchell M. *An Introduction to Genetic Algorithms*. Cambridge, MA, USA, MIT Press, 1996.