article: 1 from 1

Kragujevac Journal of Mathematics
2011, vol. 35, iss. 1, pp. 119-138

article language: English
document type: unclassified

A genetic algorithm for solving multiple warehouse layout problem

Matić Dragan[a], Filipović Vladimir[b], Savić Aleksandar[b], Stanimirović Zorica[b]

[a] Department of Mathematics and Informatics, Faculty of Science, University of Banja Luka, Bosnia and Herzegovina

[b] University of Belgrade, Faculty of Mathematics

e-mail: matic.dragan@gmail.com, vladofilipovic@hotmail.com

PROJECT

Mathematical Modelas and Optimization Methods on Large-Scale Systems (MESTD - 174010)
Security and protection of organization and functioning of the educational system in the Republic of Serbia (basic precepts, principles, protocols, procedures and means) (MESTD - 47017)

ABSTRACT

In this paper we present a genetic algorithm (GA) for solving NP-hard Multiple Warehouse Layout Problem (MLWLP). New encoding scheme with appropriate objective functions is implemented. Specific representation and modified genetic operators keep individuals correct and help in restoring good genetic material and avoiding premature convergence in suboptimal solutions. The algorithm is tested on instances generated to simulate real life problems. Experimental results show that the algorithm reaches most of optimal solutions for problems containing up to 40 item types. The algorithm is successfully tested on large scale problem instances that can not be handled by CPLEX solver due to memory limits.

KEYWORDS

genetic algorithms; warehouse layout; discrete optimization

REFERENCES

[3][GS]	Filipović, V. (2006) Selection and migration operators and Web services in parallel evolutionary algorithms. Faculty of Mathematics, PhD thesis, in Serbian
[EČ] [WOS][2][GS]	Filipović, V. (2003) Fine-grained tournament selection operator in genetic algorithms. *Computing and Informatics*, vol. 22, br. 2, str. 143-161
[GS]	Francis, R.L., Mcginnis, L.F., White, J.A.Jr. (1992) Facility layout and location: An analytical approach. Englewood Cliffs: Prentice-Hall
[CR] [EČ][GS]	Johnson, R.V. (1982) Spacecraft for Multi-Floor Layout Planning. *Management Science*, 28(4): 407-417
[CR] [EČ] [WOS][1][GS]	Kratica, J., Stanimirović, Z., Tošić, D., Filipović, V. (2007) Two genetic algorithms for solving the uncapacitated single allocation p-hub median problem. *European Journal of Operational Research*, 182(1): 15-28
[GS]	Kratica, J. (2000) Parallelization of genetic algorithms for solving some NP-complete problems. Belgrade: Faculty of Mathematics, PhD thesis
[CR] [EČ][4][SC][GS]	Kratica, J., Kovačević-Vujčić, V., Čangalović, M. (2008) Computing strong metric dimension of some special classes of graphs by genetic algorithms. *Yugoslav Journal of Operations Research*, vol. 18, br. 2, str. 143-151
[CR] [EČ] [WOS][1][GS]	Kratica, J.J., Cangalović, M.M., Kovačević-Vujčić, V.V. (2009) Computing minimal doubly resolving sets of graphs. *Computers & Operations Research*, vol. 36, br. 7, str. 2149-2159
[CR] [EČ] [WOS][1][GS]	Kratica, J.J., Kovacevic-Vujcic, V.V., Cangalovic, M.M. (2009) Computing the metric dimension of graphs : by genetic algorithms. *Computational Optimization and Applications*, vol. 44, br. 2, str. 343-361
[CR] [EČ][GS]	Lai, K.K., Xue, J., Zhang, G. (2002) Layout design for a paper reel warehouse: A two-stage heuristic approach. *International Journal of Production Economics*, 75(3): 231-243
[CR] [EČ][GS]	Onut, S., Tuzkaya, U., Dogac, B. (2008) A particle swarm optimization algorithm for the multiple-level warehouse layout design problem. *Computers & Industrial Engineering*, 54(4): 783-799
[GS]	Shouman, M.A., Khater, M., Boushaala, A.A. (2005) Comprehensive survey and classification scheme of warehousing systems. in: Kachitvichyanukul V., Purintrapiban U., Utayopas P. [ed.] International conference on simulation and modeling, 2005, Nakompathon, Thailand, proceedings
[GS]	Stanimirović, Z. (2007) Genetic algorithms for solving some NP-hard hub location problems. Belgrade: Faculty of Mathematics, Ph.D. thesis
[CR] [EČ][GS]	Yang, L., Feng, Y. (2006) Fuzzy multi-level warehouse layout problem: New model and algorithm. *Journal of Systems Science and Systems Engineering*, 15(4): 493-503
[CR] [EČ][GS]	Zhang, G., Lai, K. (2006) Combining path relinking and genetic algorithms for the multiple-level warehouse layout problem. *European Journal of Operational Research*, 169(2): 413-425
[CR] [EČ][GS]	Zhang, G.Q., Xue, J., Lai, K.K. (2002) A class of genetic algorithms for multiple-level warehouse layout problems. *International Journal of Production Research*, 40(3): 731-744
[EČ][GS]	Zhang, G.Q., Lai, K.K. (2010) Tabu search approach for multi-level warehouse layout problem with adjacent constraints. *Engineering Optimization*, 42 (6), 775-790