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An efficient correlation-based storage location assignment heuristic for multi-block multi-aisle warehouses

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References

[1]. R. De Koster, T. Le-Duc, and K. J. Roodbergen, "Design and control of warehouse order picking: A literature review," European Journal of Operational Research, vol. 182, no. 2, pp. 481-501, 2007, doi: 10.1016/j.ejor.2006.07.009.

[2]. R. Q. Zhang, M. Wang, and X. Pan, "New model of the storage location assignment problem considering demand correlation pattern," Computers & Industrial Engineering, vol. 129, pp. 210-219, 2019, doi: 10.1016/j.cie.2019.01.027.

[3]. Y. Zhang, "Correlated storage assignment strategy to reduce travel distance in order picking," IFAC-PapersOnLine, vol. 49, no. 2, pp. 30-35, 2016, doi: 10.1016/j.ifacol.2016.03.006.

[4]. B. Sarkar, M. Tayyab, N. Kim, and M. S. Habib, "Optimal production delivery policies for supplier and manufacturer in a constrained closed-loop supply chain for returnable transport packaging through metaheuristic approach," Computers & Industrial Engineering, vol. 135, pp. 987-1003, 2019, doi: 10.1016/j.cie.2019.05.035.

[5]. K. W. Pang, and H. L. Chan, "Data mining-based algorithm for storage location assignment in a randomised warehouse," International Journal of Production Research, vol. 55, no. 14, pp. 4035-4052, 2017, doi: 10.1080/00207543.2016.1244615.

[6]. R. Santis, R. Montanari, G. Vignali, and E. Bottani, "An adapted ant colony optimization algorithm for the minimization of the travel distance of pickers in manual warehouses," European Journal of Operational Research, vol. 267, no. 1, pp. 120-137, 2018, doi: 10.1016/j.ejor.2017.11.017.

[7]. K. J. Roodbergen, and R. Koster, "Routing Methods for Warehouses with Multiple Cross Aisles," International Journal of Production Research, vol. 39, no. 9, pp. 1865–1883, 2001, doi: 10.1080/00207540110028128.

[8]. M. Calzavara, H. G. Christoph, H. G. Eric, and S. Fabio, "An Integrated Storage Assignment Method for Manual Order Picking Warehouses Considering Cost, Workload and Posture," International Journal of Production Research, vol. 57, no. 8, pp. 2392–2408, 2019, doi: 10.1080/00207543.2018.1518609.

[9]. M. Mirzaei, N. Zaerpour, and R. Koster, "The impact of integrated cluster-based storage allocation on parts-to-picker warehouse performance," Transportation Research Part E: Logistics and Transportation Review, vol. 146, pp. 102207, 2021, doi: 10.1016/j.tre.2020.102207.

[10]. W. Jiang, J. Liu, Y. Dong, and L. Wang, "Assignment of duplicate storage locations in distribution centres to minimise walking distance in order picking," International Journal of Production Research, vol. 59, no. 15, pp. 4457-4471, 2020, doi: 10.1080/00207543.2020.1766714.

[11]. F. T. Chan, and H. K. Chan, "Improving the productivity of order picking of a manual-pick and multi-level rack distribution warehouse through the implementation of class-based storage," Expert Systems with Applications, vol. 38, no. 3, pp. 2686-2700, 2011, doi: 10.1016/j.eswa.2010.08.058.

[12]. M. E. Fontana, and C. A. V. Cavalcante, "Electre tri method used to storage location assignment into categories," Pesquisa Operacional, vol. 33, no. 2, pp. 283-303, 2013, doi: 10.1590/S0101-74382013000200009.

[13]. Y. Yu, R. B. Koster, and X. Guo, "Class-based storage with a finite number of items: Using more classes is not always better," Production and Operations Management, vol. 24, no. 8, pp. 1235-1247, 2015, doi: 10.1111/poms.12334.

[14]. R. J. Mantel, P. C. Schuur, and S. S. Heragu, "Order oriented slotting: a new assignment strategy for warehouses," European Journal of Industrial Engineering, vol. 1, no. 3, pp. 301-316, 2007, doi: 10.1504/EJIE.2007.014689.

[15]. M. Ansari, and J. S. Smith, "Gravity clustering: a correlated storage location assignment problem approach," in 2020 Winter Simulation Conference (WSC), pp.1288-1299, 2020, doi: 10.1109/WSC48552.2020.9384029.

[16]. Y. Yu, and R. B. Koster, "On the suboptimality of full turnover-based storage," International Journal of Production Research, vol. 51, no. 6, pp. 1635-1647, 2013, doi: 10.1080/00207543.2011.654012.
[17]. L. Q. Yang, Y. Zheng, Y. Z. Xu, and Y. J. Bai, "Research on Location Assignment Model of Intelligent Warehouse with RFID and Improved Particle Swarm Optimization Algorithm," in 2017 International Conference on Computer Systems, Electronics and Control, pp. 1262–1266, 2017, doi: 10.1109/ICCSEC.2017.8446952.
[18]. R. Manzini, F. Bindi, E. Ferrari, and A. Pareschi, "Correlated storage assignment and iso-time mapping adopting tri-later stackers. A case study from tile industry," Warehousing in the Global Supply Chain, pp. 373-396, 2012, doi: 10.1007/978-1-4471-2274-6_14.
[19]. P. Wutthisirisart, J. S. Noble, and C. A. Chang, "A two-phased heuristic for relation-based item location," Computers & Industrial Engineering, vol. 82, pp. 94-102, 2015, doi: 10.1016/j.cie.2015.01.020.
[20]. G. Lee, S. H. Chung, and S. W. Yoon, "Two-stage storage assignment to minimize travel time and congestion for warehouse order picking operations," Computers & Industrial Engineering, vol. 139, pp. 106129, 2019, doi: 10.1016/j.cie.2019.106129.
[21]. F. Guerriero, R. Musmanno, O. Pisacane, and F. Rende, "A mathematical model for the Multi-Levels Product Allocation Problem in a warehouse with compatibility constraints," Applied Mathematical Modelling, vol. 37, no. 6, pp. 4385-4398, 2013, doi: 10.1016/j.apm.2012.09.015.
[22]. N. Nahas, M. Nourelfath, and M. Abouheaf, "Optimized Buffer Allocation and Repair Strategies for Series Production Lines," International Journal of Industrial Engineering and Management, vol. 13, no. 4, pp. 239-249, 2022, doi: 10.24867/IJIEM-2022-4-316.
[23]. J. Li, M. Moghaddam, and S. Y. Nof, "Dynamic storage assignment with product affinity and ABC classification—a case study," International Journal of Advanced Manufacturing Technology, vol. 84, no. 9, pp. 2179-2194, 2016, doi: 10.1007/s00170-015-7806-7.
[24]. J. Kim, F. Mendez, and J. Jimenez, "Storage location assignment heuristics based on slot selection and frequent itemset grouping for large distribution centers," IEEE Access, vol. 8, pp. 189025-189035, 2020, doi: 10.1109/ACCESS.2020.3031585.
[25]. M. A. Trindade, P. S. Sousa, and M. R. Moreira, "Ramping up a heuristic procedure for storage location assignment problem with precedence constraints," Flexible Services and Manufacturing Journal, vol. 34, no. 3, pp. 646-669, 2021, doi: 10.1007/s10696-021-09423-w.
[26]. Y. F. Chuang, H. T. Lee, and Y. C. Lai, "Item-associated cluster assignment model on storage allocation problems," Computers & Industrial Engineering, vol. 63, no. 4, pp. 1171-1177, 2012, doi: 10.1016/j.cie.2012.06.021.
[27]. M. E. Fontana, and V. S. Nepomuceno, "Multi-criteria approach for products classification and their storage location assignment," The International Journal of Advanced Manufacturing Technology, vol. 88, pp. 3205-3216, 2017, doi: 10.1007/s00170-016-9040-3.
[28]. V. R. Muppani, and G. K. Adil, "A branch and bound algorithm for class based storage location assignment," European Journal of Operational Research, vol. 189, no. 2, pp. 492-507, 2008, doi: 10.1016/j.ejor.2007.05.050.
[29]. V. R. Muppani, and G. K. Adil, "Efficient formation of storage classes for warehouse storage location assignment: a simulated annealing approach," Omega, vol. 36, no. 4, pp. 609-618, 2008, doi: 10.1016/j.omega.2007.01.006.
[30]. D. M. H. Chiang, C. P. Lin, and M. C. Chen, "Data mining based storage assignment heuristics for travel distance reduction," Expert Systems, vol. 31, no. 1, pp. 81-90, 2014, doi: 10.1111/exsy.12006.
[31]. Y. Li, F. A. Mendez-Mediavilla, C. Temponi, J. Kim, and J. A. Jimenez, "A heuristic storage location assignment based on frequent itemset classes to improve order picking operations," Applied Sciences, vol. 11, no. 4, pp. 1839, 2021, doi: 10.3390/app11041839.
[32]. F. Bindi, R. Manzini, A. Pareschi, and A. Regattieri, "Similarity-based Storage Allocation Rules in an Order Picking System: An Application to the Food Service Industry," International Journal of Logistics Research and Applications, vol. 12, no. 4, pp. 233–247, 2009, doi: 10.1080/13675560903075943.
[33]. X. Xu, and C. Ren, "Research on dynamic storage location assignment of picker-to-parts picking systems under traversing routing method," Complexity, vol. 2020, pp. 1-12, 2020, doi: 10.1155/2020/1621828.
[34]. M. E. Fontana, V. S. Nepomuceno, and T. V. Garcez, "A hybrid approach development to solving the storage location assignment problem in a picker-to-parts system," Brazilian Journal of Operations & Production Management, vol. 17, no. 1, pp. 1-14, 2020, doi: 10.14488/BJOPM.2020.005.
[35]. J. A. Cano, A. A. Correa-Espinal, and R. A. Gomez-Montoya, "An evaluation of picking routing policies to improve warehouse efficiency," International Journal of Industrial Engineering and Management, vol. 8, no. 4, pp. 229-238, 2017, doi: 10.24867/IJIEM-2017-4-123.