

下料问题与运输问题联合优化建模

靳鹏^{1,2}, 左春荣^{1,2}, 杨善林^{1,2}, 马华伟^{1,2}

1. 合肥工业大学管理学院, 安徽 合肥 230009;
2. 过程优化与智能决策教育部重点实验室, 安徽 合肥 230009

Cutting Stock Problem and Transportation Problem Collaboration Optimization Modeling

JIN Peng^{1,2}, ZUO Chun-rong^{1,2}, YANG Shan-lin^{1,2}, MA Hua-wei^{1,2}

1. School of Management, Hefei University of Technology, Hefei 230009, China;
2. Key Laboratory of Process Optimization and Intelligent Decision-making, Ministry of Education, Hefei 230009, China

- 摘要
- 参考文献
- 相关文章

Download: PDF (871KB) HTML (1KB) Export: BibTeX or EndNote (RIS) Supporting Info

摘要 本文研究了考虑子材运输的标准一维下料问题。建立了由生产商负责运输时,标准一维下料与运输协调优化整数规划模型,最小化母材使用成本,子材库存成本及子材运输成本。采用拉格朗日松弛技术对有关约束进行松弛和模型分解,设计基于序列规则和FFD规则的混合启发式算法求解模型。该算法由两部分组成,分别用于求解标准一维下料子问题和卖方运输子问题。通过随机产生的1800个算例,验证模型合理性与算法的有效性。与基于列生成法的两阶段算法解进行比较,平均总成本降低了17.57%,表明集成算法优于两阶段算法。

关键词: 下料 运输 排序 拉格朗日松弛 模式


Abstract: In this paper, a standard one-dimensional cutting stock problem(S1-CSP) considering items transportation problem(ITP) is studied. It is assumed that the manufacturer undertakes products transportation. A coordination optimization model of standard one-dimensional cutting stock problem and items transportation is formulated. The model's objective is to minimize total costs of the stock, items inventory and transportation. Lagrangian relaxation approach is employed to relax a certain type of constraint. A hybrid heuristic method called Lagrangian-based cutting and transportation heuristic based on the methods of column generation, sequential procedure, FFD and subgradient is developed. It consists of two sub-algorithms, one is for S1D-CSP, the other is for ITP. Finally, more than 1800 randomly generated instances have been solved by using the proposed method. The calculation results demonstrate the validity of the proposed model and the corresponding solving method. Compared with two-stage heuristic based on column generation, the hybrid heuristic algorithm reduces cost by 17.57% on average, which suggests that integrated algorithm is superior to two-stage algorithm.

收稿日期: 2011-03-27;

基金资助:国家自然科学基金重点资助项目 (71131002); 国家自然科学基金资助项目(70801024,71171072,71001032)


引用本文:

靳鹏, 左春荣, 杨善林等. 下料问题与运输问题联合优化建模[J] 中国管理科学, 2013,V(2): 91-97

[1] 贾志欣. 排样问题的研究现状与趋势[J]. 计算机辅助设计与图形学学报, 2004, 16(7): 890-97. 

[2] 阎春平, 宋天峰, 刘飞. 面向可加工性的复杂约束状态下一维优化下料[J]. 计算机集成制造系统, 2010, 16(1): 195-201.

[3] 尹震颺, 春平, 刘飞, 曹智慧. 基于零件相似性特征的大规模下料分组优化方法[J]. 计算机辅助设计与图形学学报, 2007, 19(11): 1142-1146.

[4] Yanasse H H, Senne E L F. The minimization of open stacks problem: a review of some properties and their use in pre-processing operations[J]. European Journal of Operational Research, 2010, 203: 559-567. 

[5] Yanasse H H, Lamosa D M. An integrated cutting stock and sequencing problem[J]. European Journal of Operational Research, 2007, 183:

Service

- 把本文推荐给朋友
- 加入我的书架
- 加入引用管理器
- Email Alert
- RSS

作者相关文章

- 靳鹏
- 左春荣
- 杨善林
- 马华伟

- [6] Chandra P, Fisher M L. Coordination of production and distribution planning[J]. European Journal of Operational Research, 1994, 72:503-517. 
- [7] Ertogral K. Multi-item single source ordering problem with transportation cost: Lagrangian decomposition approach[J]. European Journal of Operational Research, 2008, 191: 156-165. 
- [8] Chan F T S, Chung S H, Wadhwa S A. hybrid genetic algorithm for production and distribution [J]. Omega, 2005, 33: 345-355. 
- [9] Gen M, Syarif A. Hybrid genetic algorithm for multi-time period production/distribution planning[J].Computers & Industrial Engineering, 2005, 48: 799-809. 
- [10] Qu W W, Bookbinder J H, Iyogun P. An integrated inventory-transportation system with modified periodic policy for multiple products [J]. European Journal of Operational Research, 1999, 115: 254-269. 
- [11] Zhou S X, Chao Xiuli, Lee C Y. Optimal transportation policies for production/inventory systems with an unreliable and a reliable carrier [J]. Journal of Global Optimization, 2009, 44: 251-271. 
- [12] Bard J F, Nananukul N. A branch-and-price algorithm for an integrated production and inventory routing problem[J]. Computers & Operations Research, 2010, 37: 2202-2217. 
- [13] Fumero F, Vercellis C. Synchronized development of production, inventory, and distribution schedules[J]. Transportation Science, 1999, 33 (3): 330-340. 
- [14] Erjavec J, Gradisar M, Trkman P. Assessment of stock size to minimize cutting stock production costs[J]. International Journal of Production Economics, 2012, 135: 170-176. 
- [15] Wongprakornkul S, Charnsethikul P. Optimization based heuristic approaches for solving an integrated one-dimensional cutting stock-transportation problem[J]. Journal of Mathematics and Statistics, 2007, 3: 142-150. 
- [16] Fisher M L. The Lagrangian relaxation method for solving integer programming problems [J]. Management Science, 1981, 27(1):1-18. 
- [17] Held M, Wolfe P, Crowder H P. Validation of subgradient optimization [J]. Mathematical Programming, 1974, 6 (1): 62-88. 
- [18] Gau T, Waischer G. CUTGEN1: A problem generator for the Standard one-dimensional cutting stock problem[J].European Journal of Operational Research, 1995, 84: 572-579. 

- [1] 李新明, 廖貅武, 刘洋.基于SaaS模式的服务供应链协调研究[J]. 中国管理科学, 2013,(2): 98-106
- [2] 魏涛, 王宜举, 华国伟.带全量价格折扣的供应商最低免运费订货批量研究[J]. 中国管理科学, 2012,20(6): 70-77
- [3] 王海英, 丁华, 张翠华, 王冰, 杨明 .具有时变运输时间的JIT系统批量决策[J]. 中国管理科学, 2012,20(5): 83-89
- [4] 姚升保, 徐敏 .群组决策中三角模糊数互判断矩阵的相容性及方案排序研究[J]. 中国管理科学, 2012,20(5): 152-156
- [5] 张娜, 朱建军.三端点区间数互判断矩阵的排序方法研究 [J]. 中国管理科学, 2012,(2): 152-158
- [6] 王凯, 熊中楷, 熊榆.制造商经销再制造商产品的合作模式研究[J]. 中国管理科学, 2012,(1): 145-151
- [7] 慕银平 唐小我 牛扬.不同折扣券发放模式下的供应链定价与协调策略[J]. 中国管理科学, 2011,19(6): 48-56
- [8] 徐梅 黄超.基于符号时间序列方法的金融收益分析与预测[J]. 中国管理科学, 2011,19(5): 1-9
- [9] 刘建国.多经销商竞争的整车物流联合运输策略[J]. 中国管理科学, 2011,19(5): 58-63
- [10] 滕文波 庄贵军 .基于电子渠道需求预测的渠道模式选择[J]. 中国管理科学, 2011,19(5): 71-78
- [11] 刘舰 俞建宁 李引珍 牛惠民.基于合作性投资和价格策略的多式联运企业协作行为博弈分析[J]. 中国管理科学, 2011,19(5): 147-152
- [12] 张春辉 陈继祥 .考虑内生溢出与R&D投入的创新模式选择 [J]. 中国管理科学, 2011,19(3): 26-32
- 龚艳冰 .模糊C-OWG算子及其在三角模糊数互判断矩阵排序中的应用
- [13] [J]. 中国管理科学, 2011,19(3): 118-122
- [14] 田银华 周志强 廖和平 李石新 .基于BP神经网络的家族企业契约治理模式识别与选择研究[J]. 中国管理科学, 2011,19(1): 159-166
- 李富昌 王勇 张战峰 .考虑第三方物流竞争的第四方物流运输与库存外包决策
- [15] [J]. 中国管理科学, 2010,18(6): 71-81