

A Dynamic Programming Algorithm For Days-Off Scheduling With Sequence Dependent Labor Costs

Elshafei, M; Alfares, HK

SPRINGER, JOURNAL OF SCHEDULING; pp: 85-93; Vol: 11

King Fahd University of Petroleum & Minerals

<http://www.kfupm.edu.sa>

Summary

This paper presents a dynamic programming (DP) algorithm for solving a labor scheduling problem with several realistic days-off scheduling constraints and a cost structure that depends on the work sequence for each employee. The days-off scheduling constraints include the following: (1) each employee is assigned no more than three workdays per week, (2) each employee is assigned at least two consecutive off days per week, and (3) any work stretch cannot exceed four consecutive workdays. The sequence-dependent cost structure assumes that the daily wage of each employee depends on two factors: (1) whether the given workday is weekend or a regular workday, and (2) the sequence of work patterns assigned in previous days. A DP algorithm suited to instances of moderate size is used to determine the optimum work assignments that minimize the total labor cost, while satisfying the work demand under the stated constraints.

References:

1. 2003, MANAGEMENT SERVICES, V47, P3
2. ALFARES HK, 1997, IIE TRANS, V29, P711
3. ALFARES HK, 2003, COMPUT IND ENG, V44, P325
4. ALFARES HK, 2006, INFOR, V44, P175
5. AZMAT CS, 2004, EUR J OPER RES, V153, P148, DOI
6. 10.1016/S0377-2217(03)00105-X
7. BILLIONNET A, 1999, EUR J OPER RES, V114, P105
8. BROWNE J, 1987, P I TRANSP ENG 57 AN
9. BURNS RN, 1998, NAV RES LOG, V45, P839

10. CAPRARA A, 2003, MATH PROGRAM, V98, P445, DOI 10.1007/s10107-003-0413-7
11. COSTA MC, 2006, 4OR-Q J OPER RES, V4, P73
12. DAVIS S, 1981, J OPERATIONS MANAGEM, V1, P165
13. EASTON FF, 1991, MANAGE SCI, V37, P1441
14. ERNST AT, 2004, EUR J OPER RES, V153, P3, DOI
15. 10.1016/S0377-2217(03)00095-X
16. GOULD CH, 1988, J CONSTR ENG M ASCE, V114, P577
17. HUNG R, 1993, IIE TRANS, V25, P82
18. HUNG R, 1996, INT J MANPOWER, V17, P43
19. JONSSON H, 1987, ENG COSTS PRODUCTION, V12, P29
20. KOOLE G, 2005, P 37 C WINT SIM, P576
21. MCCAMPBELL AS, 1996, HUMAN RESOURCE PLANN, V19, P30
22. MOHAMED KA, 2003, LECT NOTES COMPUT SC, V2659, P100
23. NANDA R, 1992, INTRO EMPLOYEE SCHED
24. NARASIMHAN R, 2000, INFOR, V38, P14
25. VASSILACOPOULOS G, 1985, J OPER RES SOC, V36, P517

For pre-prints please write to: elshafei@kfupm.edu.sa; alfares@kfupm.edu.sa