

The unconstrained project scheduling problem with discounted cash flows (max-npv-gpr problem)

Reference: Vanhoucke, M., 2006, “An efficient hybrid search algorithm for various optimization problems”, to appear in Lecture Notes on Computing Science

1. Solve a set of instances

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An Optimal Recursive Search Procedure for the Deterministic Unconstrained Max-npv PSP
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Number of first problem : 1
Number of last problem : 100
Percentage negative cash flows (e.g. 50) : 50
Deadline (expressed as number of time units above critical path) : 5
Interest rate (e.g. 0.01) : 0.01
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2. Input Files

The procedure needs the following inputs:

- A network: The input files can be downloaded from our website (see D1440.zip)
- The percentage negative cash flows: This is a number between 0% (all positive cash flows) and 100% (all negative cash flows). The specific cash flows will be automatically generated by the program from the interval [-500,+500]. For more information, see section “output files”
- The deadline of the project: This deadline is equal to the number of time units above the critical path
- An interest rate: This interest rate is expressed as a fractional number, e.g. 0.01

3. Output Files

1. Output.out: File with the results containing
 - a. The number of the problem instance
 - b. The number of iterations
 - c. The solution value (net present value)
 - d. The required CPU-time (in seconds)
2. Info.out: File with the extra inputs, cash flows, generated by the program. These cash flows can be used to compare other procedures (in order to generate the same instance sets). Each line contains a number, denoting the number of the problem instance, followed by a sequence of numbers, denoting the (positive or negative) cash flows for each activity from 0 (dummy start) to n (dummy end)

4. Remarks

The programs use the networks of De Reyck (1998) (these files have been created for resource-constrained project scheduling problems, but will be used here for the unconstrained project networks). Copy the input networks (D1440.zip) in the same directory as the executables to run the programs. Other networks can be used to run the programs, under the conditions that they have a similar name and extension (D*number*.gpr) and they use the same format to express an activity network with minimal and maximal time-lags. More information can be found at De Reyck, B.: Scheduling Projects with Generalized Precedence Relations - Exact and Heuristic Procedures. Ph.D. Dissertation, Department of Applied Economics, Katholieke Universiteit Leuven, Belgium (1998). The maximum allowable number of activities equals 1000.