

Hard random instances generator for the open shop scheduling problem

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The random instances generator takes the number of jobs n and the number of machine m as input and require three parameters k , p and f . An instance is generated in two steps, the first step creates the $m \times n$ matrix P of processing time with a parameters k . The second step performs a number of perturbations p to the $m \times n$ matrix P in combination with a parameter f .

Parameters k , p and f are described by:

- k : integer number such that the sum of each line of the processing times matrix is equal to k . The value $k \bmod m$ is added to the diagonal of P .
- p : number of perturbations. Such that, for each perturbation, two task's processing times P_{ij} and P_{kl} , $i \neq k$ and $j \neq l$, are randomly selected in P for which is subtracted a fixed value calculated with the parameter f .
- f : a ratio used to calculate the fixed value *to be subtracted* from The maximum *subtractable* processing time. The maximum removable processing time corresponds to the minimum of the two randomly selected tasks P_{ij} and P_{kl} (minus 1 to avoid creating tasks of length 0). A random value (between zero and the difference between *subtractable* and *to be subtracted*) values is also added to that fixed value.

The value removed from p_{ij} and p_{kl} is added to the p_{il} and p_{kj} to keep the sum of all rows equal to k . For numerous generated instances the parameters k , p and f are randomly generated as follows:

- k : random value between $n \times m$ and $n \times m \times 100$
- p : random value between $n \times m$ and $n \times m^2$
- f : random value between 0 and 1

References

- [1] Guéret, C., & Prins, C. (1999). A new lower bound for the open-shop problem. *Annals of Operations Research*, 92, 165–183. <https://doi.org/10.1023/A:1018930613891>.