

# Hiking in the scheduling landscape

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Propositions (stellingen) accompanying the PhD-thesis

# Hiking in the scheduling landscape: Exact and approximation algorithms for parallel machines

Moritz Buchem

1. There exists a polynomial time additive approximation scheme for minimizing makespan, maximizing the minimum machine load and minimizing envy with the range of the processing times,  $p_{\max} - p_{\min}$ , as instance specific parameter. (Chapter 2)
2. A maximum induced bipartite subgraph is not sufficient to find an optimal schedule for minimizing makespan with machine conflicts and unit jobs on general conflict graphs. (Chapter 3)
3. Consider the problem of minimizing weighted squared deviations from distinct due dates with unit processing times. Finding an optimal sequence of jobs for fixed starting times or optimal starting times for a fixed sequence can be done in polynomial time. (Chapter 4)
4. Theoretical lower bounds on optimal solutions used to derive approximation guarantees of policies do not translate well into practice. (Chapter 5)
5. Simplicity pays off. (Chapter 6)
6. A strongly  $\mathcal{NP}$ -hard optimization problem does not admit a fully polynomial time additive approximation scheme, unless  $\mathcal{P} = \mathcal{NP}$ .
7. Ignoring uncertainty comes at a higher cost than what we can gain with even simple techniques which take uncertainty into account.
8. A simple result is not always easy to find.
9. In mathematics and in hiking it is sometimes useful to walk in circles to gain a new perspective of where to go next.
10. The duration of a minute is relative.
11. It is the job that is never started that takes longest to finish.

- J.R.R. Tolkien, The Lord of the Rings

The real challenge, however, is to finish a job once started.