

Publication

Lagrangian Decomposition for Optimal Cost Partitioning

ConferencePaper (Artikel, die in Tagungsbänden erschienen sind)**ID** 4527423**Author(s)** Pommerening, Florian; Röger, Gabriele; Helmert, Malte; Cambazard, Hadrien; Rousseau, Louis-Martin; Salvagnin, Domenico**Author(s) at UniBasel** [Pommerening, Florian](#) ; [Röger, Gabriele](#) ; [Helmert, Malte](#) ;**Year** 2019**Title** Lagrangian Decomposition for Optimal Cost Partitioning**Editor(s)** Benton, J.; Lipovetzky, Nir; Onaindia, Eva; Smith, David E.; Srivastava, Siddharth**Book title (Conference Proceedings)** Proceedings of the 29th International Conference on Automated Planning and Scheduling (ICAPS 2019)**Volume** 29**Place of Conference** Berkeley, CA, USA**Publisher** AAAI Press**Pages** 338-347**ISSN/ISBN** 2334-0843

Optimal cost partitioning of classical planning heuristics has been shown to lead to excellent heuristic values but is often prohibitively expensive to compute. Lagrangian decomposition and Lagrangian relaxation are classical tools in mathematical programming that apply to optimization problems with a special block structure. We analyze the application of Lagrangian decomposition to cost partitioning in the context of operator-counting heuristics and interpret Lagrangian multipliers as cost functions for the combined heuristics. This allows us to view the computation of an optimal cost partitioning as an iterative process that can be seeded with any cost partitioning and improves over time. We derive an any-time algorithm to compute an optimal non-negative cost partitioning of abstraction heuristics without involving an LP solver. In each iteration, the computation reduces to independent shortest path problems in all abstractions. Finally, we discuss the extension to general cost functions.

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