Cost-Partitioned Merge-and-Shrink Heuristics for Optimal Classical Planning

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IJCAI 2020, January 2021

Setting

- optimal classical planning
- A^* search & admissible heuristic

Merge-and-Shrink Framework

- given: planning task Π
- compute a factored transition system F of Π
- repeatedly transform F using label reduction, shrinking and merging
- remaining factors of F induce abstraction heuristics of Π

Operator Cost Partitioning

- given: a set of admissible heuristics for Π
- distribute the operator costs of Π among the heuristics
- summing the cost-partitioned heuristic values is admissible
- here: consider optimal and saturated cost partitioning (OCP and SCP)

Contribution: Interaction of M&S and Cost Partitioning

- transfer operator to label cost partitioning for factored transition systems
- theoretical results on how cost-partitioned M&S heuristics are affected by M&S transformations:
  - exact label reduction preserves heuristic for OCP and SCP
  - merging can only increase OCP heuristic, but have any effect on SCP heuristic
  - shrinking can only decrease OCP heuristic, but have any effect on SCP heuristic

Contribution: Integration of SCP and M&S

- interleaved: compute SCP over F in each iteration of M&S
- offline: collect all factors encountered during M&S and compute (multiple) SCP(s) at the end

Results

- standard IPC benchmarks
- baseline: 905 solved tasks
- offline SCPs: 915
- interleaved SCPs: 933

The End

- come discuss with us at our poster
- find more details in the long video and the paper
- thank you for listening!