Computing Domain Abstractions for Optimal Classical Planning with Counterexample-Guided Abstraction Refinement

Raphael Kreft, Clemens Büchner, Silvan Sievers, Malte Helmert
Setting: Optimal Classical Planning in the SAS+ Formalism
Compute Abstractions with **Counterexample-Guided Abstraction Refinement**
State

Abstract State

Projection

Abstract Goal State

LR  LL

TR  TL

RR  RL

LR

TR

RR  RL

LL

TL
CEGAR for Domain Abstractions

- Flaws are atoms (not variables as in Projections)
- Two strategies for choosing Flaws:
  - Rand
  - MinGrow

Constructing Collections

- Multiple Sequential CEGAR runs
- Combined using Saturated Cost Partitioning
- Using different diversification strategies:
  - Blacklisting
  - Initialisation
Domain Abstractions

Sweet spot between projections and cartesian abstractions?
<table>
<thead>
<tr>
<th></th>
<th>Rand - GI</th>
<th>MinGr - GI</th>
<th>PDB</th>
<th>Cartesian</th>
<th>coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rand - GI</td>
<td>-</td>
<td>14</td>
<td>28</td>
<td>38</td>
<td>1142.4</td>
</tr>
<tr>
<td>MinGr - GI</td>
<td>14</td>
<td>-</td>
<td>32</td>
<td>41</td>
<td>1139.6</td>
</tr>
<tr>
<td>PDB</td>
<td>13</td>
<td>9</td>
<td>-</td>
<td>33</td>
<td>1091.5</td>
</tr>
<tr>
<td>Cartesian</td>
<td>7</td>
<td>8</td>
<td>13</td>
<td>-</td>
<td>1070.4</td>
</tr>
</tbody>
</table>