Landmarks

PAH (Planning and Games)

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Planners & Heuristics

FF	FF (relaxed plan) heuristic
FD-MS	Merge&Shrink heuristic
FD-LMCut	LM-Cut heuristic
LAMA	FF + Landmark heuristic
mercury	Red-Black relaxation

Quiz

What is an action landmark ?

1. An action which is used in at least one plan.
2. An action which must be used in all plans.
3. All actions in the optimal plan.

Quiz

What is an action landmark ?

1. An action which is used in at least one plan.
2. An action which must be used in all plans.
3. All actions in the optimal plan.

Answer:

2. An action which must be used in all plans.

Quiz

What is a disjunctive action landmark ?

1. A set of actions from which at least one must be used in all plans.
2. A set of actions which all must be used in all plans.
3. A set of actions from which at least one must be used in all optimal plans..

Answer:

Quiz

What is a disjunctive action landmark ?

1. A set of actions from which at least one must be used in all plans.
2. A set of actions which all must be used in all plans.
3. A set of actions from which at least one must be used in all optimal plans..

Answer:

1. A set of actions from which at least one must be used in all plans.

Quiz

A landmark-based heuristic

1. is allways admissible.
2. is never admissible.
3. can be either admissible or inadmissible.

Answer:

...

Quiz

A landmark-based heuristic

1. is allways admissible.
2. is never admissible.
3. can be either admissible or inadmissible.

Answer:

3. can be either admissible or inadmissible.

LM-Cut

- Admissible landmark-based heuristic
- Lower estimate of optimal relaxed plan
- Using disjunctive action landmarks
  - Set of actions from which at least one must be in each relaxed plan
- Note: add *i* and *g* facts and respective 0-cost actions

LM-Cut – The idea

- Find preconditions which justify the cost of actions
  - Using h_{max}
- Construct a justification graph using only those preconditions
- Find a cut in the justification graph
  - The cut forms a disjunctive action landmark
- Discount the cost of the least-cost action in the landmark from the costs of all actions in the landmark
  - Results in cost-partitioning
- Start all over again (with the modified costs)
  - Until $h_{max}(g)=0$

LM-Cut – The cut

- In the justification graph J
- Find all facts *p* from which *g* is reachable by a 0-cost path → Vg
- Find all facts *p*' reachable from *i* without visiting a fact in *V**
- Edges between facts in *V** and *Vg* form the cut