

GENERATING LANDMARKS USING AND/OR GRAPHS

1. Background

PLANNING

Landmarks - States that are true at some point in a plan.

Heuristics - Functions that guide decision making.

Planning graphs - Used for calculating heuristics in planning problems.

Delete-relaxation - Modifying the planning graph to remove delete actions.

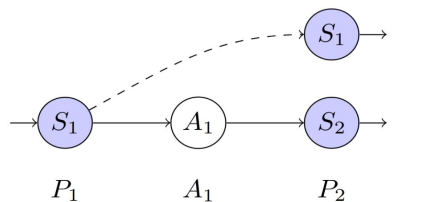
AND/ OR graphs - Graph type that represents conjunctions and disjunctions now applied to plan-graphs

KNOWLEDGE GAP

What effects do heuristics have on the effectivity of AND/OR landmarks for planning?

- Which domains are known to be effective?
- How to measure effectivity and quality?
- Which new domains are suitable?

2.1 Methodology : Graph conversion



Landmarks are found by finding a subgraph that respects ordering.

Results in same landmarks as generated by plangraph propagation

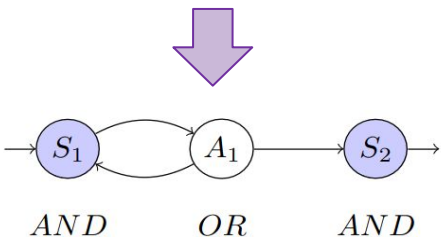


Figure 1: A planning graph with states S_1 , S_2 and action A_1 converted to an AND/OR graph.

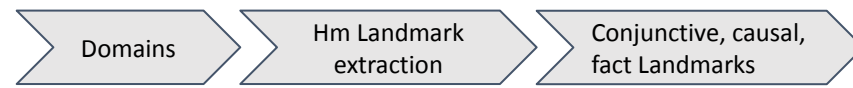
How does the Hm-Landmark extraction algorithm perform on recent planning domains?

2.2 Methodology: Retaining Delete information

Goal: Transforming problem to retain delete information

- Π_m : Compute the HM cost of problem Π by transforming it into Π_m , where facts represent sets of size m or less.
- Actions in Π_m are adjusted to include facts that may persist after application.
- Actions in Π generate a set of actions in Π_m with preconditions incorporating additional facts.

3. Experimental setup



Experiment 1: determine baseline with older domains (IPC 2008)

- Airport
- Blocksworld
- Depot
- ...

Experiment 2 : measuring effectivity on newer domains (IPC 2018)

- Folding
- Labyrinth
- Recharging Robot
- ...

5. Results

Results are still to be determined at this point in time...

5. Conclusions

1. H-m landmark generation is currently implemented in FastDownward and LAMA planners
2. Method currently known to be most effective on the following domains (IPC 2008) :
 - o Freecel
 - o Logistics -2000
 - o Woodworking
 - o Blocksworld

6. Limitations & Future work

- Structure and complexity of modern planners
- Modern domains are made for different planners



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