Re-evaluating the Performance of the Full Landmark Extraction Algorithm

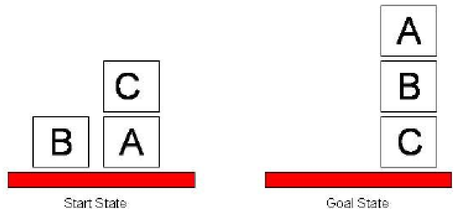
Author
Noah Tjoen

Responsible Professor
Sebastijan Dumančić

Supervisor
Issa Hanou

1. Background

Planning problem: task to reach a goal state from initial state by following some planning algorithm

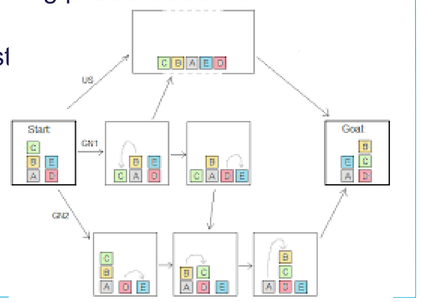


Landmarks: propositional statements or actions that must be true at any point in a valid plan

Domain: set of objects and actions which form planning problem, either logical (boolean values) or numerical (numbers & boolean values)

Planning graph: graph showing possible actions for each state, ultimately ending in a goal st

Relaxed Planning graph: version of planning graph which removes delete operations.



2. Research questions

Main question: *How does the performance of the full landmark extraction algorithm, in terms of the number of landmarks identified, compare to other landmark algorithms across different domains?*

Sub questions:

- Is a higher number of landmarks always wanted?
- Which domains are suited for testing the performance and why?

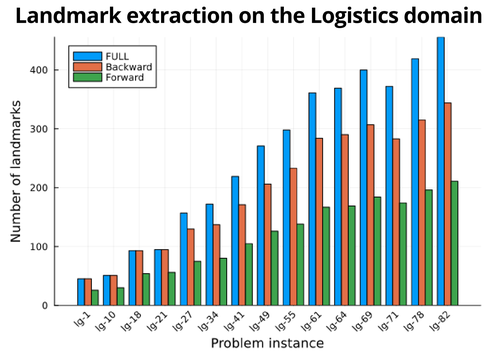
3. Methodology

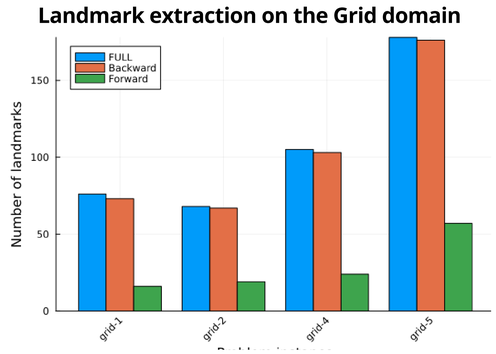
FULL, a four step algorithm:

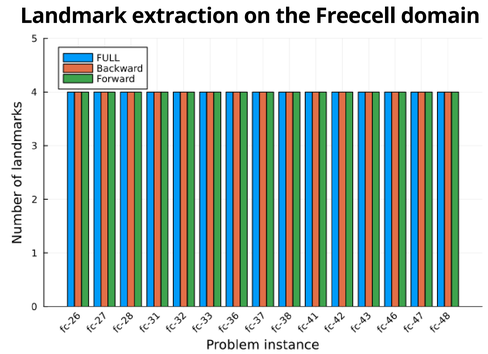
1. Extract landmarks from a relaxed planning graph using backward propagation
2. Use forward propagation on a relaxed planning graph to find more landmarks
3. Verify landmarks found in Step 2
4. Merge verified landmarks from Step 3 with landmarks found in Step 1

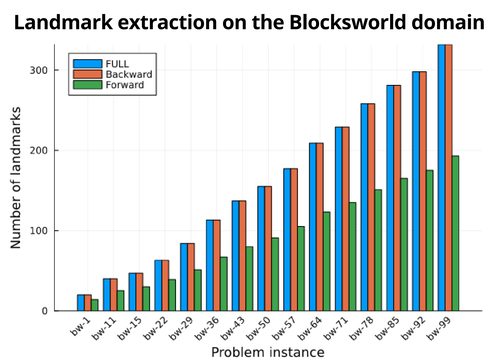
Problem selection:
15 problems from 5 logical planning domains. Instances are randomly selected while ensuring increasing complexity.

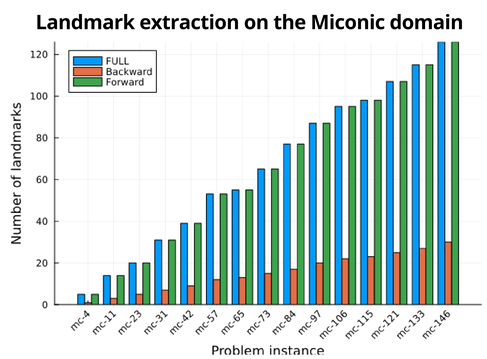
4. Findings



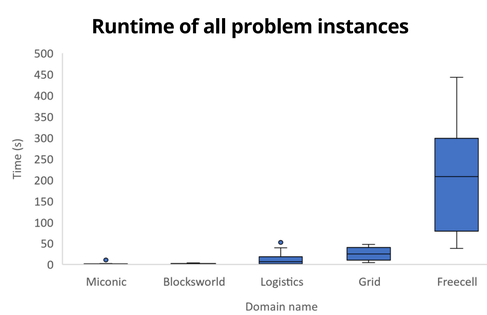








Landmarks extracted by FULL (blue), backward propagation (orange), and forward propagation (green), plotted against problems from different domains. Problems on x-axis are sorted by increasing complexity.



Boxplot of runtime of all problems from every considered domain. Domains are sorted on increasing runtime.

5. Conclusion

- FULL finds more of the same amount of landmarks than forward or backward propagation across all domains.
- A higher number of landmarks extracted means an improved runtime when landmarks are used in combination with planners as heuristics.
- The Grid, Logistics, and Miconic domains performed best in terms of number of landmarks extracted by FULL. All of these domains are transportation domains.
- Runtime did not influence number of landmarks extracted.

TU Delft