

Best-First Width Search for Lifted Classical Planning

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LIFTED PLANNING

Planning **without grounding**. In other words, using only **action schemas** and **not knowing all atoms in advance**.

WIDTH-BASED SEARCH

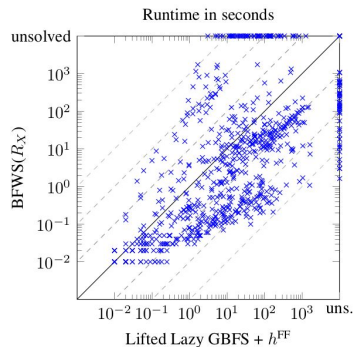
Expand states that have **novel tuples** never seen before.

WHAT WE DO

- Implement a **lifted width search planner**
- Show how to compute **novelty** measures efficiently
- Introduce new ways to balance **exploration/exploitation** using **novelty** and **delete-relaxation heuristics**

RESULTS

- New **state of the art** in lifted planning
- **Superior to the grounded implementation** for the simplest version of width-based search
- **Reduce the gap to state-of-the-art ground planners** in "normal" IPC instances



Lifted width-based search solves **more tasks** than any other lifted planner in the literature.

		IPC (1001)	HTG (862)
Baselines	FS-blind	714	442
	LAMA	917	603
	Dual-BFWS	953	522
	Lifted Lazy GBFS + h^{add}	762	663
	Lifted Lazy GBFS + h^{FF}	821	687
Lifted BFWS	R_0	725	630
	R_X	741	671
	$[R_X, h^{add}]$	838	751

FAQ

Why does width-based search work for lifted planning?

Lifted planning benchmarks are very large and heuristic computation can be expensive. Width-based search can be computed quickly while still being informed.

Can't you use a grounded width-based planner?

You could, but they fail because they either cannot ground the task or the data-structures they use to keep track of novel tuples is too expensive. In our paper, we also show how to do this more efficiently. In fact, our experiments show that a simple lifted width-based planner outperforms its grounded counterpart.

Do you introduce any new algorithm?

Yes. We show how to use novelty-based measures together with delete-relaxation heuristics using alternation between open-lists. Although this is more expensive to do in the lifted setting, it pays off in practice, and increases the coverage of our planner.

Who will win the FIFA World Cup 2022?

We have no clue.

Where can I find the PDF of this paper, the source code, and other related resources?

You can scan the QR-code below and download the PDF directly. Or, you can just copy-and-paste the links below in your browser.



Paper:
tinyurl.com/corra-seipp-icaps2022

Code, benchmarks, experiment data:
zenodo.org/record/6373935