Paper Plan
FF-Replan: & RFF: Exploiting classical AI planning for uncertain and probabilistic domains

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Abstract. blabla

1 Introduction

- Introduce planning problem
- Introduce planning for uncertainty
- Introduce the problem definition and motivation

We will focus on 2 of the current state of the art probabilistic planning algorithms that apply determinization in probabilistic domains and criticize the approaches by formulating a real-world domain as opposed to the IPPC domains. By comparing both approaches and analyzing other state of the art work we will propose some adjustments which we will theoretically test in this domain. If it is realistic, we will also try to create an empirical evaluation.

2 Problem formulation

- Summarize shortcomings of the previous solutions
- Describe the planning problem
- Argument the choice for 2 current papers to analyze
- Define how we would like to test the planning algorithms in a domain by our choice

3 Domain description

- Describe domains from IPPC
- Explain shortcomings
- Evaluate a valuable real-world domain in which we can test 2 papers

4 Theoretical approach

- Describe how we are using the created domain
- show pseudo code for the 2 papers
- Introduce the improvements (or combination) of the approaches of the papers fitted for the domain

5 Empirical evaluation

- Describe the experiment setup
- Show results for the experiment
- Critically analyze the results
- Compare with results from the original papers

6 Related Work

- Discuss the related work and how their approaches are different
- Discuss the other domains and why our domain adds anything to the community
- Introduce the current state of the art papers that use deterministic approaches for probablistic domains deadling with uncertainty

Probabilistic Planning via Determinization in Hindsight (2008) [**?**] Hindsight optimization is an online technique that evaluates one-step-reachable states by sampling future outcomes to generate multiple non-stationary planning problems which are deterministic and can be used using search. It reinterprets FF-Replan's [**?**] strategy randomly generating a set of non-stationary determinized problems and combining their solutions.

Improving Determinization in Hindsight for Online Probabilistic Planning (2010) [**?**] Hindsight optimization has enjoyed some success for online probabilistic planning. Although it has proven to be effective for many domains, it is computationally expensive. This paper presents significant improvements. 1) a method for detecting potential useful actions, 2) exploit determinism in the domain by reusing relevant plans, 2) improves action evaluation by increasing the chance that at least one deterministic plan reaches a goal.

Probabilistic Planning in the Graphplan Framework (1999) [**?**] Graphplan is a successful planning algorithm for classical STRIPS domains. This paper explores the extend it can be used in *probabilistic* domains. The paper discusses two variations of Graphplan: PGraphplan and TGraphplan. PGraphplan produces an optimal plan, while TGraphplan produces a sub-optimal plan but it has increased speed. By comparing the speed and quality of the two planners the authors are able to estimate how far they are from the ideal.

Compiling Conformant Probabilistic Planning Problems into Classical Planning (2013) [?]

How Much Does a Household Robot Need To Know In Order To Tidy Up? (2013) [?] For household robot planning, it appears easy, but actually involves uncertainty. For tidying things up objects might not be there, or sensing operations might tell things wrong. This paper looks into conditions for classical planning in a replanning loop in order to solve nondeterministic partially observable open domains This paper looks into conditions for classical planning in a replanning loop in order to solve nondeterministic partially observable open domains.

Progressive heuristic search for probabilistic planning based on interaction estimates (2013) [?] In this paper a probabilistic plan graph heuristic is described which computes information about the interaction between actions and between propositions. This information is used to find better relaxed plans to compute the probability of success. This information guides a forward state space search for high probability, non-branching seed plans. These plans are then used in a planning and scheduling system that handles unexpected outcomes by runtime replanning.

Translation based approaches to probabilistic planning (2013) [?]

7 Conclusion

- Conclude on the success of the 2 approaches
- Conclude the work done in the paper
- Hint to some future work developments

8 Some papers

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References