

Research review - Planning

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1 Introduction

To understand the current state of the field I chose to read Dana S. Nau's *Current Trends in Automated Planning*[1]. Paper does a great job in explaining the three different types of AI planners namely domain-specific planners, domain-independent planning systems and domain-configurable planners.

Domain-specific planners though not actively pursued by academia sees a lot of use in real-world especially in the fields of operations research and control theory.

Domain-independent planners which include classical planning has traditionally been used for deterministic, static, finite system. There has been recent development to interleave planning with observation to allow use of independent planners in partial or real time environments. A recent example is use of GPUs to create plan for robots for path discovery and collision avoidance in real-time[2].

Domain-configurable planners sit somewhere in the middle where you can leverage the capabilities of the vastly studied domain independent planners but by adding domain specific knowledge to the problem one can constrain the search to a small part of the search space thus achieving performance close to domain-specific planners. One big challenge for planners is acquiring domain knowledge. However, with advancement in machine learning lot of work is being done in automating the learning phase so that domain specific knowledge bases can be created and modified in real time. Example of one such system is HAPRC [3].

One of the other areas of active research is heuristic search. Various heuristic functions are being studied to improve performance of existing classical planning tools such as PDDL. One such function is red-black heuristic. The argument is that instead of traditional relaxed plan heuristic which removes all preconditions, relax preconditions partially. Such heuristics have in cases shown significant search space reductions[4]

References

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- [4] Daniel Gnad and Jorg Hoffmann, *Red-Black Planning: A New Tractability Analysis and Heuristic Function*.
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