

[UAI-2014](#)**Conference on Uncertainty in Artificial Intelligence**

July 23-27, 2014, Quebec City, Canada

Reviews For Paper**Paper ID** 61**Title** Affordance-Aware Planning**Masked Reviewer ID:** Assigned_Reviewer_3**Review:****Question**

Novelty: This is arguably the single most important criterion for selecting papers for the conference. Reviewers should reward papers that propose genuinely new ideas or novel adaptations/applications of existing methods. ... (For the rest of this question, see <http://auai.org/uai2014/reviewCriteria.shtml>)

The authors introduce an action-pruning strategy based on "affordances" which are simple functions that map the current state to a set of candidate actions, which is a (hopefully) proper subset of all possible actions. The resulting reduction in branching factor improves planning performance.

The novel aspect of the paper is therefore using the OO-MDP encoding [Diuk, others] to construct affordances [Gibson] that guide action selection and therefore aid the planner. The authors claim that state-specific action pruning is novel; I am not aware of literature prior to this that does so.

Technical Quality: Are the results technically sound? Are there obvious flaws in the conceptual approach? Are claims well-supported by theoretical analysis or experimental results? Did the authors ignore (or appear unaware of) highly relevant prior work? ... (For the rest of this question, see <http://auai.org/uai2014/reviewCriteria.shtml>)

The results and approach appear sound. The experimental results support the claim that affordances encoded using the authors' methods can be useful in a 'robot-like' domain (Minecraft) with a large state and action space.

They do not compare with other methods for encoding prior knowledge, like e.g. reward shaping; I would have preferred to see a comparison with a standard Euclidean-distance-to-goal-based reward shaping scenario, assuming that the agent has access to goal and self (x,y) coordinates. Further to that end, I would have preferred to have a table or similar detailing exactly what state information is available to the agent. I do not mean to say that if simple reward-shaping does well then the method is invalidated; however, I think a better understanding the relationship between the methods is important.

Potential Impact and Significance: Is this really a significant advance in the state of the art? Is this a paper

The impact of the proposed method is that it may provide a useful way for planner users to encode prior knowledge about how to solve problems. In my view, alternatives (options, reward shaping) are less intuitive than the method presented here. That said, its

<p>that people are likely to read and cite in later years? Does the paper address an important problem (e.g., one that people outside UAI are aware of)? (For the rest of this question, see http://auai.org/uai2014/reviewCriteria.shtml)</p> <p>Quality of Writing: Please make full use of the range of scores for this category so that we can identify poorly-written papers early in the process.</p>	<p>usefulness may be restricted to problems that are well-modeled as an OO-MDP.</p> <p>I suggest that the authors use their remaining space to make a better argument for why/when their approach is preferable to the alternatives listed in the related work section. At the end of the Reward Shaping section, for example, the authors speculate on the combination of affordances with heuristics; I think even preliminary experiments addressing this would improve the paper quite a bit.</p> <p>Quality of writing is excellent</p>
Overall Numeric Score for this Paper:	Decent paper, but may be below the UAI threshold. I tend to vote for rejecting it, although would not be upset if it were accepted.
<p>(Optional) Additional Comments to the Authors: please add any additional feedback you wish to provide to the authors here. For example, if the quality of writing in the paper is not excellent, please provide some feedback to the authors on how the writing could be improved.</p>	<p>In the abstract, the authors state "Planning algorithms for non-deterministic domains are often intractable..." First of all, problems are intractable rather than algorithms, and secondly, the affordance idea doesn't seem to me to require or "fix" non-determinism. I suggest going over the abstract to ensure it precisely identifies the contributions of the paper.</p> <p>Minor edits: "consider the coffee" -- "consider the coffee mug" "...in any number of different tasks." -- "...in any number of different tasks in the same environment." (Or something more subtle but correct; OO-MDPs with the same ontology? Not clear.) "...will not considering..." -- "will not consider" "...and restrict the state space to that which is more immediately..." -- the state-action space, I think "...on a subgoals..." -- "...on a subgoal..." Tables should have more descriptive headings, and they should have captions. "...impact the shape of the state space..." -- Not clear what this means. Since there is a free 1/2 page, I suggest expanding.</p>

Masked Reviewer ID: Assigned_Reviewer_7

Review:

Question

Novelty: This is arguably the single

The authors propose a somewhat novel representation for human input to a planning system allowing the human to specify

<p>most important criterion for selecting papers for the conference. Reviewers should reward papers that propose genuinely new ideas or novel adaptations/applications of existing methods. ... (For the rest of this question, see http://auai.org/uai2014/reviewCriteria.shtml)</p> <p>Technical Quality: Are the results technically sound? Are there obvious flaws in the conceptual approach? Are claims well-supported by theoretical analysis or experimental results? Did the authors ignore (or appear unaware of) highly relevant prior work? ... (For the rest of this question, see http://auai.org/uai2014/reviewCriteria.shtml)</p>	<p>goal-dependent action pruning. The idea that action pruning will speed planning is heuristically straightforward of course, as long as a good solution remains. Previous work in planning has not generally focused on human assistance and so work on action pruning has generally focused on machine-generated pruning, a topic that is not discussed in this paper. One landmark work on human assisted planning, TLPlan (Bacchus & Kabanza, AIJ 116, 2000), does indeed support human assisted pruning of the actions considered, and has demonstrated that many benchmark planning domains can be solved effectively by simple depth-first search using such pruning.</p> <p>The concepts developed are clear and straightforward. The empirical evaluation verifies an unsurprising result: human-specified goal-dependent action pruning indeed speeds simple stochastic planners.</p> <p>Since the key novelty proposed is a representation for human input, other appropriate comparison points would be to other forms and representations of human input and/or the ease of automatic acquisition of control information in this representation.</p>
<p>Potential Impact and Significance: Is this really a significant advance in the state of the art? Is this a paper that people are likely to read and cite in later years? Does the paper address an important problem (e.g., one that people outside UAI are aware of)? (For the rest of this question, see http://auai.org/uai2014/reviewCriteria.shtml)</p>	<p>The empirical result occupies the bulk of the paper but is insufficiently interesting/surprising to carry the work to publication.</p> <p>I am very interested in representations for human input to planners because these may serve as a guide to automating planning in richer representations. From that viewpoint, the proposed action-pruning representation is an interesting start, as is the demonstration that information in this form is very useful to planners. SO, I believe this work can provide a seed for a more significant result involving for instance the automatic acquisition of affordances or the automatic verification of the soundness of an affordance set (i.e. that the goal will always still be reachable).</p>
<p>Quality of Writing: Please make full use of the range of scores for</p>	<p>Quality of writing is good, but could be improved with some editing</p>

this category so that we can identify poorly-written papers early in the process.	
Overall Numeric Score for this Paper:	A clear rejection. I vote and argue for rejection. Clearly below the standards of the conference.

Masked Reviewer ID: Assigned_Reviewer_8

Review:

Question

Novelty: This is arguably the single most important criterion for selecting papers for the conference. Reviewers should reward papers that propose genuinely new ideas or novel adaptations/applications of existing methods. ... (For the rest of this question, see <http://auai.org/uai2014/reviewCriteria.shtml>)

While I am no specialist of knowledge engineering in AI planning, I doubt that many will find any novelty in the idea of exploiting affordances (knowledge of what actions can be useful for) to prune out irrelevant actions.

Technical Quality: Are the results technically sound? Are there obvious flaws in the conceptual approach? Are claims well-supported by theoretical analysis or experimental results? Did the authors ignore (or appear unaware of) highly relevant prior work? ... (For the rest of this question, see <http://auai.org/uai2014/reviewCriteria.shtml>)

Yes, the results are technically sound. Note that there is no particular technical difficulty here.

Still, I do not understand why, in the definition of affordances, $\$p\$$ is a grounded predicate, while $\$g\$$ is ungrounded.

The authors mention some related work, but:

- 1- they do not detail the relationship with "table top grasping problems" mentionned at the end of Section 6.4, while this could be very close to their own work;
- 2- they may have missed important related work in classical (deterministic) AI planning, and work using a different terminology for similar ideas.

<p>Potential Impact and Significance: Is this really a significant advance in the state of the art? Is this a paper that people are likely to read and cite in later years? Does the paper address an important problem (e.g., one that people outside UAI are aware of)? (For the rest of this question, see http://auai.org/uai2014/reviewCriteria.shtml)</p>	<pre>@INPROCEEDINGS{Amant99planningand, author = {Robert St. Amant}, title = {Planning and User Interface Affordances}, booktitle = {Proceedings of the 5th International Conference on Intelligent User Interfaces}, year = {1999} }</pre> <p>Because of the lack of novelty, I see little potential impact for this work.</p> <p>Moreover, the authors have considered the setting of Markov decision processes, but there is nothing in this work related to uncertainty. It would be quite straightforward to rewrite the paper talking only about classical AI planning (in PDDL).</p> <p>In my opinion, this paper would have been a better fit for ICAPS, where there is a large community focusing on knowledge engineering for AI planning (though I don't think it will have more success there).</p> <p>Two suggestions for the authors would be to (1) focus such a work on a practical application rather than on the theory, or (2) maybe dig in the direction of learning affordances (as they suggest themselves).</p>
<p>Quality of Writing: Please make full use of the range of scores for this category so that we can identify poorly-written papers early in the process.</p>	<p>Quality of writing is good, but could be improved with some editing</p>
<p>Overall Numeric Score for this Paper:</p>	<p>A very strong rejection. I'm surprised it was submitted. I will actively fight for rejection.</p>
<p>(Optional) Additional Comments to the Authors: please add any additional feedback you wish to provide to the authors here. For example, if the quality of writing in the paper is not excellent, please</p>	<p>Just a side comment: Searching for related works, I found that the starting point of the paper (the combinatorial explosion due to blindly considering all actions) is very close to issues raised in the AAAI-87 paper "Pengi: An Implementation of a Theory of Activity" by Agre and Chapman. See also "Affordance Theory for Improving the Rapid Generation, Composability, and Reusability of Synthetic Agents</p>

provide some feedback to the authors on how the writing could be improved.

and Objects" by Cornwell, O'Brien, Silverman and Toth.

Here are some small comments and typos:

- "a real world agent" -> "a real-world agent" ?
- "\$\alpha\$ a subset" -> "\$\alpha\$ is a subset"
- "will not considering placing" -> "will not consider placing"
- "the large number of irrelevant states that [...] are"
- > "the many irrelevant states that [...] are" ??
- "the action that maximizes"
- > "an action that maximizes"
- (There may be multiple optimal actions.)
- "the action with the highest optimal state-action value"
- > "an action with the highest optimal state-action value"
- What is the "Minecraft wiki"?
- "a different set ... become active and restrict ..."
- > "a different set ... becomes active and restricts ..."
- "\lambda" -> "\gamma"
- In the experiments, there is no clear indication telling what values Tables 1 and 2 are providing. Are these planning times? This should be ideally stated clearly in the body of the paper and in the captions.
- Any idea why SG is the best planner on the MAZE problem?
- "combing" -> "combining"
- "where as" -> "whereas"
- "the a Dirichlet distribution"
- > "a Dirichlet distribution"
- "were task independent"
- > "were task-independent"
- In the bibliographic references:
- * Please, in titles, protect letters that need capitalized using accolades (as in "Macro-FF", "AI", "Monte Carlo", "Markov", "UCT", "Q-learning", "Q-value", "RGB-D", "Taubin", "MDP", "POMDP", ...).

* "In In" -> "In"

* "objectspecific" -> "object-specific"

* "efcient" -> "efficient"

* A lot of information seem to be missing about the paper by Montesano and Lopes.