AI09 (author)

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AI09 Submission 165

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Paper 165	
Title:	Decomposition of Multi-Player Games
Paper:	PDF
Keywords:	Factoring Games General Game Playing Multi-Player Games
Topics:	Agents, AI Applications, Knowledge Representation, Multi-Agent Systems
Abstract:	Research in General Game Playing aims at building systems that learn to play unknown games without human intervention. We contribute to this endeavor by generalizing the established technique of decomposition from AI Planning to multi-player games. To this end, we present a method for the automatic decomposition of previously unknown games into independent sub-games, and we show how a general game player can exploit a successful decomposition for game tree search.
Time:	Jun 30, 15:48 GMT
Fax:	+49 351 463 37924

Authors

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Reviews

Review 1

Overall rating:	**1** (weak accept)
Confidence:	**4** (expert)
Relevance	5 (Highly Relevant)
Originality	3 (Moderately Original)
Significance	3 (Moderately Significant)
Quality of Presentation	2 (Poor)
Soundness	3 (Minor Flaws)

. Detailed comments explaining above ratings and suggestions to improve the paper.

Review:

While this paper contains interesting and important work extending search decomposition to multiplayer games, it relies too heavily on the reader's familiarity with an earlier workshop paper that does not appear to have been archivally published. Many terms and algorithms used in that paper are not explained, and the intuition of the algorithm employed is only lightly touched upon with an example that does not do much to enlighten. Altogether this makes the paper almost incomprehensible to anyone who is not familiar with the original, which is unfortunate because the work itself looks to be of high quality.

The authors would do better to omit section 5 (which only applies to a small set of games) and to use the space gained to expand the explanation of game tree decomposition more thoroughly with clearer examples.

A minor peeve: citations should not be used as nouns. Write "Our previous work [9] decscribes..." not "[9] describes". The text should make sense if all the citations were removed.

Do you nominate this for a best paper award? No

Review 2

Overall rating:	**0** (borderline paper)
Confidence:	**3** (high)
Relevance	4 (Very Relevant)
Originality	3 (Moderately Original)
Significance	3 (Moderately Significant)
Quality of Presentation	2 (Poor)
Soundness	4 (Seems Sound)

. Strengths of the paper:

The idea of decomposing (multi-player) games into independent subgames in order to solve them more efficiently, is indeed a natural and interesting one.

. Weaknesses of the paper:

The paper is not well-written. The main ideas are not introduced properly. Some definitions appear to rely on a previous paper of the same research group and this makes the paper not entirely self contained.

Review:

. Detailed comments explaining above ratings and suggestions to improve the paper.

The paper proposes a procedure for detecting subgames of multi-player games. A method for solving these games is subsequently introduced and some experiments are presented. Finally, the special case of "impartial games" is considered for which a more efficient decomposition search is possible.

The topic of the paper is quite interesting but, in my opinion, the paper is not well-written. The basic heuristics of section 3 are not explained in a satisfactory way. The experiments given are not extensive (only a couple of simple games are considered). The paper relies at some point on the reference [9], and this makes it not self-contained (and therefore, somewhat tedious to read). More detailed comments:

* section 3, page 4. The notion of partially instantiated fluent and action terms

should be explained in an intuitive way. In my understanding, a partially instantiated term like heap(1,_) is like a new term with a different predicate name, say heap1(_). Therefore, it is as if we have a description of a game in which different fluent symbols are used.

* section 3, page 4. The two heuristics given for the instantiation of fluents and actions are not explained at all (and no intuition is given). How strong are these two heuristics? How big is the class of decomposable games that is covered by these two rules?

* section 3, page 4. "The notion of call graph is defined in [9]". I can imagine what a call graph is, but the authors must not expect the reader to use his/her imagination when discussing technical matter. The authors must try to make the paper self-contained.

* subsection 4.3. The experiments are very shallow in my opinion. The two games considered are obviously decomposable and, I believe, not very natural. Do there exist some "more serious" games that are decomposable (but not obviously so)?

* section 5. I would prefer if this section was not included in the paper. Instead, the authors could have explained in a better way their heuristics in the previous sections and given better experimental results.

* section 6. I think, it is not a good practice to cite the (only) related work in the last few lines of the paper. If this related work is worthwhile, then a proper comparison and discussion must be given. Otherwise, it must be omitted.

Do you nominate this for a best paper award? Yes / No

No

Review 3

Overall rating:	**1** (weak accept)
Confidence:	**2** (medium)
Relevance	4 (Very Relevant)
Originality	3 (Moderately Original)
Significance	3 (Moderately Significant)
Quality of Presentation	3 (Acceptable)
Soundness	4 (Seems Sound)

. Detailed comments explaining above ratings and suggestions to improve the paper.
The paper extends a previous algorithm for decomposing General Games to handle multi-player games. A complexity analysis of the algorithm is given.
There are some concepts that are not explained but the reader is referred to other papers. Although I understand there are space constraints, I think these should be better explained in the paper to keep it self-contained - call graph, nimber, Nim-sum.

Review:
In footnote 3 (which is the first footnote?): prolog -> Prolog
Bottom of p. 3 - "described by the next rules" - aren't the frame axioms also described by next rules?
p. 5 - after def 1 - what does this mean for a frame axiom to be entailed by an action?
p. 6 - before def. 3 - can not -> cannot
- last para - concepts' -> concepts
p. 7 - last sentence - what do you mean by an optimal strategy in this context?

Do you nominate this for a best paper award? No