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AAMAS-2022 notification for paper 143 (48 hours ahead of schedule!)

1 message

AAMAS-2022 <aamas2022@easychair.org>
To: Dengji Zhao <dengji.zhao@gmail.com>

19 December 2021 at 17:23

Dear Dengji,

We are delighted to inform you that your AAMAS 2022 submission entitled “Incentives to Invite Others to Form Larger Coalitions” (#143) has been accepted for publication as a full paper and for oral presentation at the conference. Congratulations!

As every year, the reviewing process was thorough and highly selective. The programme committee reviewed a total of 629 submissions. It accepted 166 of them as full papers and a further 91 as extended abstracts, resulting in an acceptance rate of 26% for full papers and an overall acceptance rate of 40%.

You will find your final reviews both at the end of this message and on EasyChair. We hope that you will find the feedback received helpful and we ask you to carefully consider all of it when preparing the camera-ready copy of your paper.

The camera-ready copy of your paper will be due on 28 January 2022. You will receive instructions for how to submit it no later than 15 January 2022.

In principle, the title and the authors of your paper must be exactly as specified at submission time. However, if you have a good reason for wanting to change your title, then you can request permission to do so by replying to this email by 8 January 2022. Please include the submission number, the old title, the proposed new title, and the reason for wanting to change it.

Similarly, if you need to correct a typo in the name of an author or if you need to change the ordering of the authors, then you can request permission to make those changes by replying to this email by 8 January 2022. Again, please include the submission number, the old list of authors, and the new list of authors.

Please recall that making changes other than those is not possible, and later changes of these details will not be possible as well.

The instructions for preparing your manuscript remain the same as those referred to in the Call for Papers, except that we ask you to replace the string “Auckland, NZ” on the first page by the string “Online”. So you can start working on this already if you wish.

If you chose to submit supplementary material for review, then you should now de-anoymise and polish this material and make it publicly and permanently available (e.g., using a service such as Zenodo for code and data, or arXiv for additional proof details). We recommend that you include a reference to the supplementary material in the camera-ready version of your paper (listed as an item in your bibliography). The idea is that it should be possible for people to cite your supplementary material independently from and in addition to citing your paper.

As you know, the conference will be held as an online-only event. Many of the details, including the presentation format for your paper, still need to be settled over the coming months.

As in 2021, also this year we are going to have separate registration fees for papers and people. For your paper to be published, you must register your paper and at least one of its authors by 1 March 2022. Due to the switch to the online format, we do not yet have full information on how this will work exactly, but we will inform you in good time.

AAMAS 2022 is running a pilot of providing subsidised language editing services to a limited number of papers. If successful, the pilot may be expanded in following years. If you are interested in getting subsidized language editing services for your paper prior to the camera ready submission, please leave your details in the following form: https://forms.gle/87Fct8L43n75A6PC6 by 23 December 2021.

We are looking forward to seeing you at AAMAS 2022 in May!

All the best,
Piotr and Viviana

SUBMISSION: 143
TITLE: Incentives to Invite Others to Form Larger Coalitions

------------------------ METAREVIEW ------------------------
All the reviewers agree that the considered problem is interesting. Proofs are technically sound. Mathematically, the results are not particularly deep. The reviewers were also happy/satisfied with the answers of the authors. Overall, everybody agrees that the paper can accepted if there is room.
In case of acceptance, the authors have to incorporate the useful remarks they made in their rebuttal and Section 5 could do with a last polishing over. Moreover, they have to address all the minor comments that reviewers pointed out in their reviews.

---------------------- REVIEW 1 --------------------
SUBMISSION: 143
TITLE: Incentives to Invite Others to Form Larger Coalitions
AUTHORS: Yao Zhang and Dengji Zhao

----------- Overall recommendation -----------
SCORE: 0 (borderline paper)
----------- Summary -----------
In this paper, the authors introduce an invitation problem from a cooperative game perspective. Specifically, there is an initial set of players aware of the process which can invite new players, and the goal is to enlarge, as much as possible, the coalition to make it more valuable (according to some given monotone characteristic function). Hence, the authors consider scenarios where the underlying graph structure is unknown, as the relationships between agents are private information of these latter. To get the right information about the network, reward distribution mechanisms that incentivize players to reveal their relationships are needed.
Furthermore, such mechanisms are asked to be efficient, meaning that the overall reward distributed among agents meets the value of the formed coalition. In addition, a mechanism is said to be \gamma-structural fair if any player gains at least a fraction \gamma of the reward given to each of her invitees.

The authors at first focus on forests, and then they partially generalize their results on DAGs.

In the case of forests, they show that simply applying the Shapley value is not sufficient to guarantee IC. In fact, the underlying graph structure generates a hierarchy among invitations and, hence, imposes a different approach. Thus, the authors show that the natural approach is to rely on the permission Shapely value. In fact, if it is used as a reward function it guarantees IC, efficiency, and 1-SF. Furthermore, they show it is possible to satisfy IC and efficiency through a larger class of reward functions. This class is obtained by applying the permission Shapley value with weights; in particular, this enables solutions that are \gamma-SF, depending on both weights distribution and players' relationships.
Thus, the authors show how the solution to the DARPA red balloon challenge fits into their model. Finally, they extend their approach to DAGs achieving simultaneously IC+efficiency.
----------- Detailed comments -----------
Minor comments:

-Why don’t you directly show the results of subsection 3.4 and, then, observe subsection 3.3 is an immediate consequence? This would give more room in your paper for further explanations and/or other results (as I see it, the proofs are essentially the same in the two settings weighted/unweighted).

- It would be better to use finally instead of at last.

- In general, check your usage of commas (in particular missing commas).

- Some mistakes I've spot are listed in the line by line comments.

- You often use “intuitively”, you should either find an appropriate synonym or remove it somewhere.

Line by line comments:

1 INTRODUCTION

- Collaborating/collaborate + together —> it looks redundant, you could remove together
- existing players of the coalition —> current players in the coalition
-The axiomatic characterization of the Shapley value under these two approaches are given in [18] and [17] —> is given
- as a reward distribution mechanisms —> as a reward distribution mechanism

2 THE MODEL

- other than i and \Theta_{-i} be the type space —> other than i, and \Theta_{-i} be the type space (also in the definition of DIC, and, in the whole paper, when you list multiple things add comma before the "and")
-At last, we consider a property of structural fairness that guarantees a player can gained reward at least as much as a fixed proportional of the reward gained by her invitees. It is reasonable since the game is monotone and can give a promise of fairness compared to neighbours to all players before their invitations. —> Rephrase… in particular, can gained and proportional are wrong. Also the second sentence is not well structured.

3 DIFFUSION INCENTIVES IN A FOREST
- Recall what a forest is. In the paper, you assume to have a collection of trees which are directed from the root to the leaves. This should be specified.
- The first question is that what if we directly apply Shapley value [14, 19], the classical solution to cooperative games, to our setting. —> The first question is what if we directly apply Shapley value [14,19], the classical solution for cooperative games, to our setting.
- In the proof of Prop. 3.2, you shod add "." right after \phi_4=1. This correction applies to every formula that is at the end of a sentence.
- via the conjunctive and disjunctive approach respectively. —> via the conjunctive and the disjunctive approach, respectively.
- Especially, in the forest model, every player except the initial players has a unique parent —> In particular, in the forest model, every player, except the initial players, has a unique parent
- Normally, the weighted Shapley value can be defined as: —> Usually, the weighted Shapley value is defined as:

4 THE ONLY SOLUTION TO QUERY NETWORK
Normally, a solution —> In general, a solution

5 FROM FOREST TO DAG
- Agent 1 asks her friends 3 and 5 and 2 asks 4 and 5. —> Agent 1 asks her friends 3 and 5, and agent 2 asks 4 and 5. (Also in the subsequent sentences make sure to ad commas in the right place) Moreover, asks —> asks to or invites.
- considered the cases where each player has to get permissions from all or at least one of her superiors. —> considered the cases where each player has to get permissions either from all or at least one of her superiors.
- if applying the weighted permission —> "if we apply" or simply "applying"
- Theorem 5.6 appears too long, you could define before the theorem what is an appropriate function f, and then state in the theorem that weights satisfy such a definition.

AFTHER REBUTTAL: I've found the reply appropriate, and I hope the authors will include these insights in their work.
----------- Rebuttal question -----------
- I'd like to have further explanations on why we can represent the connections between agents with a DAG? Is it really meant to represent friend relationships and, in general, a social network? (About leadership I'm more convinced that a DAG is a good representation.)

- According to your model, there are some players initially forming the coalition, while the reward mechanism aims to receive \theta_i from all the players in the network. Why should players, which are not aware of the coalition yet, declare such information? How in a real-world application can we imagine this to happen?
What I also found a bit confusing is how the invitation works. Are there sequential time steps? I would imagine this process to work as follows: initially, only agents in I are in the coalition, and then repeatedly new players join depending on the declaration on previously added agents. I believe that introducing such time steps won't change your approach and your results, but, it would make the process more realistic. Moreover, it avoids the mechanism to ask all players about \theta_i, in act, it can only ask to the currently added ones; this should be more efficient in practice (and also avoids you to assume that every player is reachable from I).

-Your model bears similarities with the information spread in social networks. In fact, when restricted on forests, as soon as one player receives an invitation she will join the coalition; this can be represented by a deterministic threshold model where the threshold is 1 for all players. In general, on DAGs, you have a more expressive model, w.r.t. the linear threshold model, to represent conditions allowing invitation. Do you think it would be possible to

extend, as in the information spread, your model to a stochastic setting?
In any case, I think it would be nice to have, in the related works, some connections with this part of the literature.

- What about \gamma-SF for DAGs?

----------- Reason for the recommendation -----------

The introduced model is nice, and the provided theorems and proofs sound. Their techniques rely on the application of suitable definitions of the Shapley value, which I found quite interesting. My main concerns are about the restriction on DAGs, which is not sufficiently motivated, and about players' declarations. Indeed, it seems that the graph structure aims to represent the underlying social network involving players while in real-world scenarios social networks are far to be DAGs. Moreover, it is not also clear why all the agents in the network should reveal their neighborhoods.
Furthermore, although I believe the authors made a good effort by adding informal explanations while describing their results, the quality of the write-up needs to be improved. Further information on my concerns can be found in the detailed comments and the questions for the authors.

Overall, this puts the paper in the borderline area.

----------------------- REVIEW 2 ---------------------

SUBMISSION: 143
TITLE: Incentives to Invite Others to Form Larger Coalitions
AUTHORS: Yao Zhang and Dengji Zhao

----------- Overall recommendation -----------

SCORE: 2 (accept)

----------- Summary -----------

The authors of the paper focus on the problem of design rewards for players that are part of a coalition such that they are incentivised to invite other players. This is considered in the context of monotone game where adding more players to the coalition will not diminish its value.

Are properties like efficiency and structural fairness are considered when designing the reward distribution mechanism.

The authors tackle this problem by proposing a mechanism that merges the advantages of Shapley value, permission structure, and weights.

Initially the mechanism(s) and their properties are proven for the forest case and then they are extended to the more general DAGs case.

The authors also show how the mechanism they propose is only mechanism that applied to the query network problem is anonymous, strongly individually rational and efficient.

----------- Detailed comments -----------

I believe that the topic of the paper would be of interest for the AAMAS community.

The paper is really well written and has a structure that helps digest the incremental contribution the authors describe in the paper. Also the use of simple minimal examples is well suited for the content of the paper and helps the reader.

The mechanism proposed in a merge of existing concept and for this reason may not be mind blowing but to the best of my knowledge the theoretical results proven in the paper are sound.

As minor comment: DAG is used in section 1 even if the acronym is introduced only in section 2

----------- Rebuttal question -----------

1) Given that the application the authors have in mind are related to social network, how limiting is the assumption the the graph is acyclic?

2) In the paper, the individual rationality constrain requires that the players have a reward >0. However, it is realistic to think that players that take part to the coalition have to pay a cost (for example to collect information or rent a bike to go and search for the red balloon).
Would it be possible to use the weight structure to guarantee a minimum payment that cover the players' costs?

3) When discussing the forest case, the network connections of players are considered their private type and the aim of the reward mechanism is to elicit such information. Given this, the concept of 'permission' is introduced: a player gives permission to other players to be part of the coalition if he/she reports such players as part of his/her

type. In the DAG case, however, players may decide to join the coalition depending on a condition. In example 5.1, player 5 will join if either player 2 invited him/her or if both player 1 and 3 do so. Could the dynamic of the game and the incentives
----------- Reason for the recommendation -----------
I enjoy reading the paper. It is well written, easy to follow, and propose an interesting mechanism.

I think the topic is interested for the AAMAS community.

----------------------- REVIEW 3 ---------------------
SUBMISSION: 143
TITLE: Incentives to Invite Others to Form Larger Coalitions
AUTHORS: Yao Zhang and Dengji Zhao

----------- Overall recommendation -----------
SCORE: 1 (weak accept)
----------- Summary -----------
==Summary==
The submission concerns the following problem: Given a social network wherein players can invite other players to join their coalition, how can incentives be engineered in such a way that it is a dominant strategy to invite all of your friends to your coalition, and that the grand coalition forms. A good answer to this problem is relevant in such settings as the DARPA MIT red balloon challenge. The latter the authors also investigate as an application of their model and show that their mechanism given by the so-called permission Shapley value characterises (under certain restrictions) the winning entry in the DARPA contest.
----------- Detailed comments -----------
==Summary==
The submission concerns the following problem: Given a social network wherein players can invite other players to join their coalition, how can incentives be engineered in such a way that it is a dominant strategy to invite all of your friends to your coalition, and that the grand coalition forms. A good answer to this problem is relevant in such settings as the DARPA MIT red balloon challenge. The latter the authors also investigate as an application of their model and show that their mechanism given by the so-called permission Shapley value characterises (under certain restrictions) the winning entry in the DARPA contest.

==General remarks==

-. The model: The model the authors introduce is nice, simple and suitable for the task at hand. Perhaps the authors could emphasise that also players that are *not* in the initial coalition can also invite players. The authors could also point out in a line or two, that the permission Shapley value is the very mechanism they are proposing.

-. Alternative permission Shapley value: The authors could contemplate to contrast the permission Shapley value with the following obvious alternative definition: given a reported type profile \Theta'=(\theta'_1,...,\theta'_n) compute the Shapley value as usual, *but only taking into account permutations of the players that respect the the graph structure of G(\theta')*. This does not seem to work in Example 3.1, as player 4 still invariably gets value 1, but it might be illustrative to point out the difference with your permission Shapley value.

-. Technical soundness: I have not checked all the technical details, but the results are plausible and the proofs technically sound. Mathematically, the results are not particularly deep, but I feel that is rather a feature than a bug given what the authors want to achieve.

-. Related literature: The paper has a relatively limited number of references. Yet, I feel that that the references given are adequate and well-chosen.

-. Example: A more extensive example could be helpful in the introduction. You could extend the DARPA red balloon challenge a bit (with it being over ten years old, it may want some extra clarification in any case) or Example 3.1 for an abstract example. This is mostly a matter of taste though, though.

-. Formal presentation: The authors do a very good job giving intuitions and illustrations of the formal concepts they introduce. Moreover, the definitions are generally clear.

-. Presentation: The paper is well-written and organised. The authors have taken care to explain what they are doing instead of overwhelming their readers with a list of formulas. This applies especially to Sections 2 through 4. The presentation of Section 5 I found slightly less pleasant to read and could still do with some polishing. Table 1, I feel is not strictly necessary for the development of the paper, and by omitting it, the authors can perhaps gain the space to improve the presentation of Section 5.

-. Application to query networks: The application to query networks and the DARPA red balloon challenge is nice. I feel that the authors could therefore be more expansive about this application in the introduction and perhaps even introduce the problem setting of the paper by means of it. Can the result reported in Theorem 4.2 be extended to more general settings?
Is Example 3.1 also a very simple example of a query network with a properly defined reward function (I did not check all conditions)? If so, the authors may point out that in query networks the permission Shapley value does not coincide with the Shapley value or weighted Shapley value.

-. Future research: There seems to be plenty of room for future research. On direction could be to allow for different initial coalitions and see which coalition structure forms and if it is stable with respect to, for instance, the core.

==Detailed comments==

General: the idea that players can invite or reject other players from their coalition, as in permission structures, also seems to be present in the contractual stability concepts in hedonic games, a coalition-formation setting much studied in the AAMAS and COMSOC community. The connection seems to be intuitive rather than formal, so this is very much a side remark.

Abstract: I find the use of "grand coalition" a bit misleading here. Usually, the grand coalition is the set of all players, so by definition no more players can be invited to it. It is clear what is being meant though.

page 1, column 1, line 35: Omit "Therefore", in "Therefore, in this paper"

1,2,16: It is not clear at this point why the outside players cannot be treated equally.
1,2,21ff: "The weighted Shapley value is the very first concept that applies asymmetry to cooperative games [1]. Kalai and Samet [7] offered the idea of the weight system and an axiomatic characteri- zation of the weighted Shapley values". This looks a bit odd, as reference [1] is from 1991 and reference [7] from 1987, that is [1] is earlier than [7], but the text suggests otherwise.

2,2,reward mechanism: You are using \varphi for the Shapley value and \phi_i for the reward functions. Given their optical similarity and \varphi or \phi being standard for the Shapley value, the authors could perhaps contemplate using \rho_i (or some other sufficiently distinct symbol) for the reward function.

2,2,Def. 2.3: "\phi_i(theta,theta_{-i})" should be "\phi_i(theta_i,theta_{-i})"?
The notation (theta_i,theta_{-i}) is standard, but should presumably still be properly introduced.

3,1, Ex. 3.1: The example is nice: small, simple, and still illustrative. In Figure 1, you could perhaps contemplate to indicate the coalition I={1,2} more clearly, e.g., by putting an ellipse around the respective nodes.

3,1,33: "called permission structure before our contributions." It seems that "before our contributions" can be omitted.

3,1,34f: "They defined the permission structure on DAGs via the conjunctive and disjunctive approach respectively". At this point it is not yet clear what the conjunctive and disjunctive approaches are.

3,1,Def. 3.3: Permission structures seem to be the counterpart of the function Q: N -> 2^{N} that maps each player to p_i as defined on page 2. In particular we have that P(i)={j\in N : i in p(j)}, that is P is the inverse image of Q (https://people.clas.ufl.edu/groisser/files/inverse_images.pdf). Perhaps this connection is worth mentioning.

3,2,28ff: "For instance, in Example 3.1, without player 2, player 4 cannot provide her contribution to the coalition." This puzzled me at first a bit. Perhaps you want to rephrase as: "For instance, in Example 3.1, player 4 can only be invited to I by player 2. Hence, without player 2, player 4 cannot provide her contribution to the coalition. "

7,1,Th.4.2: "A solution to the query network" should be "A solution to a query network"?
7,1, definition v(S) bottom of page: you may want to put "forevery S\subseteq N" before the equation. As it is now it could be taken as part of the second case.

8,1,Th.5.6: I feel that, for easy readability, the conditions "with weight function omega-i=f(d_i), where d_i is the distance of player i to the initial players I in the graph, i.e. the minimum distance between i to one of the initial players(min_{j in I} d_{ji}) and f:N->R+ is monotone non-decreasing" had perhaps better be presented outside of the theorem environment.

==Conclusion==

The submission seems to well within the scope of AAMAS and is likely to be of interest to its cooperative game theory subcommunity. As far as I can tell, the problem addressed is original and the approach adopted novel. The paper is pleasantly written and relatively easy to follow, although the presentation of Section 5 could arguably still be polished. The results are plausible, but mathematically not particularly deep. I feel the latter may perhaps even seen as a feature, as the contribution of the paper is, methinks, conceptual rather than technical.
----------- Rebuttal question -----------
Q1: Do you believe Theorem 4.2 holds because of the clever design of the permission Shapley value or rather due to the darth of solutions in the query network setting. In other words, do you consider the => direction or the <= direction of the proof for more significant. (Please do not answer this question if space for your rebuttal is scarce.)

Q2: What are the perspectives of extending this work to general digraphs, that is, directed graphs that also allow for cycles?
----------- Reason for the recommendation -----------
The submission concerns the following problem: Given a social network wherein players can invite other players to join their coalition, how can incentives be engineered in such a way that it is a dominant strategy to invite all of your friends to your coalition, and that the grand coalition forms. A good answer to this problem is relevant in such settings as the DARPA MIT red balloon challenge. The latter the authors also investigate as an application of their model and show that their mechanism given by the so-called permission Shapley value characterises (under certain restrictions) the winning entry in the DARPA contest.

strengths: well-presented, in particular providing intuitions for important formal concepts; simple and easy to understand research question; easy to understand mechanisms; the application to the DARPA red balloon challenge
weaknesses: perhaps mathematical depth; presentation Section 5; discussion of future directions of research