

ANAC Repeated Multilateral Negotiation League

Challenge: What are effective negotiation strategies (e.g. bidding, opponent modeling and accepting) when negotiating repeatedly with agents in a multilateral setting?

Entrants

Entrants to the competition have to develop and submit an autonomous negotiating agent that runs on Genius. Genius is a Java-based negotiation platform in which you can create negotiation domains and preference profiles as well as develop negotiating agents. The platform allows you to simulate negotiation sessions and run tournaments. More details can be found by following this link:

<http://ii.tudelft.nl/genius/>

Performance of the agents will be evaluated in a tournament setting, where each agent is matched with other submitted agents in pools, and best scoring agents move up to the next layer in the competition. Each set of agents will negotiate in a number of negotiation scenarios. Negotiations are repeated several times to obtain statistically significant results.

A negotiation scenario consists of a specification of negotiation issues and preferences of all negotiating parties. The preferences of a party are modelled using linearly additive utility functions.

Rules of Encounter

Negotiations are multilateral and based on a multi-player version of the alternating-offers protocol. Offers are exchanged in real time with a deadline after 3 minutes. The challenge for an agent is to negotiate with two opponents without any prior knowledge of the preferences and strategies of the opponent. Your agents are only allowed to use the information in the bid history. As agents negotiate repeatedly with the same agents they may learn from their previous negotiations with these opponents.

Agents will be disqualified for violating the spirit of fair play (e.g. accessing other party's preference profile). The board of the ANAC2018 competition will be the judge

on that (for more information, see <http://ii.tudelft.nl/anac/>). The competition rules allow multiple entries from a single institution, but require each agent to be developed independently.

Learning and Adaptation in Multilateral Negotiations

This year, we allow agents to access data from their past negotiation sessions. The agent can access the following information:

- The name and order of the agents involved in all their previous negotiations.
- The utilities of the exchanged offers in any previous negotiation session (according to its own utility space). It is worth mentioning that the agents can access their own utility of a given offer. They cannot see the utilities of the other agents in any previous negotiation sessions.
- The agreement that is reached by the agents it negotiated with.

Agents may use this information learn about and adapt to domain over time, and to use this information to negotiate better with their opponents. For details, please refer to the Genius manual and the frequently asked questions.

FAQ: <http://tinyurl.com/ANAC2018GeniusFAQ>

Multi-player Protocol

The multi-player protocol is a simple extension of the bilateral alternating offers protocol, called the Stacked Alternating Offers Protocol (SAOP). According to this protocol, all of the participants around the table get a turn per round; turns are taken clockwise around the table. The first party starts the negotiation with an offer that is observed by all others immediately. Whenever an offer is made the next party in line can take the following actions:

1. Make a counter offer (thus rejecting and overriding the previous offer)
2. Accept the offer
3. Walk away (e.g. ending the negotiation without any agreement)

This process is repeated in a turn taking clockwise fashion until reaching an agreement or reaching the deadline. To reach an agreement, all parties should accept the offer. If at the deadline no agreement has been reached, the negotiation fails. More information on the SOAP protocol can found at: *Reyhan Aydoğan, David*

Festen, Koen Hindriks, and C. M. Jonker, "[Alternating Offers Protocol for Multilateral Negotiation](#)", In K. Fujita, Q. Bai, T. Ito, M. Zhang, F. Ren, R. Aydoğan & R. Hadfi (Editors). *Modern Approaches to Agent-based Complex Automated Negotiation*, Springer Japan, pp. 153-167, 2017.

Evaluation

The performance of the agents will be determined by the **average individual utilities** gained by each agent, and the **average social welfares** gained by each agents, separately. That means, we have two categories for the winners: individual utility winners and social welfare winners. The teams of the top performing agents will be notified, and the final results and awards will be announced at IJCAI 2018.

It is expected that teams that make it through to the finals will have a representative attending the conference. We reserve the right to disqualify agents under certain circumstances (see <http://ii.tudelft.nl/anac/> for more information). Team in the final will be given the opportunity to give a brief presentation describing their agent at IJCAI.

Submission (Deadline: 31 May, 2018)

Participants will submit their agent source code and class files (in a .zip or .jar package) as well as a new multi-player negotiation scenario for three parties (i.e., domain.xml, profile1.xml, profile2.xml, and profile 3.xml). That is, each group will also submit a negotiation domain description and **three conflicting preference profiles** represented by means of linear additive utility.

Submission package: Please submit your application though the following link:

- <https://tinyurl.com/GENIUSANAC2018>

(Optional) Academic report: Each participant has the option to prepare a 2-page report describing the novel aspects of their agent according to academic standards. This report will be evaluated by the organisers of this league and will be considered for inclusion in the IJCAI workshop proceedings. For eligibility, your strategy should provide some novelty and contribution to the negotiation community.

This report is recommended to address the following aspects:

- **Bidding Strategy:** describing how your agent generates bid at its each turn.
- **Acceptance Strategy:** describing how your agent decides to accept or reject a given bid.
- **Opponent Modelling:** describing how your agent models its opponent (e.g. strategy, preferences etc.)
- **Learning from the past:** describing how the history of previous negotiation used in the strategy
- **Evaluation:** describing an evaluation against previous agents; for instance the results against winners of ANAC 2017 (e.g. PonPokoAgent, CauceusDC16, Rubick, ParsCat2, AgentKN, ParsAgent3) in a negotiation scenario in Genius and provide the results of the tournament in a table showing the average utility and average product of utilities gained by each agent.

Important Dates

Submission deadline: ~~May 21, 2018~~ => **May 31, 2018**
Notification to finalists: July 1, 2018
Event: 13-19 July, 2018

Questions and Answers

Feel free to ask your questions, see the following link: [here](#)

- **For frequently asked questions:**
<http://tinyurl.com/ANAC2018GeniusFAQ>
- **Send your questions:**
 - reyhan.aydogan@ozyegin.edu.tr
 - T.Baarslag@cwi.nl
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Genius Tutorial

Wiki page regarding developing an agent for multilateral negotiation in Genius: [here](#)