

Human-Agent Negotiation League

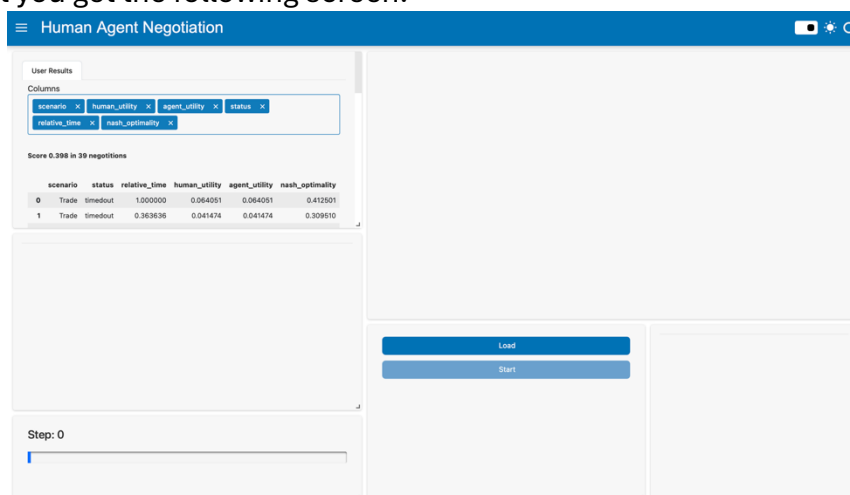
Briefing

Human-Agent negotiation, for this study, is the process of negotiating an agreement between a human and an AI agent.

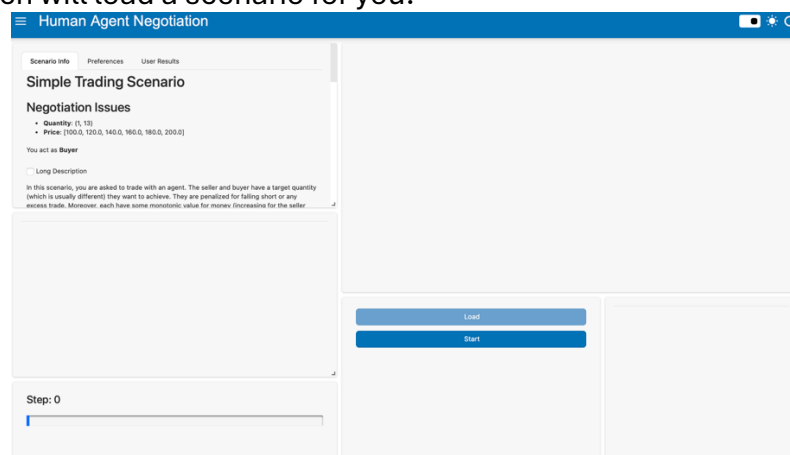
We use the Human-Agent Negotiation Interface (HANI) for experimenting with this type of negotiation.

The overall purpose and process of this study are described in the “Consent Form”. In this briefing, we will try to familiarize you with the use of HANI.

When you open the user-interface, you will be greeted with the login-screen. After that you get the following screen:



You can see your earlier results in the top left corner. To begin, press the “Load” button which will load a scenario for you:

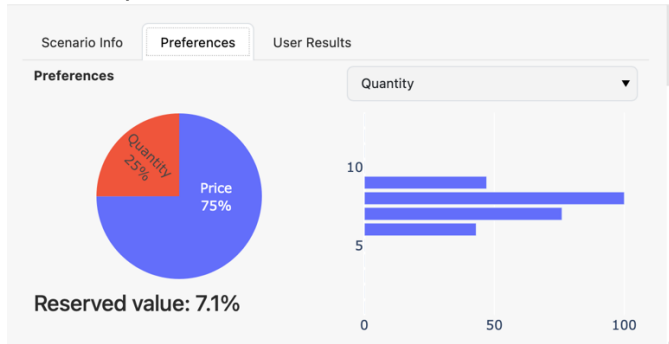


You can see now that the following tabs are added to the top left pane:

1. **Scenario Info:** describes the negotiation scenario. There is a short description and a long description. You can get the long description by checking the “Long Description” checkbox. The description provides the

issues that the negotiation will be about and the general context of the negotiation. We suggest reading the long description once per scenario. Note that the same scenario may appear repeatedly in multiple negotiations. *Please be sure to check your preferences every time as the same general scenario will have different preferences every time.* In this example, we have two issues: price and quantity

2. **Preferences:** Shows your own preferences for this negotiation. Here is an example:



To the left, you can see how important each issue for you is. In this example, price is 3 times as important as quantity.

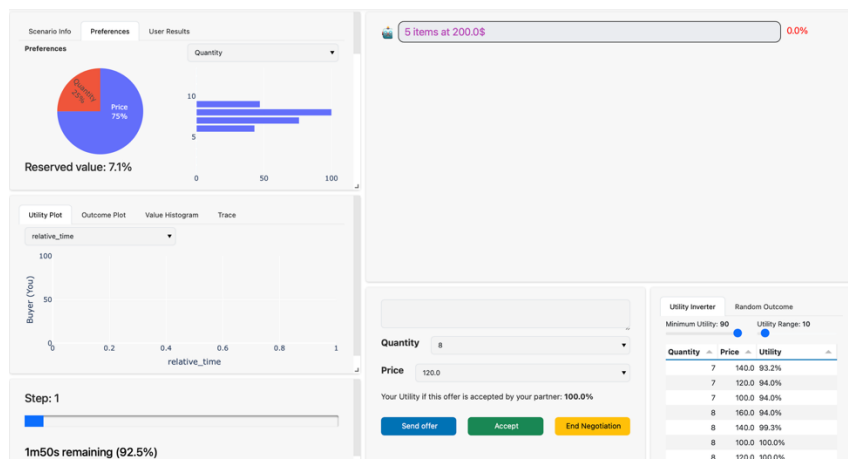
To the right, you can see the utility points you get for each value of each issue. In the example above, you want a quantity of 8 (which gives you 100 points). Agreeing on less or more incurs a penalty (i.e. leads to reduced utility).

Your AI partner has different preferences which may be similar or unsimilar to yours.

You can also see a reserved value which represent the utility you get if the negotiation did not end in agreement. It is 7.1 in our example (compare this to a maximum of 100 and you can see that it is beneficial to try to reach an agreement).

3. **User Results:** Your results so far.

After understanding the scenario and your preferences, you can press the “Start” button which starts the negotiation and starts counting time:



In the bottom right corner, you can see the current step of the negotiation, how many steps remain, and how much real time remain (1 minute 50 seconds in this case).

Above the times pane, you have a set of tools that can help you in the negotiation. We will explain these in details later. In this example, you have a utility-plot tool, an outcome-plot tool, a value-histogram tool and a trace tool.

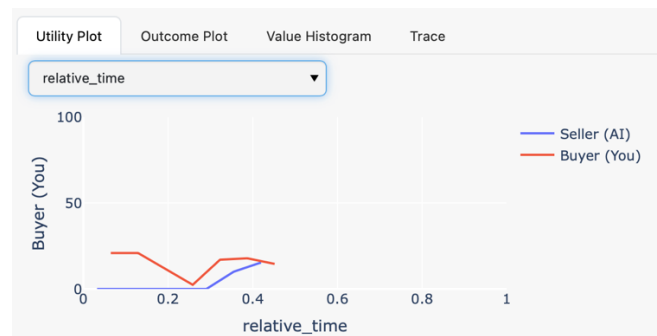
To the right, you can see the current negotiation:

- In the top right pane, you see the history of the negotiation.
- In the bottom right pane, you have tools that allow you to create offers randomly (Radom Outcome tab) or based on a utility range (Utility Inverter). For both tools, you select the input then press the “Set Offer” button to find an outcome that match the criteria you provided. In the screenshot above, the system displays all outcomes with utilities between 90 and 100 (max). You can select any one of these by pressing it and its quantity and price will be copied to the bottom-mid section which is used for offering to your partner.
- The bottom mid pane is the most important pane and is used to respond to the latest offer from your partner and giving them a counter offer if you do not accept their offer. You can do the following actions:
 - Accept Offer: ends the negotiation with success giving you and your partner the corresponding utility for the last offer received. You can see your utility in the right of the partner offer (last one in the history pane above). In the screenshot above, the partner’s last offer was 5 items at 200\$ which gives you a utility of zero. Because this utility is less than your reserved value (7.1), it is highlighted in red.
 - End Negotiation: ends the negotiation with failure giving you and your partner the corresponding reserved value. In this case, you get 7.1
 - Send Offer: Sends the offer selected including any free text you write in the textbox above the Quantity line. Your utility if this offer is accepted by your partner is shown (100 in this case). You can select any value for any issue manually or use the outcome generation tools on the right to generate outcomes in given utility ranges.

Support Tools

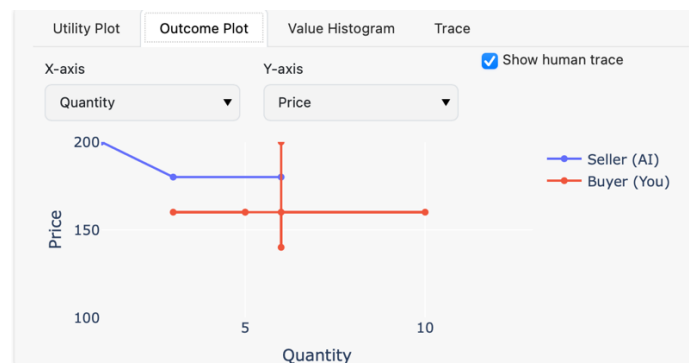
You can participate in the Human-Agent Negotiation League using the information provided so far in this briefing. Nevertheless, we provide some support tools that may be helpful for you in determining your negotiation strategy and next actions. This section describes the tools available in the HANI version used in the IJCAI 2025’s ANAC HAN competition.

Utility Plot



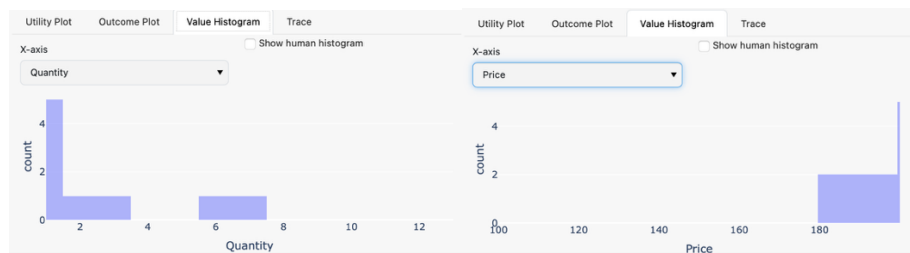
The utility plot shows the your utility of your offers (you) and your partner (AI) over time. You can use the step number, real time or relative time (a value that goes from zero at the first step and 1 at the end of the negotiation). This can help you determine how much did you and your partner concede over time. In the example above, your curve shows that you did not concede in the beginning then conceded too to a very low utility (which your partner did not accept suggesting that this was not a good option for them as well), and then went up with an offer with a higher utility then conceded again slowly this time. The AI offered you outcomes with very low utility for the first 25% of the negotiation time then started to offer you outcomes with higher utilities.

Outcome Plot



The outcome-plot is similar but displays two of the negotiation issues on the x and y axis. Here we have quantity on the x-axis and price on the y-axis. You can see that the AI started with the highest price (200) and lowest quantity. Because the AI is a seller, it makes sense that they offered the highest price first. Moreover, this may suggest (if the AI is not trying to confuse us) that its best quantity is 1 (what it offered in the first offer). Moreover, we can see that over time, the AI reduced the price to 180 but not lower and started increasing quantity up to 6. You can use this kind of information to judge the likely goals of the AI (low quantity high price) and adjust your offers accordingly.

Value Histogram



The value histogram is a useful tool for understanding which values of each issue are preferable by your AI partner. You can select an issue, and the system will show you a histogram of how many times did the AI partner offer each one of these values.

In the example above, you can see that the AI offered the quantity 1 the most (5 times) and offered no quantities above 8. This may suggest that their preferences is for a lower quantity. You can see also that it offered the price of 200 (max) 6 times and 180 twice and no other prices which is reasonable giving that it behave as a seller preferring higher prices.

Trace

The trace tool gives you a table of all the offers exchanged so far in this negotiation:

Utility Plot	Outcome Plot	Value Histogram	Trace	
step	relative_time	negotiator	offer	Buyer (You)
0	0.032258	Seller (AI)	(1, 200.0)	0.000000
1	0.064516	Buyer (You)	(5, 160.0)	0.209089
2	0.096774	Seller (AI)	(1, 200.0)	0.000000
3	0.129032	Buyer (You)	(5, 160.0)	0.209089
4	0.161290	Seller (AI)	(1, 200.0)	0.000000
5	0.193548	Buyer (You)	(3, 160.0)	0.116775
6	0.225806	Seller (AI)	(1, 200.0)	0.000000
7	0.258065	Buyer (You)	(10, 160.0)	0.024461
8	0.290323	Seller (AI)	(1, 200.0)	0.000000

For each offer, you can see the step it was offered in, who offered it (negotiator), the relative time (goes from zero to one always), the offer itself and your utility for this offer.