AgentVSCforOneShot for ANAC SCML OneShotTrack

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Abstract

This report provides an explanation of AgentVSCforOneShot for ANAC2023 SCML OneShot Track. AgentVSCforOneShot is an improved SyncAgent to achieve a better agreement. AgentVSCforOneShot obtained a higher score than SyncAgent and other sample Agents in my experiments.

1 Negotiation Strategy

This section explains how to manage the negotiation strategy of offering strategy and acceptance strategy. AgentVSCforOneShot is an improved version based on SyncAgent, which is a greedy agent inherited from OneShotSyncAgent to handle all negotiations synchronously. AgentVSCforOneShot will try to agree with terms that better meet the number of input products or output products needed than SyncAgent.

1.1 Offering Strategy

AgentVSCforOneShot makes a common proposal to all negotiators, the values of those issues are the following.

- QUANTITY : The needed quantity of input products or output products divided by the number of negotiators that have not agreed. This deals with the risk of agreement on a quantity in excess of the needed quantity.
- UNIT PRICE : If buying, the lower of the unit price options in the negotiation, otherwise the higher of it.

Table 1: Agents Scores

Agent Type	mean	min	25%	50%	75%	max
AgentVSCforOneShot	1.15	0.82	1.00	1.13	1.24	1.67
GentleS	1.120	0.66	0.95	1.17	1.29	1.64
AgentSAS	1.013	0.58	0.96	1.08	1.25	1.69
PatientAgent	0.81	0.07	0.69	0.82	1.01	1.31
SyncAgent	1.09	0.53	0.94	1.10	1.22	1.69

1.2 Acceptance Strategy

When AgentVSCforOneShot receives offers from its negotiators, it selects a good combination of the offers and decides whether to accept or reject them. First, AgentVSCforOneShot sorts the offers in descending order of unit price if selling, otherwise in ascending order of it. Next, AgentVSCforOneShot sorts the offers in descending order of quantity. Then, AgentVSCforOneShot picks offers one by one from sorted offers and if they do not exceed the needed quantity, select them as candidates to accept. Finally, if the normalized utility value of the combination exceeds the threshold, AgentVSCforOneShot accepts offers in the combination and rejects the other offers, otherwise, it rejects all offers. The utility function is defined as AgentVRCforOneShot's profits. The threshold th_r depends on the average number of elapsed negotiation rounds $r(0 \leq r \leq R-1)$ and is determined by Equation (1) below.

$$th_r = 0.1 + 0.8(1 - \frac{r}{R-1})^2 \tag{1}$$

The concessions shown in Equation (1) address the risk of not agreeing.

2 Evaluation

To evaluate AgentVSCforOneShot, I tested AgentAgentVSCforOneShot in 30 simulations against SyncAgent and the top 3 agents in SCML2022 OnShot Track, PatientAgent, GentleS, and AgentSAS. The configurations for the competition are n_steps:100 and $n\_configs$:10. The results are shown in Table 1.

As Table 1 shows, the mean score of AgentVSCforOneShot is the same level as GentleS and higher than those of any other agents.