Quantity Oriented Agent

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Introduction

For the SCML 2023 competition, it is established that the maximum trading price and the minimum trading price are consecutive values. The quantity to be negotiated in the contracts should be the single most important aspect to be considered [1].

Quantity Oriented Agent was developed to *efficiently* match the amount determined in the exogenous contract to the number of products negotiated with the other agents, to avoid being penalized.

Layout and definitions

The simulation replicates a supply chain with 2 layers, and each agent controls a factory. The agents are bound by an exogenous contract, which creates the supply and the demand.

The agents negotiate the price and quantity of the intermediary products through contracts.
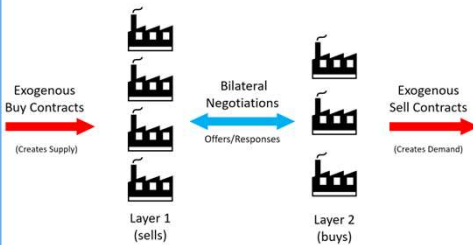
Definitions:
- **Best Price:** the price that maximizes the agent's profit L1: p_{max}, L2: p_{min}.
- **Worst Price**: the price that minimizes the agent's profit L1: p_{min}, L2: p_{max}.
- **Exogenous quantity:** the amount established by the exogenous contract, which must be matched during the negotiations.
- **Secured quantity:** the total number of products the agent successfully negotiates through all its contracts.
- **Agent's needs**: the difference between the exogenous amount and the secured amount.

Strategy

Proposal strategy:

To minimize rejections based on quantity, Quantity Oriented Agent divides its needs by two (rounded up), if its needs are superior, or equal to 5. Otherwise, it simply offers what it currently needs.

The agent always offers the Best Price for itself. At the last step of proposals, Quantity Oriented Agent concedes on the prices, offering the Worst Price, to minimize the risks of not matching the exogenous amount. The agent adopts the same general strategy, regardless of its layer.

Resoponse strategy:

The agent accepts any proposals, regardless of price, as long as the established quantity in the contract is lower or equal to the agent's needs .

During the last proposal it receives, Quantity Oriented Agent attempts to minimize the modulus of difference between the quantity determined by the exogenous contract and the number of products negotiated.
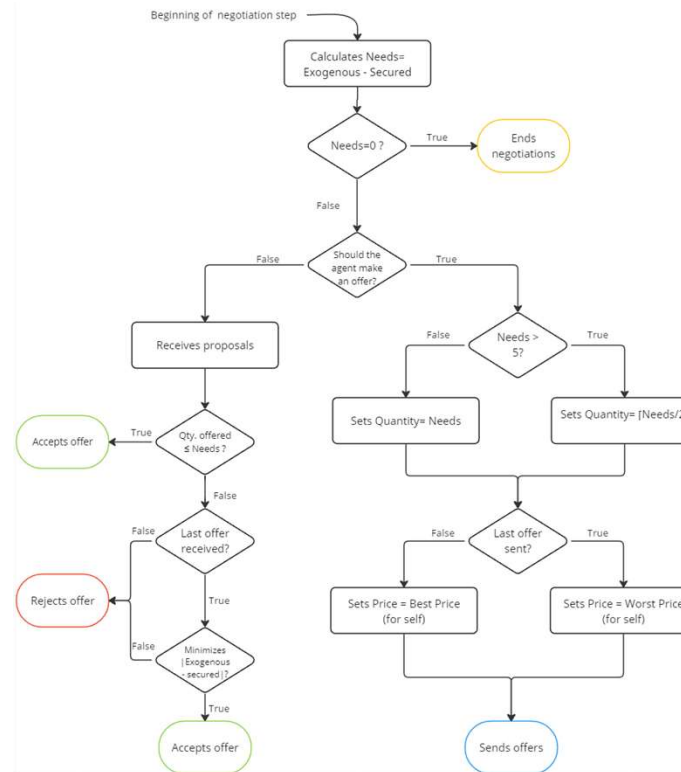
Results and analysis

Quantity Oriented Agent performed better and more consistently than the standard SCML agents (e.g, Better Agent, Simple Agent, Greedy OneShot Agent).
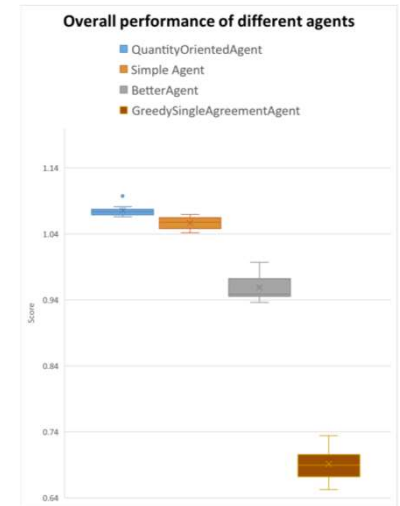
This indicates that it is able to efficiently match the exogenous quantity, and to minimize its potential losses.

References

[1] Y. Mohammad, "Developing an agent for SCML2023 (OneShot)- Effect Of Price" www.yasserm.com. http://www.yasserm.com/scml/ scml2020docs/tutorials/02.develop_agent_scml2020_oneshot. html#effect-of-price-new-in-2023 (accessed May 1, 2023).

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