

AgeAgeAgent: An Agent Submitted to the ANAC 2026 SCM League

Yuto Morikawa
Nagoya Institute of Technology, Aichi, Japan
yu-mori@ozlab.org

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1 Introduction

In the SCML Standard Track, each agent earns profit by purchasing raw materials from suppliers, using them to produce products, and selling the products to consumers. However, maximizing profit requires more than simply selecting low-priced buy offers or high-priced sell offers. Excessive purchases of raw materials increase inventory costs, while excessive sales contracts may lead to shortfall penalties if the agent fails to produce enough products to satisfy them.

Furthermore, in SCML, multiple negotiations proceed simultaneously. Therefore, if each offer is evaluated independently, the agent may end up accepting contracts that exceed its required quantity, or conversely, fail to secure enough contracts to meet its production needs. For this reason, it is important to select a feasible combination of contracts by comprehensively considering current inventory, existing contracts, production capacity, delivery time, price, and the reliability of negotiation partners.

To address this problem, AgeAgeAgent adopts a negotiation strategy that combines history-based partner evaluation with delivery-step-based need estimation. It uses the success rate, average transaction quantity, and average price of each negotiation partner to determine proposal targets and offer prices. In its acceptance strategy, the agent selects a set of offers so that the quantities of buy and sell contracts are appropriately balanced.

2 The Design of AgeAgeAgent

The basic policy of AgeAgeAgent is to select a contract set that is executable under inventory, production-capacity, and delivery-step constraints, rather than evaluating each offer independently.

2.1 Initial Proposal Strategy

AgeAgeAgent first calculates the required buy quantity and the required sell quantity at the current step. The required buy quantity is determined based on the current inventory, existing purchase contracts, existing sales contracts, and the number of production lines. If the current inventory and existing purchase contracts are not sufficient to satisfy the quantities required for sales contracts or production, the required buy quantity increases. On the other hand, the required sell quantity increases when the existing sales contracts are insufficient relative to the production capacity.

In selecting proposal targets, AgeAgeAgent assigns a score to each negotiation partner. The score is calculated as a weighted sum of two normalized values: $priceScore_i$, which represents the favorability of the price condition, and $successRate_i$, which represents the historical negotiation success rate. The score of partner i is defined as follows:

$$score_i = \mu \cdot priceScore_i + (1 - \mu) \cdot successRate_i.$$

Here, μ is a weight that determines how much importance is placed on the price condition. In AgeAgeAgent, μ is adjusted so that the weight of the price condition becomes larger as the target delivery step becomes farther from the current step. As a result, the agent emphasizes the certainty

of reaching an agreement for near delivery steps, while it places more emphasis on favorable price conditions for distant delivery steps.

AgeAgeAgent assigns proposal quantities to partners in descending order of their scores, based on the average transaction quantity of each partner. If the required quantity cannot be satisfied using only the average transaction quantities, the agent redistributes the quantities after adding a small amount to the average transaction quantity. However, if the required quantity still cannot be satisfied, the agent does not make excessively large proposals and instead proposes only the quantities that can reasonably be assigned. This design enables the agent to try to secure the required quantity while avoiding unnaturally large contracts.

Partners that are not used at the current step are treated as candidates for future contracts. For future contracts, AgeAgeAgent checks the required quantity in order from near delivery steps and selects proposal targets using a knapsack method based on the partner scores.

This allows the agent to prioritize not only partners with high scores, but also partners that can offer quantities that are effective for satisfying the required quantity. Therefore, AgeAgeAgent can secure future contracts in a planned manner while giving priority to contracts required for current production and sales.

2.2 Offer Acceptance Strategy

In the acceptance strategy of AgeAgeAgent, the agent first checks whether each offer received from a negotiation partner satisfies the minimum profit condition. Offers that satisfy this price condition are divided into buy and sell offers, and are then classified by delivery step. In SCML, the value of a contract depends not only on its price but also on its delivery timing. For example, even if the agent concludes a sales contract, a shortfall penalty may occur if it cannot secure the required raw materials by the corresponding delivery step. Therefore, AgeAgeAgent selects a feasible set of contracts by matching the quantities of buy and sell contracts for each delivery step.

At each delivery step, the agent constructs subsets of buy offers and sell offers, and selects the most appropriate combination among them. For buy offers, the agent gives priority to combinations with a smaller total payment among those that achieve the same quantity. For sell offers, the agent gives priority to combinations with a larger total revenue among those that achieve the same quantity. Then, the agent selects a combination such that the inventory level after the contracts does not fall below the required inventory level. Combinations that lead to inventory shortages are not selected, because they may result in shortfall penalties.

AgeAgeAgent also considers the temporal relationship between buy contracts and sell contracts. Since buy offers may be used for sales contracts immediately after their delivery, the agent treats not only buy offers at the current step but also buy offers from one step earlier as candidates that can support sell contracts at the current step. This makes it easier to align the timing of raw material arrivals and product sales, aiming to conclude contracts while avoiding inventory shortages.

3 Conclusion

In this report, we described the design of AgeAgeAgent, a negotiation agent developed for the ANAC 2026 SCML Standard Track. AgeAgeAgent mainly consists of an initial proposal strategy and an offer acceptance strategy. In the initial proposal strategy, the agent calculates the required quantities for both the current and future delivery steps, and selects proposal targets using scores based on price conditions and historical success rates. This enables the agent to plan contracts according to its needs while giving priority to reliable negotiation partners.

In the offer acceptance strategy, the agent first checks whether each offer satisfies the minimum profit condition. It then classifies buy and sell offers according to their delivery steps and selects combinations of contracts that are expected to be profitable while avoiding inventory shortages. This allows the agent to make decisions by considering not only price, but also quantity, delivery step, inventory, existing contracts, and production capacity.

The main feature of AgeAgeAgent is that it does not evaluate individual offers independently. Instead, it treats multiple simultaneous negotiations as a whole and attempts to select a feasible set of contracts. By considering the balance between purchases and sales, AgeAgeAgent aims to achieve stable profit while reducing the risks of shortfall penalties and excessive inventory. Future work includes improving the estimation of negotiation partners' behavior and dynamically adjusting price conditions and risk tolerance according to the agent's inventory level and market situation.