Penguin Agent

An agent submitted to the ANAC 2024 SCM league

Kazusa Goh, Takanobu Otsuka

Nagoya Institute of Technology, Aichi, Japan

Outline

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1. Introduction

In the Real World

Profitable options

- Reducing the cost of creating a product
  - ➢ cost of factory land, equipment maintenance, employee wages, inventory management
- Adding value to the product
- Making factory larger

In the SCML World

There are some differences

- The size of factory and the products to be manufactured are fixed
- There are only two types of unnecessary costs
  - ➢ costs of raw material inventory, penalties paid for shortages of products to be sold

From these differences,
reducing unnecessary costs is effective for generating profits

2. Our Strategy: Calculating Needs

Main strategy

- Reduce unnecessary costs

→ Calculating necessary quantities to buy and sell
(Difference from daily production volume)

Calculating necessary quantities of raw materials

- Securing the daily production volume

→ Subtract the existing stock and the contracted quantities at that step from the daily production volume

$$needs = daily\_production - stock\ - contracted\_quantities_i$$

needs:	necessary quantities of raw materials at step i
daily_production:	dairy production volume
stock:	existing stock of raw materials
contracted_quantities:	contracted quantities at step i

2. Our Strategy: Calculating Needs

Calculating necessary quantities to sell

- If there is excess stock of raw materials, producing more than the daily production volume
- Do not exceed the maximum daily production
  - Maximum value as the maximum daily production capacity

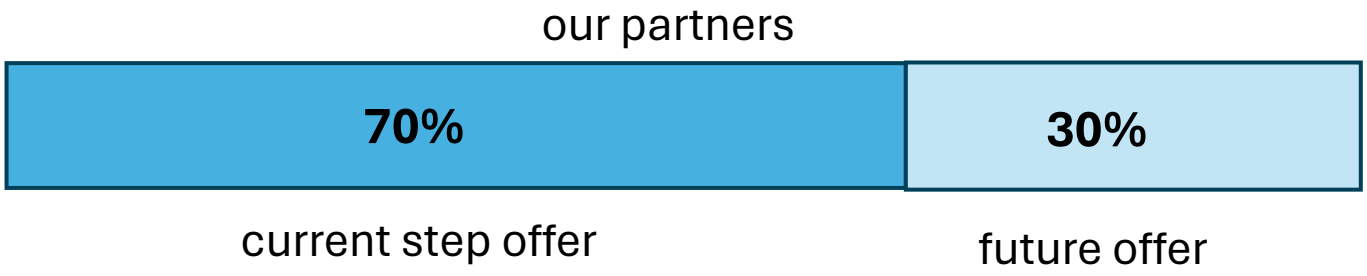
$$needs = \min(n\_lines, daily\_production + stock) - contracted\_quantities_i$$

needs:	necessary quantities to sell at step I
n_lines:	maximum daily production capacity
daily_production:	dairy production volume
stock:	existing stock of raw materials
contracted_quantities:	contracted quantities at step i

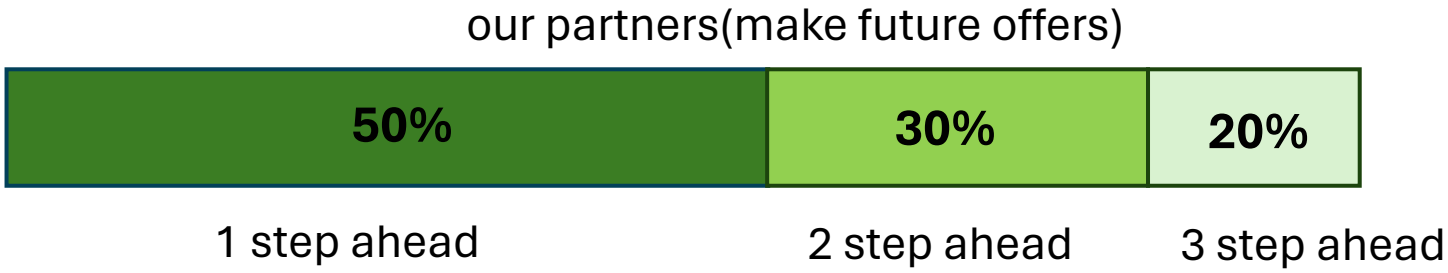
2. Our Strategy: Make Our Offer

Make offers sent from our agent to partners

- We offer necessary quantities in current step to 70% of our partners
- We make future offers to the remaining 30% of our partners



- We divide 30% of our partners into proportions of 50%, 30%, and 20% and make offers for 1, 2, and 3 steps ahead, respectively



2. Our Strategy: Counter Partner's Offer

- We Separate the received offers into those for the current step and those for the future step

Counter current step offer

- For current offers, we find all subsets of the set of offers and calculate the difference between each subset and the required amount
- We accept the subset of offers with the smallest difference
- Even if the offer quantity exceeds the required amount, we accept it if it exceeds by less than 10%

Counter future step offer

- We record the accepted quantity for each step when accepting the offer.
- We accept the offer if the quantity of raw materials/sales in the offer, combined with the quantity already accepted, falls below the required amount

3. Experimental Result

- We added GreedyStdAgent, SyncRandomStdAgent as competitors
- We ran five simulations

Table: Experiment Result

Experiments	PenguinAgent (MyAgent)	GreedyStdAgent	SyncRandomStdAgent
1	0.99	0.70	0.48
2	1.00	0.66	0.57
3	0.94	0.66	0.53
4	1.13	0.67	0.50
5	1.03	0.75	0.51
Average	1.02	0.69	0.52

- This table shows that Penguin Agent has the best score all five times

4. Conclusion

- We created an agent named PenguinAgent
- Our Strategy is to make a profit by reducing unnecessary costs
- We aim to prevent buying/selling excess quantities by calculating the required amount for each step
- As an experimental result, our agent achieved better scores than the other agents in all five runs