

May 9, 2024

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S C M L O n e S h o t T r a c k

# D i s t R e d i s t A g e n t

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# Overview

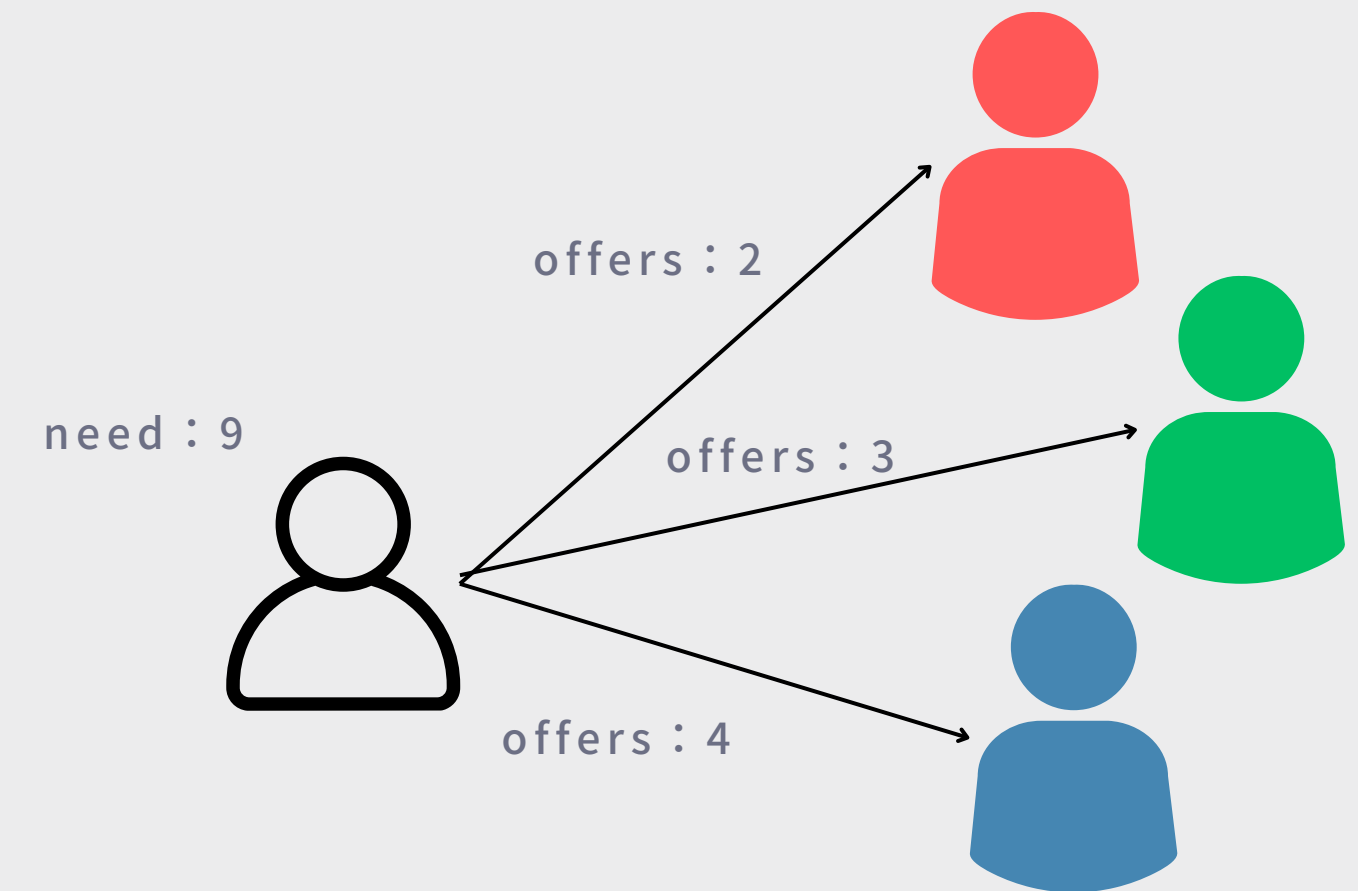
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## SCML OneShotTrack 2024

- Range of unit price is narrow.
- Quantity is more important than Price.

## DistRedistAgent's concepts

- Tries to secure **needed\_supplies** and **needed\_sales**.
- Aims to **minimize** the cost due to **Disposal** and **Shortfall**.
- Designed to **distribute** it's needed contract quantity to partner agents wisely.
- If offers it got are not so good to accept, it **redistributes** it's needed quantity and conduct reproposal.
- **3 types** of distribution methods and select depending on the situation.
- Based on the OneShotSyncAgent in the SCML 2024 tutorial.



## Accept Strategy

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- ① If “contract quantity = needed contract quantity” → ACCEPT
  - Otherwise, it selects the option with as highest utility as possible.
  - ”needed contract quantity” means “needed\_supplies” or “needed\_sales”
- ② Aims “contract quantity ≤ needed contract quantity” as much as possible
  - Once contracts with excessive quantity are agreed, it canNOT be revoked.  
→ The ideal result is absolutely missed !!
  - There is still a possibility of compensating for insufficient contract quantity through negotiations with other agents in the remaining rounds.
- ③ Sets minimum requirements that an accepted offer must meet.
  - Too unfavorable offers should not be accepted
  - Conduct reproposal instead.
- ④ As rounds progress, it becomes more open to accepting excessive quantity
  - Making concessions to the negotiating agents.

# Distribution Methods

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3 types of distribution methods.

- ① Using accumulated information
- ② Using information about previous offers
- ③ Random distribution

- ① → used in First Proposal
- ② → used in Counter All
- ③ → used with a certain probability

## Distribution ① : use accumulated information

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collect 3 types of information from each negotiation partner through past negotiations.

- ① NS : Number of all the successful contracts
- ② TQ : Total quantity contracted through the simulation with the agent
- ③ NU : Number of all the unsuccessful contracts

calculate the value P shown below

$$P = \left( \frac{TQ}{NS} \right) \times \left( \frac{NS}{NS + NU} \right)$$

P = (average contracted quantity) × (possibility of successful contracts)

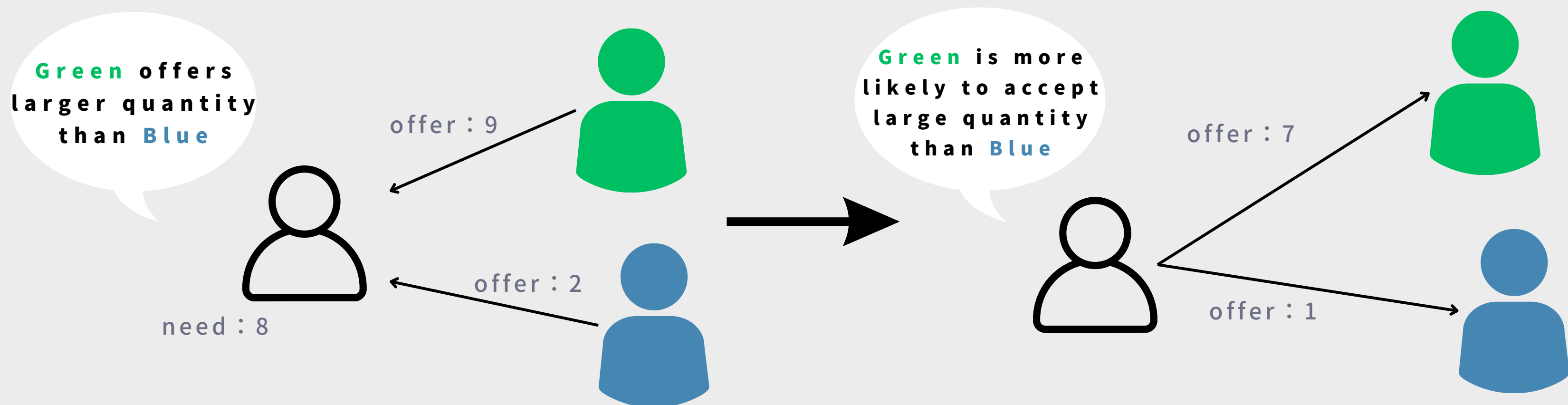
Agents with higher P are more likely to agree to contracts with more quantity  
→ offers with a higher quantity will be proposed to them.

This distribution method is used in **First Proposal function**

## Distribution ② : use previous offers information

Partner agents which proposed offers with larger quantities are more likely to agree to contracts with larger quantities.

→ Offers with a larger quantity will be proposed to them.



This distribution method is used in **Counter All function**.

→ If offers are not so good or there is remaining quantity to contract, DistRedistAgent will redistribute it's needs by this method.

## Distribution ③ : Random Distribution

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- It just **randomly** distributes its required contract quantity to partner agents.
- In expectation of most offers being rejected, it distributes **1.35 times** the required contract quantity in advance.
  - This is based on the **designer's empirical rule** that the possibility of all random offers being accepted is very low.
- This distribution method is used in the First Proposal function and Counter All function with **a probability of 7 %**.
  - This contributes to gaining diverse information about other agents.



# Experimental result

- DistRedistAgent demonstrated superior performance compared to other sample agents. (Figure 1)
- Also, even in the late stages of the live competition, DistRedistAgent usually performed well enough to remain in the top ranks. (Figure 2 : yellow line)

	agent_type	score
0	DistRedistAgent	1.09072
1	SyncRandomOneShotAgent	1.06112
2	BetterSyncAgent	1.05671
3	RandomOneShotAgent	0.81646

Figure 1

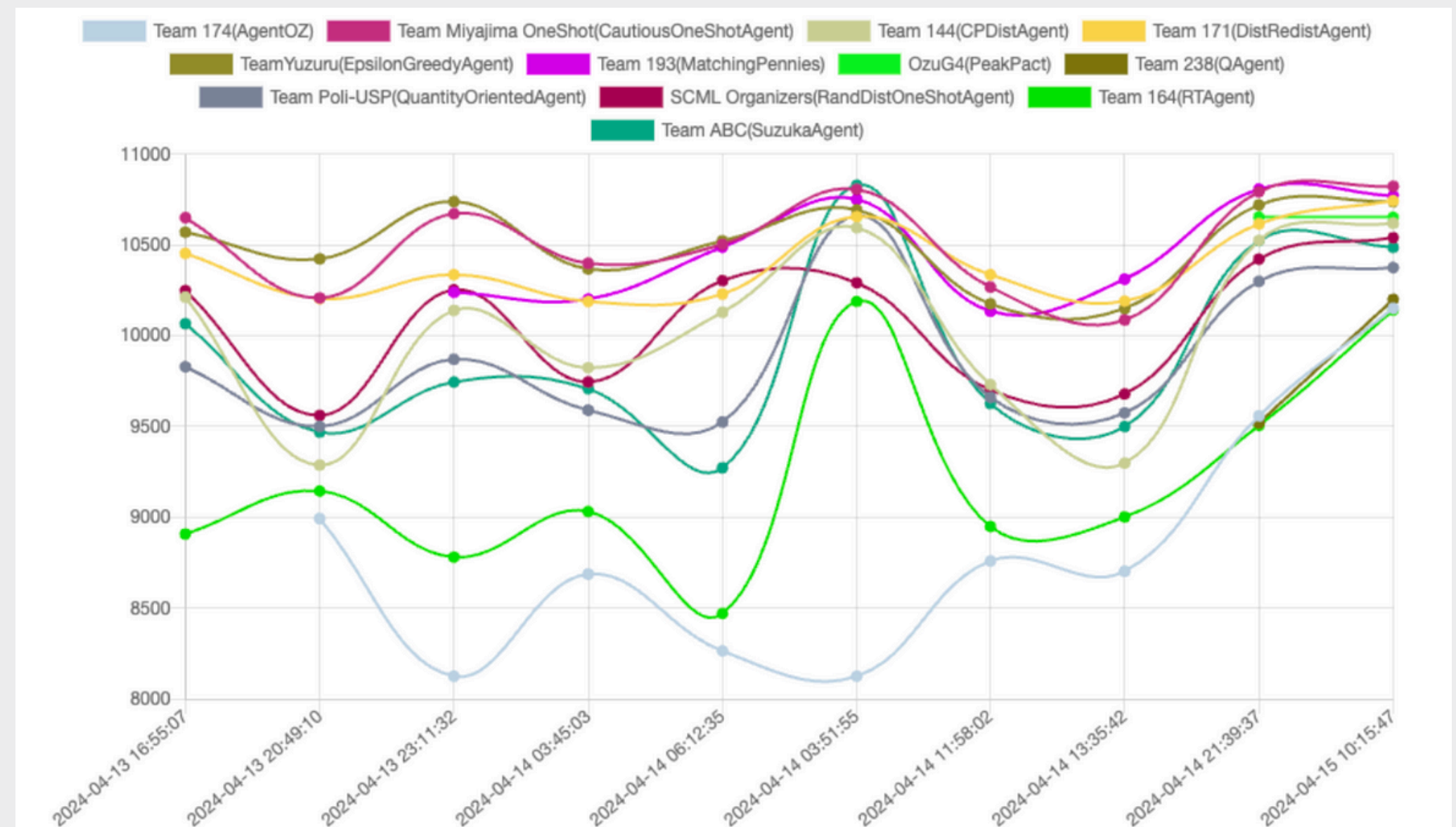


Figure 2



**THANK YOU!**