SCML Agent "Zilberan"

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Overview

Our agent using several approaches for maximize the profits:

- **Price Ranges Learning** by adapting the range to the partner strategy (l264).
- **Safety Margins** Do not accept non-profitable contracts (l247).
- **Recognizing "Weak" Behavior** of the partner (l276).
- **Tracking Best Prices** that were bidded in the negotiation.
- **Market Price Learning** to understand which proposals are profitable for our agent.

Combination of those approaches will help us recognize profitable & non-profitable proposals, maximize our profits by taking advantage of the partner strategy.
Code: https://github.com/idoazzz/scml_agent

Classify "Weak" Behavior & Price Ranges Learning

We keep track of the partners ACCEPT/REJECT offers (each partner is tracked).
Our aim is to recognize agents who compromise and ACCEPT more than they REJECT.
If it's the case we decrease our "slack" and adjust our prices range to make higher profits.
How? If we buy - propose a lower price. If we sell - propose a higher price.

If we see that the partner **still** ACCEPT our proposals after we proposed offers which are less-profitable for him, we will increase our profits by adjust the price for more profitable price, and each round that the user stays in his category (Weak/Not Weak) will adjust the rate that we increase/decrease our prices proposals.

Also, Each step the partner is still in its category (Weak/Not Weak) will be recorded to calculate the profit gain rate.

If we see a Not-Weak agent, we will compromise our proposals in order to still get some profits (even smaller).

In each negotiation end we update our slack.

Example for Weak partner scenario
We are the sellers. Recognition process shows that our partner is "Weak" because he accepted our last 10 proposals. We started to increase the proposal prices, in the start, by a little bit.
If we see that the other agent is still accepting our offers, we will increase our "increasing rate" and bid higher prices.
It lets us maximize our profits by adjusting the increasing rate.
We can refer to the "increasing/decreasing rate" adjustable parameter as the Explore/Exploit indicator.
Strong partner will get better proposals but those proposals are still **profitable** for us (Safety Margins).

Prices Ranges
With this classification & Prices ranges calculation we perform with the best prices tracker and (explained in the next sections) is used in `_is_good_price,  _find_good_price` and `best_offer` to recognize good offers and decline bad offers, and propose good prices (for us). Combination of LearningAgent slack and this extended behavior which uses the "Weakness" behavior of each partner help us gain profits.

Safety Margins

Our agent has a Safety Margin when he sells the products. He won't sell the product for losing prices because this behavior will accumulate losses.

Tracking Best Prices

Our agents determine the "best prices" range by record and save the best price we saw in the negotiations (for sell & buy). Those parameters used in the price range calculator with the slacks we received from the "Weak" classifier.

Market Price Learning

We save all the past market prices to perform Linear Regression on those prices and predict our new **nowaday** price. This learning gives us a way to understand and determine which prices are more profitable.

Basis Agent Skeleton

Our agent skeleton is based on the basic agents of SCML that implement the basic strategy of price ranges, calculating best offers according to the given price ranges, and calculating the needed units. We used their interfaces and the basic logic of those agents to override and extend their behavior to insert learning processes.