BRAM Agent

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General Description:

BRAM agent learns the opponent's preferences from its offers and suggests bids accordingly, while preserving a pre-defined utility threshold. BRAM will receive any offer with utility greater than the threshold, which is updated during the negotiation according to the elapsed time and the discount factor.

Threshold Value:

The threshold is calculated as a pre-defined percentage of the maximum utility that can be achieved at the current moment (0-60 seconds: 93% of the maximum utility, 60-150 seconds: 85%, 150-175 seconds: 70%, 175-180 seconds: 20%).

Learning the opponent's preferences:

BRAM collects the last 10 offers received from the opponent. The number of times each value of each issue was included in an offer is updated (real and integer issues are discretized). For example, in the ItexvsCypress domain, the data structure is as follow:

Price		Delivery		Payment		Returns	
Value	Count	Value	Count	Value	Count	Value	Count
$4.37	0	60 days	10	Upon delivery	5	Full price	3
$4.12	3	45 days	0	30 days after delivery	5	5% spoilage allowed	3
$3.98	7	30 days	0	60 days after delivery	0	10% spoilage allowed	4

In this example, the opponent seems to prefer that the delivery will be in 60 days, since it was requested in all of his last 10 offers. However, there is no obvious preference for a particular value for the return issue.

Selecting a bid to offer:

At the beginning of the negotiation, BRAM creates an array with all the possible bids in the domain (or all the bids he managed to create in 2 seconds). The array is sorted in a descending order according to the utility values.

The first 10 offers BRAM makes contain the bid with its maximum utility. During this time, the initial data for the opponent's modeling is gathered. Then, in each turn, BRAM tries to create a bid that contains as many opponent's preferred values as possible, with a utility greater than the threshold (or equals). If BRAM fails to create such a bid, a bid will be selected from the bids array that was created at the beginning of the session. From his last offer's position (in the array), BRAM chooses randomly a nearby bid.