

Agent Appaloosa

The Appaloosa agent is a time based conceder, which makes adjustments according to its minimum accepted utility threshold, which depends on a model constructed by logistic regression. Since machine-learning libraries are allowed, I used Weka library, which is a machine-learning library for Java, in order to build a logistic regression model

Bidding Strategy

The logistic regression model classifies the bids as reject / accept based on the previous sessions' data. The inputs are time and the weight of the bids. At the first session, bid generation process based on creating random bids that are greater than the utility threshold of that time. After the first session, the agent builds the logistic regression model based on the past data. The bidding strategy changes after the regression model builds. By getting help by SortedOutcomeSpace, the agent gets all of the possible bids that are above the minimum utility threshold and sort the bids by their probability of being accepted. An array list keeps 10 bids that have the most utility. After the array list is constructed, with a probability of 0.2, the bid with the biggest probability of being accepted is offered. With a 0.8 probability, a bid will be offered out of the rest nine bids with a uniform distribution. This array list is updates when the utility threshold changes.

Acceptance strategy:

My acceptance strategy is very basic that if an offer has an utility above the agent's minimum utility threshold at that time, the agent accepts the offer.

Opponent Modeling

I used logistic regression for opponent modeling. I modeled the opponents as 1/0 classification model where 0 implies rejection of the offer and 1 implies the acceptance. Since the agent needs enough data to make accurate predictions, the first sessions with opponents are played without an opponent model. At the end of all sessions, all of the bids are recorded into an arff file. At the beginning of each session (except the 1st session), the opponent model is built by Weka library's logistic regression class. As it is said before, the bids are stored with the weights of each issues and the time value of that time. As the volume of the data increases, the predictions get better.

Learning

Learning improves as opponent modeling improves. As the volume of data increase, the logistic regression model get better at predicting the acceptance probabilities in the utility space.