

ID2209 – Distributed Artificial Intelligence and Intelligent Agents

Assignment 2: FIPA Contract Net Protocol

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November 20, 2019

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1 Introduction

Assignment Description

This assignment is about the interaction of agents in GAMA [1] based on Auction theme. There are agents in the simulation ground who like to participate in auctions of the articles of their interest. There are auctioneers which announce the auction proceedings and update the auction participants as the event progresses.

How to run?

Run GAMA Platform - v1.8.0 (<http://gama-platform.org>) and import project Assignment2. Press main to run the simulation. Note that the number of agents, auctioneers, and the time step can be changed by changing the global parameters. There are four models in the projects which can be simulated. These are:

1. Basic model
2. Challenge 1
3. Challenge 2
4. Creativity

2 Species

2.1 Participant

These are the agents as potential participants in the auction and their quantity is determined by the user (default is 10). They have two main attributes: interest and money. Their main function is to purchase the object of their interest by attending the object's auction and buying it by bidding against the other participants. It communicates with the auctioneer via FIPA contract net protocol. It moves around the ground randomly when nothing of interest happens.

2.2 Initiator

The initiator or the auctioneer calls for auctions of specific items and invites interested participants. The auctioneer communicates or broadcasts the auction proceedings to the auction participants. The initiator number can also be defined by the user (default is 1).

3 Implementation

Firstly, the two different kinds of agents as stated earlier were created making sure each agent looks different and more close to real life. The next logical step was to set the behaviour of the participants which was defined as to move until an interesting auction happens. If there is a call for auction of the category of their interest, they move to the auctioneer announcing the auction to buy the item by means of bidding. When the auction is over (when the item is sold or the bid has reached its minimum possible price), they go back to some random place on the map. All the interaction between agents is carried using the FIPA contract net protocol in GAMA and reflex actions are used to monitor the money of the participants.

4 Results

As it can be observed from figure 1, both agents are in the playground as expected. Few guests are moving randomly while others are approaching the place of auction upon announcement by the initiator. After the auction has ended, they go back to random positions and continue moving around until another auction takes place.

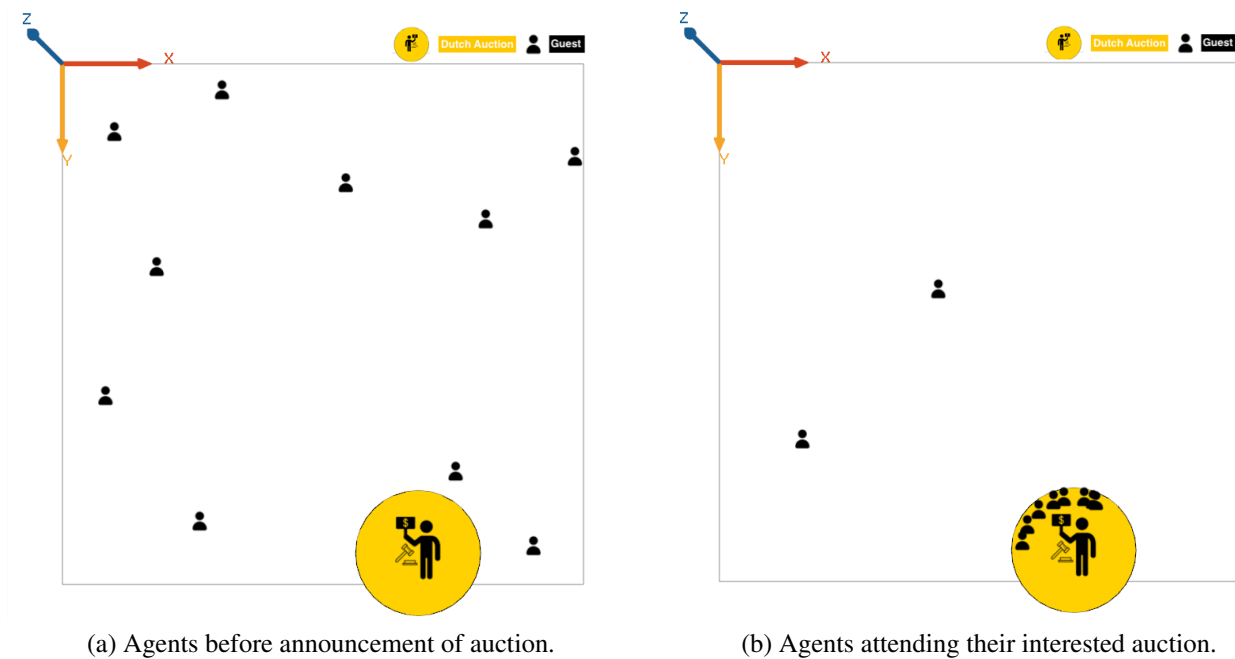
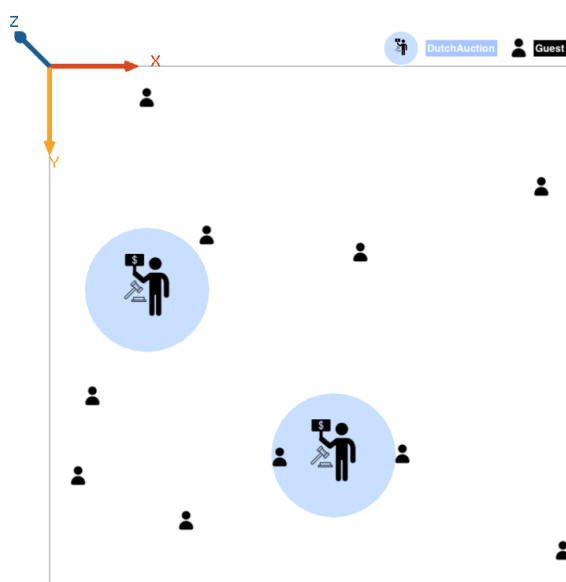


Figure 1: Behaviour of agents during the auction process. [2]

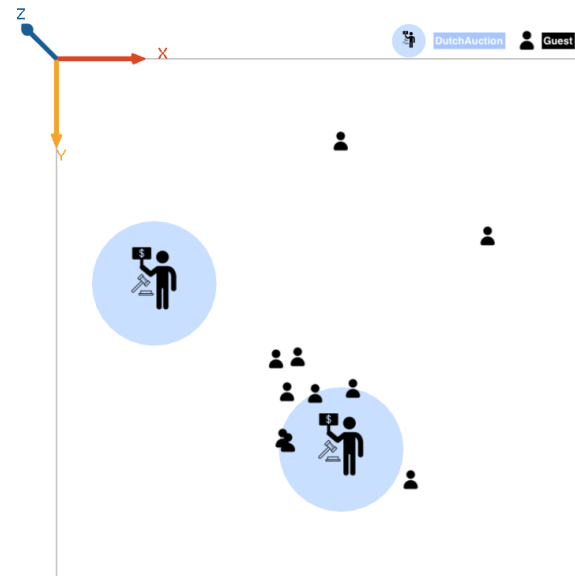
5 Challenges

5.1 Challenge 1

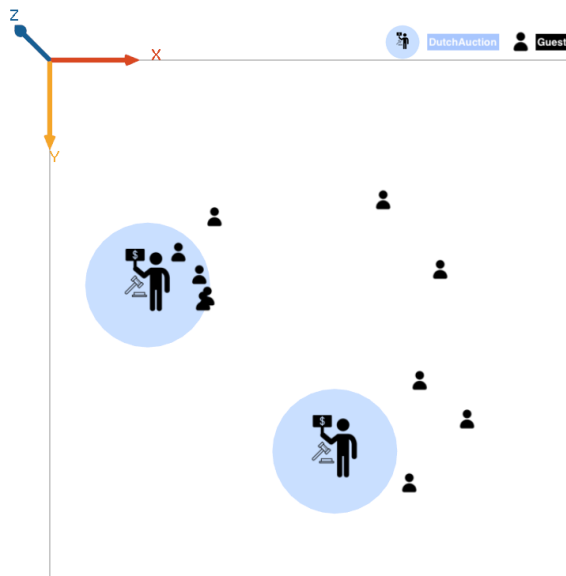
The task for challenge 1 was to implement multiple objects of interest for the attendees and hold multiple auctions. The agents will join the auctions that they are interested in.



(a) Agents before announcement of any auction.



(b) Agents after announcement of one of the auctions.



(c) Agents after announcement of the other auction.

Figure 2: Behaviour of agents during the auction process.

5.2 Challenge 2

The task for challenge 2 was to benchmark different auctions against each other, both from the perspective of the auctioneer and of the participants and analyse their gains.

Comparing the three types of auctions, sealed-bid generated the most profit for the auctioneer in our simulation. For the participant, the most favourable one was the English auction.

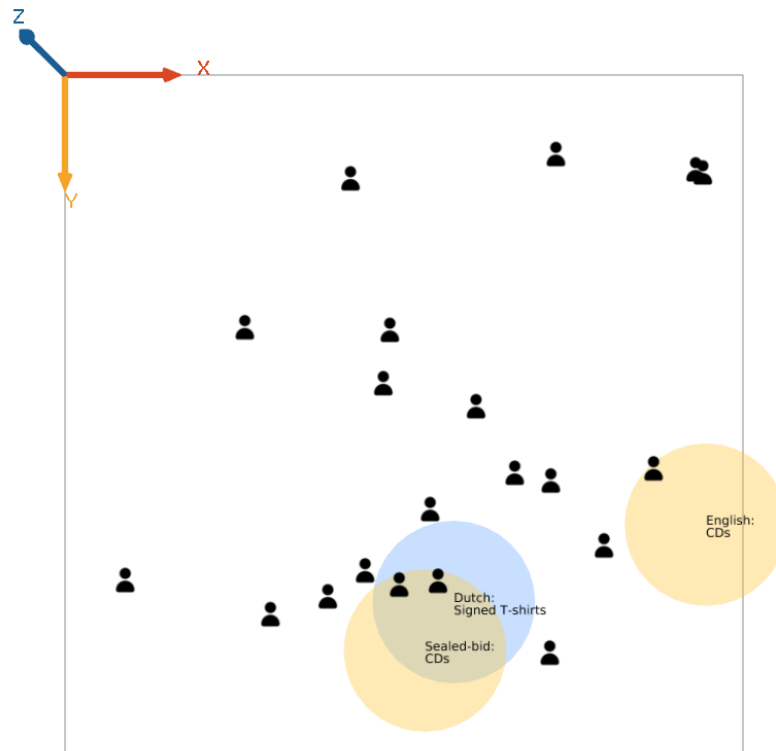


Figure 3: Behaviour of agents in multiple auctions with multiple genres.

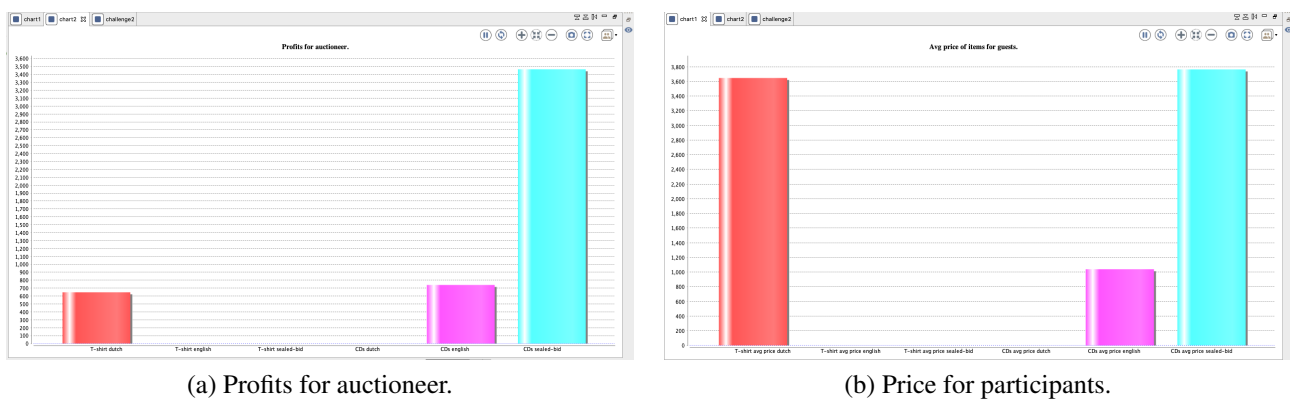


Figure 4: Statistics for the different auction processes.

5.3 Creativity

For the creativity part, an exit gate was added. When the participants run out of money and they have an approximate idea that they can't buy anything else in any of the auctions, they will leave.

6 Discussion / Conclusion

The basic assignment was a bit difficult to implement and the learning curve for FIPA on GAMA platform was high. Implementing the sealed-bid auction was the easiest of all three as it had the least to-and-fro communication.

References

- [1] GAMA. GAMA-Platform. (2019, Nov 13). [Online]. Available: <https://gama-platform.github.io>
- [2] For icons,. (2019, Nov 13). [Online]. Available: <https://thenounproject.com>