

ID2209 – Distributed Artificial Intelligence and Intelligent Agents

# **Assignment 3**

## **Coordination and Utility**

**Group 38**

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# Introduction

In this assignment, we were given two different tasks to increase our ability in FIPA ACL, agent coordination and gain an understanding in utility base decisions.

There were challenges to improve upon and increase the detail level of the simulation. Such as adding multiple auctions, different settings or self-imposed creativity challenges.

## How to Run

Extract the folder *Assignment-3* from the .zip file and import as a project to GAMA 1.8 version built for Linux. There are two model files *task1.gaml* and *task2.gaml* that contain a single experiment each which can be run to observe the simulation through the console or the 2D model.

## Task 1

### Species

#### Board

Board agents hold the dimensions of the board and a grid that is used to keep the locations of the queens on the board. It also writes the state of the board at each cycle as a way of keeping track of information.

#### Queen

Queen agents are linked to the board and another queen agent that is their predecessor. Through actions they can find valid positions on the board and move to one. At each cycle, if the queen has not been placed yet or has been requested to move or has requested another queen to move then it looks for valid positions on the board to move. If it can not find any, then it makes a request to its predecessor to move to another position.

## Results

Overall, it works fine. However, I encountered a bug where a FIPA conversation gets started but corresponding request does not register in the system. It results in a situation where a queen is waiting for its predecessor to move but the predecessor has never gotten the request to move. Even though a request is sent and the corresponding conversation exists. Thus, the experiment enters a deadlock in some runs.

## **Task 2**

### **Species**

#### **Concert**

Concert agents are unchanging and conceptual. They are used as a data structure to store and pass information as needed. Each has six variables that stands for the different attributes of the act and are associated with a single stage.

#### **Stage**

Unlike concerts, stages have an active role in the model. They keep time and inform all of the guests as old concerts get finished and new concerts start. They are also where guests head to if they decide to see the concert.

#### **Guest**

Guests have the most active role in the model. They have six variables that stand for their preferences for concert attributes. Each time they are informed of a new concert they compare it to all of the concerts they know of and head to the best one. This evaluation is done through an utility function.

### **Results**

At the beginning of the simulation guests distribute evenly to the concerts. However, after the first round of the concerts are over they start to act very uniformly. I think this stems from me being unable to achieve a wide range of preference distribution. But, even under this situation, guests separate from time to time. So it is obvious that it works.

## **Challenges and Creative Implementation**

I did not attempt any.

### **Conclusion**

Compared to the previous assignment, I feel that I have a better understanding of FIPA. In the other direction, the biggest difficulty I face is the lack of documentation and examples using the GAMA platform.