

## Homework 3 (16-11-2007)

### Submission Deadline (02-12-2007)

#### Question 1: Agent Percept to Action mapping, reasoning in Uncertainty

Download and install Wumpus and develop a behavior of the Wumpus Hunter Agent.

For assistance consult Hamid Reza Mezani's presentation from last year.

Goal of Agent Behavior: Agent would be able to fetch gold and avoid the Wumpus and pits.

#### Question 2: Ontologies for Communication and Auction Protocols

Extend the example given in "Appendix A" of JADE Programmer's Guide to the following scenario

1. Develop a Simple Ontology for Mobile-Phones in JADE, which will be used for Auctioning (i.e. Ontology should consider basic/necessary concepts for such process).
2. Consider
  - a. FIPA Dutch Auction Interaction Protocol
    - i. <http://www.fipa.org/specs/fipa00031/XC00031F.html>
  - b. FIPA English Auction Interaction Protocol
    - i. <http://www.fipa.org/specs/fipa00032/XC00032F.html>

Develop the protocols in JADE and use the Ontology developed in '1' for Communication between Initiator and participant.

##### **A simple example of Ontology in JADE**

<http://www.ryerson.ca/~dgrimsha/courses/cps720/Resources/JADE/Jade24Appendix.pdf>

#### Question 3: Develop utility functions and establish Nash equilibrium

Consider your P2P file-sharing application. The application depends upon voluntary participation. We need to avoid free-riders and benefit those who benefit others.

We consider the following definitions

"Agents/Peers that contribute more in system, should get better Quality of Service" &

"Agents reward other Agents in proportion of their contribution in System"

Consider the following parameters

$N'$	Number of blocks in file
$N$	Number of Peers/Agents in System
$A_1, A_2 \dots A_N$	$N$ Peers/Agents in System
$Utility_i$	Utility of $A_i$
$Cost_i$	Cost incurred by $A_i$ to sending 01 block of file
$Benefit_{i,j}$	Benefit caused by $A_i$ to $A_j$ ( $i \neq j$ i.e. benefit is not to oneself but only to others) $Benefit_{i,j} = 0$ (if no connection or '0' blocks transferred by $A_i$ to $A_j$ )
$Benefit\_Average_i$	Average benefit/contribution caused by $A_i$
$Request\_Accept\_Function_i$ ( $Request_j$ )	Function for $A_i$ using which $A_i$ will either accept or reject request from $A_j$  <b>Hint:</b> KaZaA uses $Participation\_Level = (Upload \text{ in MB}) / (Download \text{ in MB} * 100)$

1. Develop a Utility Function for Agents given the above parameters.
2. Incorporate the Utility Function in your File Sharing Application (just incorporation of few conditions before sending a block)
3. Establish Nash Equilibrium in your File Sharing Application.
  - a. You should be able to show Convergence of System to Nash Equilibrium for 03 – 04 Agent System, but your utility function should be general for  $N$  Agents/Peers.

Question 4: There is one more question from Mobility (from Originally planned Homework 4)

Question 5: There will be one bonus question.

## Deliverables

Documented Source Code (with instructions for execution) and Report for Bonus question emailed by deadline (2<sup>nd</sup> December) to [ahaseeb@kth.se](mailto:ahaseeb@kth.se) with Subject "DAIIA07 HW3"

### Time Slots for Demo:

Monday 5<sup>th</sup> December: 11 – 2 pm, & 5 pm – 8 pm. Slots sheet will be on 8<sup>th</sup> Floor elevator C.