Introduction to Multi-Agent-Programming

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Exercise Sheet 6

Due: December 10th, 2008

Exercise 6.1 (Kalman Filter)

The temperature of a victim is measured by three agents (a_1, a_2, a_3). Each of them is equipped with a temperature sensor. The measurements are guided by three independant Gaussians with covariances $(\sigma^2_{a_1}, \sigma^2_{a_2}, \sigma^2_{a_3}) = (1, 2, 3)$.

(a) **Integrate the measurements (0.5pt, written)**
The agents get the measurements $(m_{a_1}, m_{a_2}, m_{a_3}) = (34, 30, 40)$. If these measurements are integrated in a Kalman filter, what is the result?

(b) **Explain the results (0.5pt, written)**
The temperature of a victim should be 37.5 if one is concious, or 33.0 if one is unconcious. What is most possible status (concious?) of the victim, and why?

Exercise 6.2 (Joint World Model)

(a) **Observation Communication (1 pt; programming)**
Download the sensing update from
http://www.informatik.uni-freiburg.de/~ki/teaching/ws0809/map/sensingPatch.tar.gz.
Call super.sense() in your agent's sense() function for this to work.

Implement a ComObject subclass to send information about a probabilistic sensing of a ExplorationCivilian containing:

- The id of the civilian (int)
- The type of sensing (Use 0 for now) (byte)
- The actual Value and Sigma (2x float)

Send this sensing to the Center, each time you have *new* information about a civilian (i.e. look at the lastSeenTime and the agent's actual timeStep). Provide an agent implementation, where the agents actually stay multiple rounds at a certain target to get more than one reading.

Note: To convert floats to the byte[], please look at the "intBits" typefunctions in the Float class.

(b) **Joint World model (1 pt; programming)**
Implement a Center, that listens to the sensing information from the agents.
Collect the estimated *thermalValue* and *thermalSigma* for each civilian, that has been seen.
If information for the same civilian is sensed multiple times use the Kalman Filter fusion to merge multiple sensings.
Print out the estimates for each civilian in each round.

Please send your solution to dornhege and zhangd @informatik.uni-freiburg.de
Note: We encourage you to submit the written solution in a ***pdf*** *file. The latex template is available at the exercise web page.*