Web Intelligence Master Program – Multiagent Systems

"Multiagent Frequency Allocation" Project

2015

Objective and Means

During the *Multiagent systems* course [2], students have to conduct investigations through a project, requiring all the skills and techniques learnt during the class. Following this project, students will have a clear and concise overview of the potential of MAS for today's applications. Students, in **groups of 2 (validated by the program manager)**, will conduct their investigations and will have to make modeling and prototyping choices. These choices will be defended during an oral presentation, the final session of the program.

Requirements

We want to develop a multiagent simulator to solve frequency assignment problems (FAPP) [6]. The idea is to model antennas as agents that have to cooperate to find the optimal frequency assignment. When an antenna chooses its frequency, it may interfer with other antennas due to radio frequency properties. Therefore, neighboring antennas share constraints on their values: they must keep some *distance* between their values. Another requirement to take into account is that we want to *minimize the number of used frequencies*, to keep some space for future deployement of antennas. We propose to map the FAPP as a distributed constraint optimisation problem [5, 3]. This DCOP should solve using the DPOP algorithm we have studied during the class [4]. The multiagent system can be developed with any programming language (Java, Python, JaCaMo, Jason, ...). The precise version of the FAPP you choose is up to you, but your program needs to be compliant with the format presented in [6].

Expected Results

Students are free to conduct investigations in the direction they wish, while meeting the previous requirements.
We expect the following results to be provided at the end of the project:

1. A **clean and documented code** of the implemented simulator,
2. A set of **experimental results** on various instances of different size (these experiments should be reproductible!),
3. A user **manual** for installing and running the solver and the expertiments,
4. A **technical report** summarizing the investigations
   — presenting the chosen **FAPP version and the related DCOP** used to model it
   — presenting a **study on the performance and the behaviour** of the solver during the experiments
5. A set of **slides** for the presentation during the defense

These deliverables have to be sent to gauthier.picard@emse.fr.

Schedule

04/12/15 – This document is available
11/12/15 – Group formation proposal (sent to gauthier.picard@emse.fr)
11/12/15 – Group validation
08/01/16 – Work session (with professors)
29/01/16 – Defense (morning) and slides delivery
08/02/16 – Report, manual and code delivery

References

[1] Zuse Institute Berlin. Frequency assignment problem. http://fap.zib.de, 2015. [Online; accessed 04/12/15].

[2] Olivier Boissier. Multi-Agent Systems. http://www.emse.fr/~boissier/enseignement/maop15/index.html, 2015. [Online; accessed 04/12/15].

[3] J. Cerquides, A. Farinelli, P. Meseguer, and S. D. Ramchurn. A tutorial on optimization for multi-agent systems. *The Computer Journal*, 57(6):799–824, 2014.

[4] Adrian Petcu and Boi Faltings. A scalable method for multiagent constraint optimization. *IJCAI International Joint Conference on Artificial Intelligence*, pages 266–271, 2005.

[5] Gauthier Picard. Multi-Agent Problem Solving. http://www.emse.fr/~picard/cours/mas/lecture-DCSP-2015.pdf, 2015. [Online; accessed 04/12/15].

[6] T. Schiex. The celar radio link frequency assignment problems. http://www7.inra.fr/mia/T/schiex/Doc/CELAR.shtml, 2015. [Online; accessed 04/12/15].