

Coursework 2: Understanding Social Behaviour in Games *or* Simulations

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1 Introduction

All of your courseworks are designed primarily to give you experience in developing intelligent control and/or cognitive systems. This course also gives you experience and feedback in writing about research. To this end, you will be writing research reports of at least one full page but not much more than two, using exactly this format. Submissions should be in the format specified for Coursework 1.

2 Approach

There are two different ways to do Coursework 2, and they will have very different learning outcomes. No one course can cover everything, and the exam will allow you to select between alternative questions catering to both sets of experiences. Nevertheless, it is probably worth thinking about how you would approach each of these problems, even though you will only actively work on one.

2.1 Option 1

There are many different types of social simulation, but in keeping with the emphasis of ICCS, you will be doing a *spatial simulation*, where you are meant to be simulating some approximation of:

- real time,
- real space,
- real animal capacities, e.g. motion, perception, and metabolism.

The basic task is to replicate the results reported by Marshall and Rowe (2003). This means you should briefly review the scientific reason for the model as well as checking the model's outcomes, probably by replicating them in NetLogo. If you want more information than you had in lecture about replication, you may want to read King (1995) or Bryson et al. (2012). Note that you may also want to start your own work from Michael Brooks' [BODNetLogo](#) described by Brooks (2013), since this provides action selection for BOD development, which *might* be useful.

2.2 Option 2

You will learn to build character Game AI for UT2004. The software for this is installed only in EB 0.8, and you are expected to use the computers there. *If you want to use your own computer, you are solely responsible for trying to get that working, you will not get help from any of the teaching staff.*

You will be trained in how to build agents in UT2004 using BEHAVIOR ORIENTED DESIGN (BOD), utilising the ADVANCED BOD EDITOR (ABODE) in lab the week of **17 March**.

70% of your coursework will be marked like any of the other courseworks, based on a two-page report concerning the benefits and/or costs of creating a team for capture the flag, and how you helped them cooperate. The remaining 30% of the mark will be allocated in a competition to be run in the **Thursday 3rd April** laboratory. 20% will be simply for turning up with working code that is somehow substantially different than what is distributed in lab and having your team successfully compete in a round-robin event. 5% will be allocated to anyone who wins at least two matches in the round-robin stage. An additional 5% will be allocated to the overall winner¹ via a direct elimination tournament on **Tuesday, 8 April** (attending is not mandatory.) Technical details are available in a Tech Brief by Zack Lyons.

3 Results

As with Coursework 1, please report experimental results, that is, propose and support hypotheses. The type of results will depend on which option you pursue.

If you describe a reasonably-well working system in a comprehensible manner you will pass. If you can get the basic replication and describe it appropriately in the report, you will get around 55. Getting a mark over 70 requires demonstrating insight, creativity and/or understanding that goes beyond the basics laid out for you in this document. You may want to read more papers on signal or language evolution, or the evolution of altruism (and obviously cite that reading). However, only reference papers you really use in your research.

3.1 Option 1

NetLogo provides a tool for running experiments (BehaviourSpace) and for drawing graphs. Thus it is pretty easy to get NetLogo to run experiments for you, if you can think of parameters you might like to vary that would be experimentally interesting.

3.2 Option 2

Describe what you attempted in order to get teamwork working, and the the impact of your strategy or strategies compared to single players and/or teams of identical, unmodified players. It is quite possible that you may spend most of your space describing qualitative outcomes as a result of various approaches you have taken to the problem, but you can of course run tournaments between various strategies and report the outcomes. Are they statistically significant?

4 Discussion and Conclusions

These are per the instructions in Coursework 1.

¹Note that a few students have prior experience of BOD either from dissertations or repeating the course. If one of them wins, the highest-ranking student without previous experience will also receive 5%.

References

- Brooks, M. (2013). Facilitating the creation of advanced agents within netlogo by allowing specification and control using the behaviour oriented design methodology. Technical Report 2013-07, Department of Computer Science, University of Bath. Available from <http://opus.bath.ac.uk/37915/>.
- Bryson, J. J., Ando, Y., and Lehmann, H. (2012). Agent-based models as scientific methodology: A case study analyzing the DomWorld theory of primate social structure and female dominance. In Seth, A. K., Prescott, T. J., and Bryson, J. J., editors, *Modelling Natural Action Selection*, pages 427–453. Cambridge University Press.
- King, G. (1995). Replication, replication. *PS: Political Science and Politics*, XXVIII(3):443–499. with comments from nineteen authors and a response, “A Revised Proposal, Proposal,”.
- Marshall, J. A. R. and Rowe, J. E. (2003). Kin selection may inhibit the evolution of reciprocation. *Journal of Theoretical Biology*, 222:331–335.