University of Sussex

26 October 2005

Master's Thesis Review

Ondrej Pacovsky : On-line learning in real-time environments

I acted as Ondrej Pacovsky's supervisor at the Department of Informatics in the University of Sussex for his study on our Masters programme Evolutionary and Adaptive Systems (EASy). Over the course of the months of April to September I maintained regular contact with Ondrej while he pursed his thesis in the manner of an independent researcher.

The project considered the problem of the need for pre-determined state partitioning (of continuous variables) for a reinforcement learning system. The thesis provided and tested a novel idea to circumvent this problem using echo-state machines to pre-process the input data. A scientific approach of some rigour was applied to benchmarking the new algorithm against pre-existing ones. It was found that the algorithm was at least as good as Q-learning with hand tuned state discriminations.

The work under review could have been improved by a choice of learning problem that was focused on revealing the advantages and limitations of the echo-state machine learning system. I should point out that Ondrej had a subsidiary intention (which may have influenced the decision over the learning problem) of demonstrating a learning system that could work in a computer game environment; he successfully applied his skills as a software engineering to this non-trivial goal. There are also unexplored questions concerning whether a simpler system could provide a similar solution to the problem of state partitioning or that the echo-state machine is particularly suitable.

I consider the work carried out to show promise and that in its present state there is material of sufficient rigour, novelty and content that this thesis could be converted into a paper for submission to an international conference. Further, the methods that this thesis had begun to develop deserve further study and if so pursued I expect additional discoveries of interest to the community.

My judgement of this thesis is that would such a thesis be submitted for consideration for a masters programme in the Department of Informatics at the University of Sussex then we would consider it to be worthy of a distinction (the top class that we award). In order to measure the significance of the distinction mark for purposes of international comparison I provide the following rough data: for the EASy Msc course our general admission criteria is the equivalent of a UK first class honours BSc. degree; such individuals form about 15% of the UK student cohort; of each cohort in the EASy programme 30% would obtain a distinction.

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