School of Informatics Teaching Course Proposal Form

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Proposal

Course Name: Reinforcement Learning
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Course Year: 5
Names of any courses that this new course replaces :

Course Outline

Course Level: 11
Course Points: 10
Subject area: Informatics
Programme Collections:
Artificial Intelligence, Cognitive Science.

Teaching / Assessment

Number of Lectures: (As before)
Number of Tutorials or Lab Sessions: 1 lab session
Identified Pre-requisite Courses:
Identified Co-requisite Courses:
Identified Prohibited Combinations:

Assessment Weightings:
Written Examination: 75%
Assessed Coursework: 25%
Oral Presentations: n/a%

Description of Nature of Assessment:
One assignment worth 25%, one exam worth 75%. The assignment will consist of a large programming exercise using Matlab in which several of the discussed RL algorithms will be implemented and evaluated. The exam will test factual knowledge and understanding of modelling/algorithmic concepts.

Course Details

Brief Course Description:
Reinforcement learning (RL) refers to a collection of machine learning techniques which solve sequential decision making problems using a process of trial-and-error. It is a core area of research in artificial intelligence and machine learning, and today provides one of the most powerful approaches to solving decision problems. This course covers foundational models and algorithms used in RL, as well as advanced topics such as concurrent interactive learning of multiple RL agents and scalable function approximation using neural network representations.

Detailed list of Learning Objectives:

    1: Knowledge of basic and advanced reinforcement learning techniques

    2: Appreciation and identification of suitable learning tasks to which these learning techniques can be applied

    3: Insight into the problems involved in applying these techniques to real-world problems, and how to overcome those problems

    4: Use and writing of Matlab programmes, ability to set up and run computational experiments to produce statistically sound results

    5: Formulation of problems, evaluation of results from the student's own experiments and those presented in some cases in the research literature

Syllabus Information:

Recommended Reading List:

    Reinforcement Learning: An Introduction. R. Sutton and A. Barto. MIT Press, 1998

    Algorithms for Reinforcement Learning. C. Szepesvari. Morgan and Claypool Publishers, 2010

    Reinforcement Learning: State-of-the-Art. M. Wiering and M. van Otterlo. Springer, 2012

Any additional case for support information:

    I will be the new lecturer for this course starting 2018/19. The course requires some updates to its contents, and should be optimised with respect to the substantially increased student numbers in recent years (160+). Based on discussions with Ram Ramamoorthy, Sharon Goldwater, Iain Murray, and Stuart Anderson, I propose to keep the course at 10pts but ask to have it as my only course due to high student numbers and required revisions. In addition, based on recent student feedback regarding high workload in assignments, I propose to reduce the number of assignments from 2 to 1, with a weighting of 25% in the final course grade. The proposed changes were discussed and agreed with Stuart Anderson prior to the BoS meeting.