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Three possible PhD positions are offered in the intersection between the area of Multi-agent Systems and the areas of Machine Learning, Reinforcement Learning and Computer Vision, respectively. For more information see the ads below and contact Dr Maria Chli (maria-chli.org, m.chli@aston.ac.uk) or Dr George Vogiatzis (george-vogiatzis.org, g.vogiatzis@aston.ac.uk).

1. PhD Title: Deep Transfer in Reinforcement Learning

Applications are invited for a 4-year PhD studentship in the School of Engineering & Applied Science (http://www1.aston.ac.uk/eas/), Aston University, Birmingham, UK

4-Year Studentship: This studentship will pay tuition fees and a tax-free stipend of £15,500 per annum (increases on an annual basis), for a period of 4 years.

Start Date: by agreement

Background: Many real life applications require an autonomous agent to plan how to achieve long-term objectives. In most settings the agent needs to reason in a highly dynamic environment where the consequences of its actions are not certain. Reinforcement Learning (RL) has been successfully applied to such contexts, however, the high-dimensional nature of these problems, the large number of training samples needed to learn a task, and the impossibility of reusing prior knowledge (even between closely related tasks) have imposed some fundamental limitations to the RL paradigm to date. Transfer learning, the practice of reusing knowledge gained from solving related tasks in order to accelerate learning upon encountering a new task, has recently been proposed.

Project: The overall aim of this programme is to establish a principled new framework for developing portable adaptive agents that will thrive when placed in new environments, while relying only on skills and knowledge learned in previously encountered settings. The framework will be based on the idea of coupling reinforcement transfer learning with deep learning techniques.

The successful applicant will have a strong undergraduate and/or masters degree in computer science, engineering, mathematics or a related discipline as well as excellent programming and analytical/mathematical skills. A demonstrable interest in agent systems and probabilistic modelling is essential.

For further information, please contact Dr Maria Chli (maria-chli.org, m.chli@aston.ac.uk).

How to Apply: Applications should be made online at http://www1.aston.ac.uk/eas/research/prospective-research-students/how-to-apply/. Please enclose a research proposal (a maximum of 2,000 words), and a full CV, giving contact details for two academic referees. Applicants from non-English speaking countries will require an IELTS score of 6.5, TOEFL score of 600 or equivalent.

2. PhD Title: Trust and Reputation in Multi-agent Systems

Applications are invited for a 4-year PhD studentship in the School of Engineering & Applied Science (http://www1.aston.ac.uk/eas/), Aston University, Birmingham, UK

4-Year Studentship: This studentship will pay tuition fees and a tax-free stipend of £15,500 per annum (increases on an annual basis), for a period of 4 years.

Start Date: by agreement

Background: The recent trend in computing is towards increasingly larger, open and distributed systems such as electronic marketplaces (eBay), distributed file and information sharing systems (Gnutella, BitTorrent), social and professional networking sites (Facebook, LinkedIn). These are used by numerous human and software agents, each acting in a self-interested manner and often required to make decisions under uncertainty. Ensuring users enjoy a useful, fair service of consistent quality is difficult to achieve through enforcing centralised control measures due to the distributed and largely anonymous nature of these systems.

Project: This project will deliver a fully automated trust and reputation decision-making system to be used locally by each participant. It will formulate a fully probabilistic framework for modelling trust and reputation. The model needs to allow for realistic assumptions, describing interactions in a marketplace or a social network context, and yet be general enough so that it can adapt to different scenarios.

The successful applicant will have a strong undergraduate and/or masters degree in computer science, engineering, mathematics or a related discipline as well as excellent programming and analytical/mathematical skills. A demonstrable interest in agent systems and probabilistic modelling is essential.

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How to Apply: Applications should be made online at http://www1.aston.ac.uk/eas/research/prospective-research-students/how-to-apply/. Please enclose a research proposal (a maximum of 2,000 words), and a full CV, giving contact details for two academic referees. Applicants from non-English speaking countries will require an IELTS score of 6.5, TOEFL score of 600 or equivalent.

3. PhD Title: Visual Validation of Agent-based Simulations of Traffic Systems

Applications are invited for a 4-year PhD studentship in the School of Engineering & Applied Science (http://www1.aston.ac.uk/eas/), Aston University, Birmingham, UK

4-Year Studentship: This studentship will pay tuition fees and a tax-free stipend of £15,500 per annum (increases on an annual basis), for a period of 4 years.

Start Date: by agreement

Background: Multi-agent simulation is an established tool for analysing traffic systems. The bottom-up modelling of the entities involved (vehicles, pedestrians, etc.) affords the inclusion of a greater level of realism, leading to more accurate simulations. Agent-based modelling has been shown to be very effective in investigating the effects of new policies, traffic incidents, changes in driver behaviour etc.

Project: One of the main challenges of any bottom-up modelling approach is to ensure that the model is faithful to real-world data in a predictive sense. There is no guarantee that a group of individually realistic agents will lead to a multi-agent model that faithfully reproduces reality. This project will overcome this challenge by creating bottom-up traffic models that are, by construction, guaranteed to mimic real-world traffic behaviour. Cameras will be used to capture driver behaviour at points of interest around a traffic network. Using computer vision algorithms, these streams of visual data will be converted to local vehicle tracks capturing key aspects of driver behaviour. Machine learning algorithms will generate a probability distribution of possible driver types. The resulting multi-agent model will consist of samples from this distribution, whose behaviour will be simulated on a real city traffic model. Success of this novel multi-agent calibration methodology in a traffic context will allow it to be extended and generalised to be applicable in a wider range of social and spatial simulations.

The successful applicant will have a strong undergraduate and/or masters degree in computer science, engineering, mathematics or a related discipline as well as excellent programming and analytical/mathematical skills. A demonstrable interest in agent systems and probabilistic modelling is essential.

For further information, please contact Dr Maria Chli (maria-chli.org, m.chli@aston.ac.uk) or Dr George Vogiatzis (george-vogiatzis.org, g.vogiatzis@aston.ac.uk).

How to Apply: Applications should be made online at http://www1.aston.ac.uk/eas/research/prospective-research-students/how-to-apply/. Please enclose a research proposal (a maximum of 2,000 words), and a full CV, giving contact details for two academic referees. Applicants from non-English speaking countries will require an IELTS score of 6.5, TOEFL score of 600 or equivalent.