

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: 1st October 2015 (or later 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.
