Emma Byrne, PhD

Email: elb@aber.ac.uk **Web:** http://www.uclmail.net/users/e.byrne

Academic Experience

March 2006 - Present:
Post-doctoral Research Associate, Robot Scientist Project, University of Wales Aberystwyth.
I am currently using multi-objective Genetic Algorithms and Abductive Logic Programming to generate new biological knowledge using a Robot Scientist. A Robot Scientist is a physically implemented system that applies artificial intelligence to autonomously discover new knowledge through cycles of scientific experimentation. The Robot Scientist at University of Wales, Aberystwyth is one of the most advanced laboratory automation systems in existence. My role on this project has included: the investigation of logic programming techniques to abduce and induce new knowledge from background knowledge and experimental results and; to use multi-objective genetic algorithms to evolve queues of planned work, in order to optimise resource use on the robot.
I have also been involved in knowledge transfer and public engagement activities, including the presentation of the Robot Scientist at the BCS SIGAI Machine Intelligence Competition. I spoke with the press and the publicity agent for the competition's sponsor, Electrolux, about the Robot Scientist project. I also filmed and produced a short film demonstrating the capabilities of the physical robot.

January 2005 - March 2006:
Lecturer in Information Systems, University of Greenwich.
I was employed as course leader, with responsibility for large numbers of students, and in charge of a sizeable teaching team. Developed an undergraduate course module in Information Systems.
I was concurrently involved in interdisciplinary research to assess the role of rhetorical structures and argumentation in the development of evidence based policy. In particular, I provided analytical input into a project that analysed policy making in a London Primary Care Trust (PCT) from an argumentation perspective. I brought to bear expertise in formal and informal logic and, in particular, argumentation theory. This work is in press, and I have presented this work at invited talks at UCL and the LSE.
I was also involved in interdisciplinary research on the theoretical analysis of templates in information extraction. Template design is a bottleneck in the information extraction process. I provided a logical framework that permitted template designers, whether human or automatic, artificially intelligent ones, to describe template terms in partially ordered sets using a specificity relation. Together with an expert in machine learning, I designed a framework that makes it possible to direct the search for good templates.

November 2001 - November 2004:
Research Fellow, University College London
I developed the Expectation Violation Analysis framework that identifies interesting information by means of identifying news and background knowledge that is logically inconsistent with expectations concerning the behaviour of entities in the real world. The framework also includes findings on the relationship between the logical entailment relation between expectations and the degree of interest attached to the violation of those expectations. This work provided a novel method for ranking textual articles, particularly news reports, as interesting, by automating the identification of unexpectedness, rather than relying solely on relevance as has been the approach to date.

Industrial Experience

April 2000 - Oct 2000: *Head of Technology*, Balance Digital Ltd (Web publishers). London
As head of a team of developers and trainers I designed web applications and web sites for a number of large and medium sized corporate clients and provided advice on hosting, development and training.

October 1998 - April 2000: *Software Engineer,* Thomas Cook Group, Peterborough
I was responsible for a number of projects in the department, including database design and implementation and the design and development of on-line, intranet applications for staff use.

April 1997 -October 1998: *Founder and Business Director*, ActiveNet Marketing Ltd.
I provided consultancy to small and medium businesses regarding the use of the internet to grow their business. Working together with a recent CS graduate, the company provided web-sites, on-site networks and arranged hosting and training for our clients.

Education

November 2001 - July 2005: *PhD Computer Science*, University College London. There were three aspects to the PhD research: the identification of news that is inconsistent with expectations (and therefore unexpected); the measurement of unexpectedness given a set of expectations; and the relationship between the logical implication relation between two expectations and the relative degree of interest in a violation of those expectations. My work has included an examination of existing information management techniques, the cognitive basis for interest, temporal logics, default logic, logic programming and lattice theory.
I was also closely involved with departmental life, acting as PhD student representative, as a PhD student mentor, a project supervisor and as joint writer of the departmental Christmas pantomimes and summer shows.

October 2000 - September 2001: *MSc (Distinction) IT*, Aston University.
I focused on artificial intelligence with particular respect to machine learning, neural networks and evolutionary computation. My dissertation presented a novel operator for genetic algorithms that was based on biology and that was not currently in use by the evolutionary computation community.

October 1993 - July 1997: *BSc (Hons) International Business with Modern Languages (2:i)*, Aston University.
Management modules included economics, finance, group psychology, organisational behaviour and statistical methods. Language and culture modules concerned francophone countries, past and present. The third year consisted of a work/study placement in France. During this time I developed near-native fluency in French.

Cont...

Publications:

Refereed Journals:

Russell J, Greenhalgh T, Byrne E, McDonnell J (2007) "A case for rhetoric in healthcare policy analysis", *Journal of Health Services Research and Policy*, In Press.

Byrne E. (2006) "A Logical Framework for Identifying and Explaining Unexpected News", *Computing and Informatics*, 25(2-3): 127-152

Byrne E. and Hunter A. (2005) "Evaluating violations of expectations to find exceptional information", *Data and Knowledge Engineering*, 54(2):97-120.

Byrne E. and Hunter A. (2004) "Man bites dog: Looking for interesting inconsistencies in structured news reports", *Data and Knowledge Engineering*, 48(3):265-285.

Conferences:

Byrne E. (2007) "Optimising the flow of experiments to a Robot Scientist with Multi-Objective Evolutionary Algorithms", *Genetic and Evolutionary Computation Conference (GECCO 2007)*, In Press.

Corney, D. P. A., Byrne, E.L., Buxton, B. F. and Jones, D. T. (2005) "A Logical Framework for Template Creation and Information Extraction", *Foundations of Semantic Oriented Data and Web Mining workshop, part of ICDM2005 (the Fifth IEEE International Conference on Data Mining).*

Byrne E. (2005) "Because Men Don't Bite Dogs: A Logical Framework for Identifying and Explaining Unexpected News", *International Symposium on Explanation-aware Computing (ExaCt 2005)*, AAAI FAll Symposium, November 2005.

Book Chapters

Corney, D. P. A., Byrne, E.L., Buxton, B. F. and Jones, D. T. (2007) "A Logical Framework for Template Creation and Information Extraction", Extended version of Corney *et al* (2005), *Lecture Notes in Computer Science (LNCS)*, to appear.

Other Professional and Related Activities

December 2006: Lead the Robot Scientist team entry in the BCS SGAI conference Machine Intelligence Competition. First prize.

Summer 2004 - Winter 2005: Course author and online tutor, ("Foundations of Logic"), Queen Mary, University of London Online and Distance Learning Unit.

December 2003: Volunteer literacy, language and IT trainer, Crisis Open Christmas Project for homeless and vulnerably housed.

December 2003: Devised and delivered lecture series on "Information Overload" for EFREI (The French School of Technological Engineering, Information and Management) at the UCL Language School.

October 2003 - December 2003: Tutor, logic and computational theory problem classes. Computer Science Department, UCL

April 2003 - Sept 2003: UCL MSc CS Student Project Supervisor.

May 2003: Searchspace and CS Department PhD Poster Competition. Winner (First Prize)