Report on The Eighth Ireland Conference on Artificial Intelligence and Cognitive Science (AICS-97)

Theme: AI in "Crisis"?

Paul Mc Kevitt

The Eighth Ireland Conference on Artificial Intelligence and Cognitive Science (AICS-97), which was run in conjunction with the Irish Machine Vision and Image Processing Conference (IMVIP-97), was a success. The delegates for both meetings enjoyed themselves and expressed their congratulations on the program and organization. Also, for the first time, AICS attracted a large number of delegates and papers from abroad, including many from the United Kingdom, Europe, and even the United States and Asia.

AICS-97 was hosted by the Faculty of Informatics, University of Ulster, Magee College; the Artificial Intelligence Association of Ireland (AI)^2, the Cognitive Science Society of Ireland (CSSI), and the Society for the Study of Artificial Intelligence and Simulation of Behavior (SSAISB). Sponsorship was provided by the University of Ulster, the Industrial Research and Technology Agency Unit (IRTU) of Northern Ireland, the International Association for Pattern Recognition (IAPR), the European Computer Vision Network of Excellence (ECVnet), and the Optical Engineering Society of Ireland (OESI). A large number of other Irish and British organizations, including the British Council, the Institution of Electrical Engineers, and the British Computer Society, agreed to cooperate. The cognitive science strand of AICS-97, the Annual Conference of the CSSI, was run as "MIND-II: Computational Models of Creative Cognition" at Dublin City University, Dublin, Ireland, on 15–17 September.

We advertised AICS-97 internationally to mail groups and on usenet as well as placed information at the University of Ulster on the World Wide Web. The local press (*The Derry Journal & Belfast Telegraph*) and radio (BBC Northern Ireland) ran a number of articles leading up to and during the conference. All plenary invited speaker talks and the panel session went out on streaming video and audio, stored and live with the possibility of phone-in questions (organized by Ted Leath, University of Ulster, Magee).

This article is a report of the Eighth Ireland Conference on Artificial Intelligence and Cognitive Science (AICS-97), which was run in conjunction with the Irish Machine Vision and Image Processing Conference (IMVIP-97), held at the University of Ulster, Magee College in Derry/Londonderry, Northern Ireland, on 10 to 13 September 1997.

Fionn Murtagh (University of Ulster, Magee) was the general chair for both AICS-97 and IMVIP-97, and Jon Campbell (University of Ulster, Magee) coordinated local organization for AICS-97 as well as acted as program chair for IMVIP-97. They did a supreme job. More details on all the events are available at www.infm.ulst.ac.uk/research/conferences.html.

Venue

Straddling the meandering River Foyle where it becomes Lough Foyle, Derry (from Doire [Oak Grove] in Gaelic), or Londonderry (and some other names besides), has a rare scenic beauty. It is rich in history, encompassing monastic settlement and fully extant city walls, the great siege of the late seventeenth century, and much more. A visit to the renowned Tower Museum is more than rewarding. It is a northern European city of 100,000, almost on the border between the Republic of Ireland and Northern Ireland. The area has wide renown for its writers (Brian Friel, Seamus Heaney, Jennifer Johnson) and musicians (Phil Coulter, Clannad, Dana, Enya, Daniel O Donnell) and, of course, its computer scientists (www.ni-tourism.com/noplugin.htm, www.ireland.travel.ie/, and www.interknowledge.com/northern-ireland).

To the east of the Foyle, we have the north Derry coast, with beautiful beaches at Benone and Castlenock and then through Coleraine to the seaside resorts of Portstewart and Portrush. A few kilometers further along the north Antrim coast, we arrive at the Giants' Causeway and Bushmills with the world's oldest whiskey distillery (www.infosites.net/tourism/topten/bushmills.html) that delegates could visit as part of the conference tour.

The Inishowen Peninsula borders the West of Lough Foyle with a beautiful "Inishowen 100" tour, and one can visit the rugged mountains and sea cliffs in the close hinterland of Donegal (for example, Glenveagh National Park once owned by the McIlhenny Family, inventors of famed Tabasco Sauce!); Gweedore, home of the Clannad Family; and Enya and Kincasslagh, home of Daniel O Donnell. A yearly calendar of events for Ireland and Northern Ireland can be found at www.emigrant.ie/calendar.htm.

The Faculty of Informatics at the University of Ulster has a large research team in AI covering a broad range of themes. Particular strengths lie in the areas of evidential reasoning, data mining and knowledge discovery, user modeling and natural language processing, machine learning,

computational intelligence, intelligent multimedia, and distributed object computing (www.infc.ulst.ac.uk/informatics/).

The faculty hosts the Northern Ireland Knowledge Engineering Laboratory (NIKEL), a joint venture with International Computers Limited, which carries out extensive work on the application of AI techniques to industrial and medical problems.

The Program

The Program Committee consisted of more than 80 members from both Ireland and Great Britain as well as internationally renowned researchers from farther afield. The program contained a balanced and interesting set of papers in response to the following call for papers:

> AI in "Crisis"?
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> Has the field been in `crisis'?—Some argue we've been in the wilderness with no breakthroughs for decades except minor shifts toward connectionism and neural networks, artificial life, data collection/corpora, and hybrid systems. Others say the move toward integration (e.g. intelligent multimedia integrating language/vision), Person-Kommunikation, mobile and remote computing, more and more engineering and a focus on the significance or otherwise of the self, mind and consciousness is emphasizing the successes of AI....
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> Ireland has hosted AI conferences usually annually since 1988. This eighth AI-97 conference will continue the tradition of emphasizing presentations of Ireland's and international original research in all areas of artificial intelligence and cognitive science including computer science, psychology, linguistics, philosophy, neuroscience and related disciplines on the obvious problems of speech, NLP, and vision processing, robotics, learning, reasoning, knowledge representation and mobile/remote computing. Papers which address whether or not the field has been in "crisis" and its failures/successes are particularly welcome!
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> Ever since George Boolean Logic (Cork), James Joyce's advances on streams-of-consciousness (see Dennett's Joycean machine), Claude Shannon found information theory and John McCarthy made LISP and gave the field its name (Dartmouth, US, 1956) we have been into artificial intelligence.

Invited Papers

AICS-97 had 6 posters, 3 invited papers, and 21 papers split into 5 sessions: (1) data analysis, (2) artificial life and neural networks; (3) knowledge representation, (4) psychology and philosophy, and (5) natural language processing. We had a good group of international invited speakers: John McCarthy (Stanford University), Walther Von Hahn (University of Hamburg, Germany), and Naoyuki Okada (Kyushu Institute of Technology, Japan). These speakers were complimented by a similarly good set for IMVIP-97: James Crowley (Institut National Polytechnique de Grenoble, France), Anil Jain (Michigan State University), and Jean-Christophe Olivo (European Molecular Biology Laboratory, Heidelberg, Germany). The IMVIP-97 speakers gave memorable talks on the latest results in vision and image processing, and David Vernon (NUI, Maynooth, Ireland) gave an excellent tutorial on industrial vision.

It was a coup to have McCarthy, who named the field artificial intelligence at the Dartmouth, United States, conference in 1956 and also gave us Lisp. McCarthy's paper, entitled "The Logic Road to Human-Level AI," focused on a history of AI throughout the years, going back as far as Frege, Boole, and Turing, with the clear theme that formal logic is central to achieving results in AI. Von Hahn's paper, entitled "Putting Together the Parts: Complex Artificial Intelligence Systems," stressed the importance of integration in AI and the need to spend more time on technologies for putting subsystems together, including intelligent multimedia systems that integrate language and vision. He pointed to his particular experience in the VERBMOBIL Project, which integrates speech and language processing as applied to a spoken dialogue machine-translation system running on a mobile laptop computer. Okada focused on a similar theme to Von Hahn with his paper "AESOPWORLD: An Integrated System for Intellectual Emotional Agents," describing an integrated comprehension and generation system for integrating vision, language, and motion. The system simulates the protagonist, or fox, of an Aesop fable, "The Fox and the Grapes," showing his mental and physical behavior with graphic displays, a voice generator, and a music generator that expresses the wolf's emotional states.

Submitted Papers

Intelligent multimedia (Mc Kevitt 1995–1996) was a theme that came up a number of times: Paul Mc Kevitt presented a frame semantics for the CHAMELEON system (Brøndsted et al. 1998) at Aalborg University, Denmark, that integrates spoken dialogue, gesture, and laser output and, in one application, gives information on two-dimensional building plans placed on a table. Ronan Reilly's (University College Dublin) paper, entitled "BROCA's Area and the Development of Object Assembly and Language Production Skills," explores, through simulation, the various issues raised by Greenfield's work on motor coordination and speech, with results supporting her homology hypothesis.

A number of the papers directly addressed the theme of the conference (AI in "Crisis"?), and those that did were memorable. In "Reinventing Behaviorism," Patrick Juola from Oxford University noted that one of the fundamental problems of AI is its unwillingness to take credit for things that appear to be successes. He argues that modern AI theories are sophisticated versions of long-discarded behaviorist theories. Juola noted that on 11 May 1997, the IBM program DEEP BLUE became the first chess-playing computer program to defeat a grand master in a match, and four days later, Mc Kevitt posted the call for papers for AICS-97 with the theme *AI in "crisis"?* Steve Battle in "The Chang-

Reilly started by noting that there isn't a crisis in AI, rather, the opposite. He said developments in AI and in a number of related disciplines will lead to significant breakthroughs in the field within the next decade.

ing Role of Representation in AI" looked at the changing role on the basis that if there is a crisis in AI, we are sure to find the epistemological status of knowledge representation at the heart of it. He illuminated the checkered history of the field with the analogy that the work of Wittgenstein suffered a similar crisis.

Another memorable paper was by James Hammerton, entitled "Functional Compositionality and a New View of Knowledge Representation," who argued that new connectionist techniques for compositional representation have opened up a new view of knowledge representation by demonstrating that compositionality can be achieved in more than one way and that the form of the representation is just as important as the choice of representational language. There were papers by Mike McTear, Ian O Neill, and Kevin Greenan on working spoken dialogue systems; Adrian Trenaman presented an approach to evolutionary computation to overcome the problems of autonomous behavior in artificial systems; D. Charles and C. Fyfe discussed an approach where neural networks use factor analysis to provide preprocessing techniques for subsequent higher-level symbolic processing; and Niall Griffith and M. Lynch presented NEURODRAUGHTS, a connectionist draughts player.

Plenary Panel Session: "Is There a Crisis in AI?"

The plenary panel session for both AICS-97 and IMVIP-97, entitled "Is There a Crisis in AI?" with Mc Kevitt (chair), Ronan Reilly (Dublin), Crowley, Okada, and Jain, came to the conclusion that there is no crisis in AI, and the field has never been doing better in terms of both theory and engineering.

Reilly started by noting that there isn't a crisis in AI, rather, the opposite. He said developments in AI and in a number of related disciplines will lead to significant breakthroughs in the field within the next decade. These include (1) research on intelligent agent-based systems; (2) research on robots that can learn; (3) the increased exploitation of parallel computation; and (4) the increased spatial and temporal resolution of noninvasive brain-imaging techniques, leading to better models of brain functioning. He pointed to some interesting trends in the field of embodied cognition and robotics that suggest that looking at the integration and collaboration of multiple sensory and motor modules (such as we find in the brain) might be a way of cracking some of the hard problems that confront us when we adopt a more monolithic approach to AI tasks.

Crowley mentioned the "S curve" of technology growth and the fact that we need to see AI in a historical framework. He mentioned his "grand challenge for speech, vision, and artificial intelligence" to build a machine that integrates, perception, speech, natural language, reasoning, and learning to exhibit awareness. In turn, awareness would bring intelligence to our artifacts, machines, and buildings. Houses, apartments, and offices would distinguish us from intruders or guests and would adapt the environment to our preferences (music, temperature, lighting). He noted that we want to be able to tell devices what to do and not how to do it. The challenge requires contributions from the fields of human-computer interaction, computer vision, speech recognition, speech synthesis, natural language processing, learning, and AI. For more details, see Crowley (1997).

Okada asked, "Why should AI be in crisis?"; it is progressing slowly and steadily. With respect to breakthroughs in the near future, he noted that for algorithms, the answer is maybe, and for data, well? Data collection is behind algorithm development. He pointed out that at the moment, data at the human level is collected by hand-crafting and machine-assisted methods but might be by machine learning in the future. He noted that concepts and rules are not enough for knowledge data, and episodic data, including many instances from everyday life, are important. He concluded by saying that intelligent agents will come close to human-level agents in more than 100 years.

Jain pointed out that his area of research is pattern recognition and computer vision and that he might be considered an outsider to the field of AI. He noted that although many would claim that pattern recognition is an intelligent task, it has also been said that problems that have been solved (for example, isolated spoken word recognition) come under the category of pattern recognition and those that have not yet been solved (for example, continuous speech recognition) are labeled as AI problems. With respect to AI in crisis, he suggested that perhaps a better way to ask this question would be to make the observation that many AI researchers, including pattern recognition and computer vision researchers, have realized that (1) no single representation and matching approach will work for a variety of problems; (2) to evaluate a particular representation-matching approach, one should build a complete system; and (3) systems must be evaluated on large amounts of real data. As an example, many vision researchers have been designing and refining specific modules (for example, stereo) without determining which particular approach will perform better (both in terms of speed and accuracy of the resulting depth map) when inserted in a complete vision system. In summary, Jain said he does not feel that AI is in crisis. On the contrary, it has matured, and we should see some impressive intelligent systems in the near future. Whether

we want to call these systems AI systems or robotics systems or vision systems or pattern-recognition systems is a separate issue.

Mc Kevitt started by saying that he believes there is no crisis in AI and that AI has moved very much now into engineering. He presented the CHAMELEON hardware and software platform developed at Aalborg University (Brøndsted et al. 1998) that integrates spoken dialogue and image processing and noted that this is happening in an engineering department. He pointed to the robotics work at the University of Sheffield, United Kingdom, where spoken dialogue is being integrated with MURPHY, a Nomad robot, that can interpret maneuvers in spatial environments. He then went on to show the "Irish room," a response to Searle's (1990) "Chinese room," where a leprechaun who understands Gaelic and cannot understand English, is locked in a room and has the task of using a Gaelic rule book for manipulating English words. Each English word has an icon or picture sequence attached to it. Then, to an outside observer, the leprechaun appears to be able to understand English just as a computer program that manipulates symbols could appear to do so. However, this time, the leprechaun begins to understand the English words because he/she has reference to their meaning. Video, sounds, smells, and even touch can be added in later! Mc Kevitt concluded with a formula for the future:

$$CS = I \times I \times I = I^3,$$

where both cognitive science (*CS*) and computer science (*CS*) are converging on information (*I*), intentions (*I*), and integration (*I*).

There were a large number of questions and comments from the audience. Campbell noted that the lack of students having good ability in mathematics was hampering success in speech and image processing. Pat Hayes (University of West Florida) sent a number of e-mail messages stressing that there is no crisis in AI and listed a large number of successes in the field. He noted that NASA Ames current long-term research program for planetary exploration has AI as a central feature, and the total U.S. research budget devoted to AI has increased steadily and shows no signs of being cut back in the near future. Von Hahn also sent an e-mail expressing that if there is any crisis, it is of expectations that are too high. The breakthroughs of the first years were the unexpected (because of the shift of paradigm) toy applications and sketchy projects that caused expectations that were too high. Like all other fields, AI needs its maturation, and it is starting to produce, slowly, like all other fields, its first useful results. Von Hahn's invited paper also concluded by saying that doing more engineering with integrated systems will keep AI out of crisis. The complete panel session is available as audio/video on the conference web page (www.infm.ulst.ac.uk/research/conferences.html).

Local Organization

Local organization was coordinated by Murtagh and Campbell, with the help of Administrative Assistants Rosemary Doherty, Caroline McNutt, and Colm O Driscoll and Technicians Ted Leath and Paddy McDonagh. McNutt did an excellent job of making sure everything ran smoothly. Leath and McDonagh worked hard on the video and computing facilities and the stored and live-streaming video and audio.

The extensive social program for AICS-97, organized by Murtagh and Campbell was a great success (the social program always makes a conference); it included a registration reception at The Derry City Guildhall hosted by the Mayor as well as a guided tour of the building, a conference banquet at the Trinity Hotel, and a conference tour of the famed Bushmills Distillery and Giants' Causeway. At the banquet, McCarthy gave an informal talk on the role of robots in society and what form new master-slave relations would take. Also, Mc Kevitt briefly thanked Murtagh and Campbell for their excellent organization and noted that he (Mc Kevitt) could be accused of going for program chair of AICS-97 because his parents live just 20 miles up the road! Campbell also organized a number of informal tours for visiting dignitaries, including the Campbell family home, Grianan of Aileach, and the Derry City Walls.

Unlike previous AICS meetings, this conference was much more international, with many coming from Great Britain, Europe, the United States, and Asia. We hope that this trend will continue so that AICS continues to be seen as an international meeting. We had over 70 delegates for both AICS and IMVIP. A picture gallery of the conferences is available at www.infm.ulst.ac.uk/research/ai97.[1]

Note

1. Copies of the AICS-97 and IMVIP-97 proceedings can be bought by sending a check for 25.00 British Pounds (which includes postage costs), made payable to "IMVIP/AI-97—University of Ulster" to Jon Campbell, Faculty of Informatics, University of Ulster, Magee College, Londonderry BT48 7JL, Northern Ireland.

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