Conference Report on The Eighth Ireland Conference on Artificial Intelligence and Cognitive Science (AICS-97) Theme: AI in "crisis"? University of Ulster, Magee College, Derry/Londonderry, Northern Ireland Wednesday 10th to Saturday 13th September, 1997

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1. Introduction

This Eighth Ireland AICS Conference (AICS-97) run in conjunction with the Irish Machine Vision and Image Processing Conference (IMVIP-97) has been a success. The delegates for both meetings enjoyed themselves and expressed their congratulations on the programme and organisation. Also, AICS attracted for the first time a large number of delegates and papers from abroad including many from Britain, Europe and even the US 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 Behaviour (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 organisations including the British Council, the IEE and British Computer Society agreed to cooperate. The Cognitive

Science strand of AICS-97 was run as *MIND-II: computational models of creative cognition*, The Annual Conference of the Cognitive Science Society of Ireland (CSSI), at Dublin City University, Dublin, Ireland (September 15th-17th).

We advertised AICS-97 internationally to mailgroups and on usenet as well as placing information at the University of Ulster on WWW. 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 (organised by Ted Leath, University of Ulster, Magee).

Prof. 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 Organisation for AICS-97 as well as being Programme Chair for IMVIP-97. They did a supreme job. More details on all the events are available on (http: //www.infm.ulst.ac.uk/ research/conferences.html).

2. 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 17th 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 (see http://www.ni-tourism.com/noplugin.htm and http://www.ireland.travel.ie/ and http://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 kilometres further along the north Antrim coast we arrive at the Giants' Causeway and Bushmills with the world's oldest whiskey distillery (see http://www.infosites.net/tourism/topten/bushmills.html) which 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 (e.g. 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 is found at http://www.emigrant.ie/ calendar.htm.

The Faculty of Informatics at the University of Ulster has a large research team in Artificial Intelligence covering a broad range of themes. Particular strengths lie in the areas of evidential reasoning, data mining/knowledge discovery, user modelling/natural language processing, machine learning, computational intelligence, intelligent multimedia, and distributed object computing (see http://www.infm.ulst.ac.uk/ informatics/)

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

3. The programme

The Programme Committee consisted of over eighty members from both Ireland and Britain but also internationally renowned researchers from further afield. The programme contained a balanced and interesting set of papers in response to the following Call for Papers:

AI in "crisis"?

> Has the field been in 'crisis'? — some argue we've been in the wilderness with no breakthroughs for decades except minor shifts towards connectionism and neural networks, artificial life, data collection/corpora, and hybrid systems. Others say the move towards integration (e.g. Intelligent MultiMedia integrating language/vision), PersonKommunikation, 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 hosts AI conferences usually annually since 1988. This eighth AI-97 conference will continue the tradition of emphasising 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!

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.

3.1. Invited papers

AICS-97 had three invited papers, twenty one papers split into five sessions: data analysis, artificial life and neural networks, knowledge representation, psychology and philosophy, and natural language processing together with six posters. We had a very good group of international invited speakers: John McCarthy (Stanford University, US), Walther Von Hahn (University of Hamburg, Germany), and Naoyuki Okada (Kyushu Institute of Technology, Japan). This was complimented by a similarly good set for IMVIP-97: James Crowley (Institut National Polytechnique de Grenoble, Grenoble, France), Anil Jain (Michigan State University, US) 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 (National University of Ireland, Maynooth) gave an excellent tutorial on "Industrial Vision".

It was a coup to have John McCarthy, who named the field "Artificial Intelligence" at the Dartmouth, US conference in 1956 and who also gave us LISP. John McCarthy's paper entitled "The logic road to human-level AI" focussed on a history of AI throughout the years, and even going back as far as Frege, Boole, and Turing, but 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 that we need to spend more time on technologies for putting subsystems together including Intelligent MultiMedia systems which integrate language/vision. He pointed to his particular experience in the Verbmobil project which integrates speech and language processing and applied to a spoken dialogue machine translation system running on a mobile laptop computer. Naoyuki Okada focussed 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 integration of vision, language and motion. The system simulates the protagonist or fox of an AESOP fable, "the Fox and the Grapes", and his mental and physical behaviour are shown by graphic displays, a voice generator, and a music generator which expresses his emotional states.

3.2. Submitted papers

Intelligent MultiMedia (see Mc Kevitt 1995/96) was a theme which came up a number of times – Mc Kevitt presented a frame semantics for the CHAMELEON system (see Brøndsted et al. 1998) at Aalborg University, Denmark which integrates spoken dialogue, gesture and laser output and in one application gives information on 2D building plans placed on a table. Ronan Reilly's 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 papers directly addressed the theme of the conference (AI in "crisis"?) and those which did were memorable. In "Reinventing behaviourism", Patrick Juola from Oxford noted that one of the fundamental problems of AI is its unwillingness to take credit for things which appear to be successes. He argues that modern AI theories are sophisticated versions of long-discarded behaviourist theories. Juola noted that on May 11th, 1997 the IBM program "Deep Blue" became the first chess-playing computer program to defeat a grandmaster in a match and four days later Paul Mc Kevitt posted the call for papers for AICS-97 on the theme "AI in 'crisis'?" Steve Battle in "The changing 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 by analogy with the work of Wittgenstein which suffered a similar crisis.

Other memorable papers were by James Hammerton on "Functional compositionality and a new view of knowledge representation" where he argues 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 behaviour in artifi-

cial systems, Charles and Fyfe an approach where neural networks use factor analysis to provide preprocessing techniques for subsequent higher level symbolic processing, and Griffith and Lynch presented "NeuroDraughts", a connectionist draughts player.

3.3. Plenary panel session: "Is there a crisis in AI?"

The plenary panel session for both AICS-97 and IMVIP-97 on "Is there a crisis in AI?" with Paul Mc Kevitt (Denmark) (Chair), Ronan Reilly (Dublin), James Crowley (Grenoble), Naoyuki Okada (Kyushu), and Anil Jain (Michigan State) (see Figure (photograph) 1) 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.

Figure 1. Photograph 1: "Is there a crisis in AI?"; Paul Mc Kevitt, Ronan Reilly, James Crowley, Naoyuki Okada and Anil Jain attempt to decide.

Ronan started by noting that 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 non-invasive brain imaging techniques, leading to better models of brain functioning. He pointed to some interesting trends in the field of embodied cognition and robotics which suggest that looking at the integration and collaboration of multiple sensory and motor modules (such as we find in the brain) may be a way of cracking some of

the hard problems that confront us when we adopt a more monolithic approach to AI tasks.

James Crowley mentioned the "S" curve of technology growth and the fact that we need to see AI in a historical framework. James mentioned his "Grand Challenge for Speech, Vision and Artificial Intelligence" to build a machine which integrates, perception, speech, natural language, reasoning and learning in order 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 artificial intelligence. For more details see Crowley (1997).

Naoyuki Okada asked "why should AI be in 'crisis'?"; it is progressing slowly and steadily. With respect to breakthroughs in the near future he notes 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 handcrafting and machine-assisted methods but may 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 one hundred years.

Anil Jain pointed out that his area of research is pattern recognition and computer vision and that he may be considered an outsider to the field of AI. He noted that while many would claim that pattern recognition is an "intelligent" task, it has also been said that problems which have been solved (e.g., isolated spoken word recognition) come under the category of pattern recognition and those which have not yet been solved (e.g., continuous speech recognition) are labelled as AI problems. With respect to "AI in 'crisis'?" he suggested that perhaps a better way to ask this question would be by making the observation that many AI researchers, including pattern recognition and computer vision researchers, have realised that (i) no single representation and matching approach will work for a variety of problems, (ii) in order to evaluate a particular representation/matching approach, one should build a complete system, and (iii) systems must be evaluated on large amounts of real data. As an example, many vision researchers have been designing/refining specific modules (e.g., 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.

Paul Mc Kevitt started by saying that he believed 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, Denmark (see Brøndsted et al. 1998) which 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, England where spoken dialogue is being integrated with MURPHY, a Nomad robot, who can interpret manoeuvres in spatial environments. He then went on to show the "Irish Room", a response to Searle's "Chinese Room" (see Searle 1990) where a leprechaun who understands Gaelic, and who 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 which 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! Paul concluded with a formula for the future:

$$\text{CS} = \text{I x I x I} = I^3$$

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. Jon Campbell noted that the lack of students having good ability in mathematics was hampering success in speech and image processing. Pat Hayes (West Florida) sent a number of emails stressing that there is no crisis in AI and listed a large number of successes of the field. He noted that NASA's (AMES) current longterm research program for planetary exploration has AI as a central feature and the total US research budget devoted to AI has increased steadily and shows no signs of being cut back in the near future. Walther Von Hahn also sent an email expressing that if there is any crisis it is of too high expectations. The "breakthroughs" of the first years were the unexpected (because of the shift of paradigm) toy applications and sketchy projects which

caused too high expectations. As all other fields AI needs its maturation and it is starting to produce, slowly as all other fields, 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 (http://www.infm.ulst.ac.uk/research/conferences.html).

4. Local organisation

Local organisation was coordinated by Prof. Fionn Murtagh and Jon Campbell with the help of Administrative Assistants Rosemary Doherty, Caroline McNutt, and Colm O Driscoll and technicians Ted Leath and Paddy McDonagh. Caroline did excellent work in making sure everything ran smoothly. Ted and Paddy did an excellent job on video and computing facilities and enabling the stored and live streaming video and audio.

The extensive social programme for AICS-97, organised by Fionn and Jon was a great success (the social programme always makes a conference) included a Registration Reception at The Derry City Guildhall hosted by the Mayor and involving 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 John McCarthy gave an informal talk on the role of robots in society and what form new master/slave relations would take. Also, Paul Mc Kevitt briefly thanked Fionn and Jon for their excellent organisation and noted that he (Paul) could be accused of going for Programme Chair of AICS-97 because his parents live just 20 miles up the road! Jon Campbell also organised a number of informal tours for visiting dignitaries including the Campbell Family Home, Grianan of Aileach (see Figure (photograph) 2) and the Derry City Walls.

Unlike previous AICS meetings, this Conference was much more international with many coming from Britain, Europe, the US and Asia. We hope that this trend will continue so that AICS continues to be seen as an international meeting. We had over seventy delegates for both AICS and IMVIP. A picture gallery of the conferences is available at http://www.infm.ulst.ac.uk/research/ai97. Finally, there are a number of copies of the AICS-97 and IMVIP-97 proceedings left and copies can be bought by sending a cheque for 25.00 British Pounds (which includes postage costs), made payable to "IMVIP/AI-97 - University of Ulster", to Prof. Fionn Murtagh, Faculty of Informatics, University of Ulster, Magee College, Londonderry BT48 7JL, Northern Ireland.

Figure 2. Photograph 2: John McCarthy and Paul Mc Kevitt at Grianan of Aileach; Scalp mountain (Inisowen, Co. Donegal) in the background.

5. Irish meetings during 1998

AICS-98 was held at University College Dublin (August 19-21) and this year's cognitive science strand incorporated the Seventh International Workshop on the Cognitive Science of Natural Language Processing (CSNLP-7). The theme of the AI strand was "Agents and media: intelligent access, navigation and presentation" and of the CS strand was "Grand Unified Theories (GUTs) of language". Invited speakers were Kristian Hammond and Mark Seidenberg. Mind III (The Annual Conference of the Cognitive Science Society of Ireland) was also held at University College Dublin (August 17-19) and this year's theme

was: "Spatial Cognition". IMVIP-98 was at The National University of Ireland, Maynooth (September 9-11). More details are available on http://www.cs.ucd.ie/aics-98 (AICS), http://psych.ucsb.edu/~hegarty/cssi (MIND), and http:// www.cs.may.ie/oesi-imvip (IMVIP) respectively. It is anticipated that reports on some or all these will appear here in due course.

6. References

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