AISB Quarterly No.108

The Newsletter of the Society for the Study of Artificial Intelligence and Simulation of Behaviour

A good time to be an AI Graduate

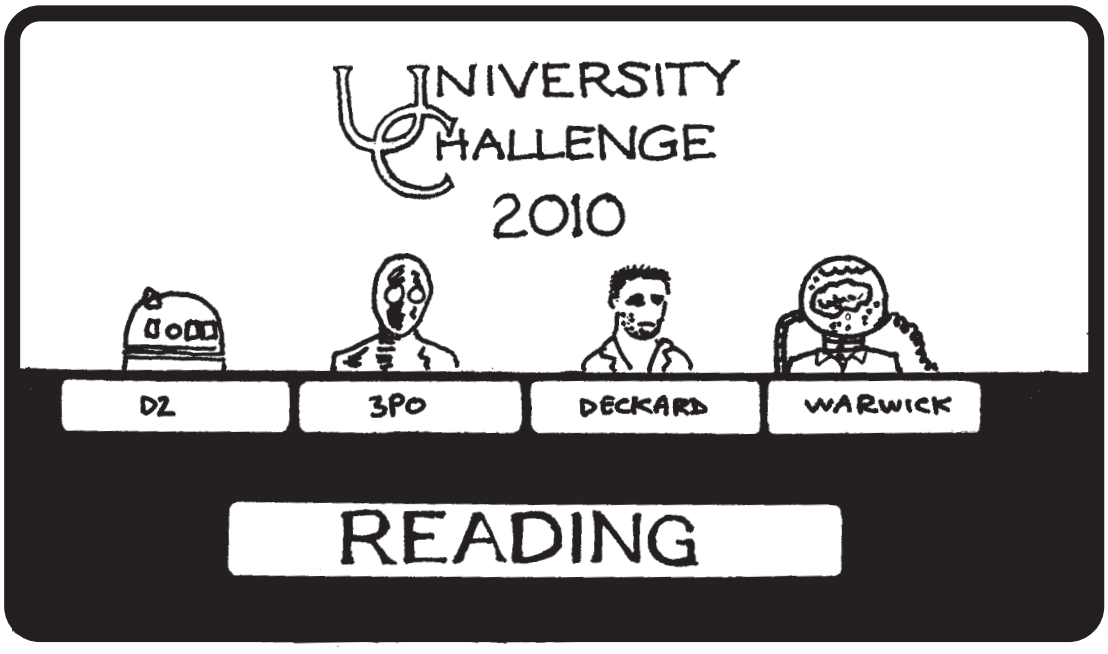
An article in the Times Higher Education Supplement (February 15th 2002) repeats a familiar theme but with a very interesting new twist. The IT industry is still suffering from a severe skills shortage, writes Caroline Davis. This seems to be in spite of a slight fall in overall graduate recruitment and an increase of 62% in the number of acceptances on computing degree courses since 1996.

A survey by the Real Time Club – an organization of 150 IT entrepreneurs – drew attention to a lack of certain skills in UK IT professionals. What caught my eye was that the report highlighted a deficiency in logic skills as a specific problem for the UK IT industry. Logic, claims the article, is generally taught in the US as part of a Computing degree, but not in the UK. If that is true – and there's no reason to doubt the source or the survey – then it is very interesting for us in AI.

Logic may not always be in fashion, but it is an essential ingredient of a degree in AI. Maybe it's a dangerous comment, but I think even Father Hacker would agree on that. It seems to me that a degree in AI may provide just the sort of skills package that the IT industry is looking for.

A few years ago I noted the surprisingly good performance of our AI graduates on the job market. I went out and interviewed a few AI firms to see if a successful AI sector was the reason behind this. I found a thriving AI industry in the UK, but it seems that the appropriateness of a degree in AI for all IT jobs may be just as important. In this issue there is a call for contributions from student members. I hope my analysis of their strong employment position increases their confidence

Blay Whitby
Editor



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What is London AI?

London-AI is a website and listserver for researchers in artificial intelligence, neural networks, robotics, cognitive science and related fields to pool information on events in the general area of London, Oxford, Cambridge and Brighton. The home-page is http://www.cogs.susx.ac.uk/users/toms/London-AI/, where you can view the forthcoming (and previous) events, links to research groups and seminar series, submit events and comments, and join the mailing list. The forthcoming seminar list is also mailed to the list weekly.

London-AI was founded by Sunny Bains, who continues to support the service, and is also supported by the AISB. The service is currently run by Tom Smith at the University of Sussex (http://www.cogs.susx.ac.uk/users/toms/).

Giving voice to Student Members

The AISBQ invites Junior Researchers and student members to contribute to the Quaterly. We are looking for short features (up to 1200 words) and reviews and opinions (up to 600 words) from AISB members who are either under - or post- graduates, or have recently completed their Phd. We hope to offer a forum whereby the next generation of AI researchers can contribute to academic debate and add the AISBQ to their formative list of publications. Please email abstracts and suggestions of 100 words only to editor@aisb.org.uk.

Publications dates for the next issue of AISBQ:

All submissions for the June issue of AISBQ must be made no later than ***26 April 2002.***

Publication of the AISBQ will be in March, June, September and December, with copies of the AISBJ being sent out with the June and December issues.

Futurologists - don't you just love them?

In the news over the last few weeks has been BT's futurologist, Ian Pearson, and he's been making lots of predictions about AI. AI research is coming on in leaps and bounds, says Mr. Pearson and by 2010, the first robot will have passed its GCSE exams. Such a robot would be ready to take its A Levels a few years later and a degree a few years after that, he says.

Do I expect to see robots as undergraduate students in ten or fifteen years time? Well, honestly, I don't. I've often heard that AI is coming on in leaps and bounds before, but on closer inspection, fits and starts would seem to be a better description. It would be interesting to hear members views on this latest prediction. If your research looks like producing a robot undergrad in the medium future then it is certainly worth hearing about. It could be that BT has something very special in a secret lab somewhere. Then again, it could be that Mr. Pearson has based this prediction on observation of tealeaves rather than of robots.

Futurology is such a tricky business and it rarely does much good for AI. Simon Colton of the AISB committee makes this point rather well. In response to Ian Pearson he said: "I think we should make the prediction that by 2010, BT will have a turnover of 100 billion and be the world's number 1 telecommunications company…making inaccurate predictions about other people's business can be damaging."

Blay Whitby

If you want to write to the editor, or send an open letter for publication, please write to:

The Editor, AISBQ, School of Cognitive and Computing Sciences, University of Sussex, Brighton, East Sussex BN1 9QH

Or email editor@aisb.org.uk

AISB News

Chair's Message

AISBJ

The past three months have been a time of both hard work and stabilisation or the AISB committee and our administrative colleagues at CASA. Following the successful relaunch of AISBQ into its newsletter format, last summer,we have been focussed mainly on the new Journal, the first copy of which members will by now have received.

The next issue of AISBJ is due out with the mid-summer issue of AISBQ. As I write, we are recruiting an editorial board, and I am very pleased to report that, already, some very significant figures in UK AI and Cognitive Science have signed up: the new Journal seems to be attracting the support it deserves.

In my last Chair's report, I emphasised the point that the new Journal is a not-for-profit enterprise, and that all funds raised from it will go back into developing the society, and supporting its members. This, of course, raises the question of how AISB is financially able to produce both the new format Q and the Journal: some members may be worried about whether this new activity is sustainable.

The answer, I'm pleased to say, is that the cost per annum of both items together is no greater than the that of the previous style of AISBQ, mostly because of new, more streamlined approches to typesetting and production. This means that the Society can achieve its aim of improving services to members without significant rises in membership fees.

The arrival of the Journal means that the publications side of AISB's activity is now even more important than before. I'm pleased to report that Eduardo Alsono has agreed to take this over as a priority task. We expect, therefore, to be able to report the institution of our on-line bookshop in the near future. The Journal, the Quarterly, and the proceedings of AISB Conventions will be available via the site.

Public Relations

Another new personnel development is the instigation of a publicity team, led by David Brée in his new capacity as Publicity Manager. Gillian Hayes will be dealing with external relations (notably with industrial connections) and Louise Dennis will be dealing with schools liason. David will be focussed on the wider issues of promoting understanding of AI and Cognitive Science in the media.

New Consitution

My own primary activity as Chair, at time of writing, is the redevelopment of the Society's constitution, which, I reported in an Erratum to the last Q, has been found to be inconsistent. A new proposed constitution will be circulated for scrutiny by the membership as soon as is possible.

Geraint Wiggins
AISB Chair

Financial report for the AISB Convention 2002 at York

I am please to report that the AISB 2002 Convention, held at York, was not only an intellectual but also a financial success. The income and expenditure figures look like this:

INCOME (£)	
Registration fees	12,775
Other	1,083
Total	**13,858**
EXPENDITURE (£)	
Proceedings	2,700
Rooms & catering	2,700
Reception & speakers	1,640
Other	690
Total	**7,730**
	———
INCOME - EXPENDITURE	**6,128**

This continues the trend of successful AISB Conventions in recent years. Our hearfelt thanks and congratulations to all who made this Convention such a success, in particular to the Convention Chair, Simon Colton, and to the Local Arrangements Chair, Eduardo Alonso. But also to the Chairs of the individual Workshops: Axel Cleeremans and Pawel Lewicki, Colin Johnson, Daniel Kudenko, Luc Moreau, Michael Schroeder and Kostas Stathis, Andrei Voronkov and, yes, Geraint Wiggins. Thanks to the hard work put in by all these souls, the AISB continues to be your thriving Society. *David Brée, Treasurer*

Viewpoint

Two Notes on Agents

Agents, what agents?

Agent technology is widely used in the Artificial Intelligence (AI) community as a means to build systems that act autonomously, that is, systems that make their own decisions. Agent-based applications have been reported in manufacturing, process control, telecommunication systems, air traffic control, traffic and transport management, information filtering and gathering, electronic commerce, business process management, entertainment, social simulation and medical care. As a consequence, dozens of different agent taxonomies have been proposed, each highlighting particular aspects of agents (e.g., Nwana classification focuses on mobility (Nwana, 1996)). Regardless of this heterogeneity, Wooldridge's definition of agency is universally accepted (Wooldridge, 1997):

"An agent is an encapsulated computer system that is situated in some environment and that is capable of flexible, autonomous action in that environment in order to meet its design objectives"

Some critics, however, argue that such a concept of agency has become a catch-all concept: In fact, it can be applied to almost any system, from software daemons to cognitive agents with goals, beliefs, and intentions. It is our contention that this overgeneralization might lead to a devaluation of the concept. According to Wooldridge's definition, a thermostat is a kind of agent. He explains that a thermostat is autonomous in so far as it acts independently from its designer. Once it has been programmed, the thermostat "knows" when to act, and acts accordingly: When the temperature drops it decides it must switch on; when the temperature goes up, it switches off. The designer thus does not directly control the process. It seems that autonomy is understood in terms of *independence of action*. However interesting this approach might be, the object oriented (OO) community responds, quite rightly, that this kind of behaviour can be implemented by using well-known OO techniques. Not surprisingly, agents are still designed and implemented in OO programming languages, due to the lack of a well-defined agent oriented language.

We propose a more restricted approach to agents, where autonomy is identified with *re-configuration*. Agents are autonomous because they are able to vary their configuration according to the changes in the environment. In most dynamic domains a designer cannot possibly foresee all situations that an agent might encounter and therefore the agent needs the ability to learn from and adapt to new environments. This is especially valid for multi-agent systems, where complexity increases due to several agents acting in the environment. For agents to be autonomous, they must thus be provided with the appropriate tools to make decisions when new information arrives. A lot of work has been recently produced on this topic, particularly on the field of learning for multi-agent systems (e.g., Imam, 1996; Weiss, 1997; Sen, 1998; Kudenko and Alonso, 2001).

Negotiation, what negotiation?

Despite some alarm about the slowdown figures (due mainly to technical problems such as lack of broadband services), electronic commerce, that is, commerce through electronic means (e-mail, internet) is undoubtedly an economic driving force. The Office for National Statistics has recently published its *First E-commerce Survey of Business,* covering 9,000 businesses, with 10 or more employees across most of the economy (http://www.statistics.gov.uk/pdfdir/ecom0501.pdf). It shows a healthy amount of business being done online in the UK, totalling nearly £57 billion in sales.

The personalised, continuously running autonomous nature of agents make them well suited for mediating those consumer behaviours involving information filtering and retrieval, personalised evaluations, complex co-ordinations, and time-based interactions. Specifically, these roles correspond to the product brokering, merchant brokering, and negotiation stages of the Consumer Buying Behaviour model (Guttman et al., 1998). The study of agent-mediated electronic commerce has produce abundant literature (Noriega and Sierra, 1999; Moukas et al., 2000; Dignum and Sierra, 2001; Dignum and Cortes, 2001).

So far, most of the work in negotiation in

electronic commerce has been developed in *distributed negotiation* such as auctions. Auction mechanisms are very popular due to their simplicity and well pre-defined rules. However, this type of negotiation presents a very hostile characteristic: The decision-making process of resolving a conflict involves two or more parties over a single mutually exclusive goal, namely, price. That constraint makes auctions zero-sum games where what one agent gains, the other agent(s) loses. On the other hand, *integrative negotiation* involves two or more parties over multiple interdependent, but non-mutually exclusive goals. Interactive negotiation is a win-win type of negotiation as the agents have more freedom to negotiate over different parameters such as price, delivery time, quality, quantity, and warranties.

It is abundantly clear, however, that companies still prefer to work in distributive negotiation scenarios. From traditional markets to online trading, auctions seem to be the way real agents negotiate. No doubt, integrative negotiation and argumentation are interesting from a technical point of view. However, it is argued, they do not occur in the real world. When buying a product, we do not engage ourselves in complex bargaining, but just check the different offers in the market and buy the more profitable according to our preferences.

A typical B2C trading episode would be as follows:

- BT offers a (package) of product(s), e.g., *Home Highway, BT with Unlimited Local & Surf Calls*
- After comparing different offers from other companies (e.g., ntl) customer accepts or rejects it
- End of story! No (explicit) exchange of offers and counteroffers

Integrative negotiation is therefore not worth simulating. Companies do not think that they negotiate in such a way. They offer their products and consumers accept or reject them. It is an all or nothing situation. We think, however, that integrative negotiation deserves more attention. Although real-life trading does not imply explicit exchange of offers and counteroffers, the trading process as a whole might be seen and studied as such. To understand this claim, we should understand bargaining not as independent trading episodes but as a history of interactions. Using the previous example, the distributed scenario can be seen as an integrated one:

Offer 1: *"Free unlimited evening and weekend surf calls (Evenings: 6pm-8am; Weekend: Fri midnight-Sun midnight) applies only to calls made to dial-up numbers beginning 0844 04"*

Counteroffer 1: Average customer rejects the offer (does not buy)

Offer 2: Change the original (previous) offer so that the new offer *"... applies to any number"*

Counteroffer 2: Average customer

A company is actually adapting to the market and learning from the customers' expectations and preferences. If the product is rejected, the company will vary its offer and see how the public responds. The cyclical update of its offers can be seen as a kind of integrative negotiation, where learning plays a central role.

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References:

Dignum, F. and Sierra, C. (eds.) 2001. *Agent mediated electronic commerce: The European Agentlink perspective*. LNCS 1991, Springer-Verlag, Berlin.

Dignum, F., and Cortes, U. (eds.) 2001. *Agent-mediated electronic commerce III: Current issue in agent-based electronic commerce systems*. Proc. Autonomous Agents Workshop. LNCS 2003, Springer-Verlag, Berlin.

Guttman, R., Moukas, G. and Maes, P. 1998. Agent-mediated electronic commerce: A survey. *Knowledge Engineering Review* (13):3.

Imam, I.F. (ed.) 1996. *Intelligent adaptive agents*. Papers from the 1996 AAAI Workshop. Technical Report WS-96-04, AAAI Press.

Kudenko, D. and Alonso, E. (eds.). 2001. Adaptive Agents and Multi-Agent Systems. *Proc. AISB-01 Symposium*, AISB, York, UK.

Moukas, A., Sierra, C. and Ygge, F. (eds.). 2000. Agent mediated electronic commerce II: towards next-generation of agent-based electronic commerce systems. *Proc. Sixteenth International Joint Conference on Artificial Intelligence Workshop*, LNAI 1788, Springer-Verlag, Berlin.

Noriega, P. and Sierra, C. (eds.) 1999. Agent mediated electronic commerce. *First International Workshop on Agent Mediated Electronic Trading, AMET-98*, LNAI 1571, Springer-Verlag, Berlin.

The Calculemus Project

Putting it All Together - The Calculemus Project

One of the original goals of AI was to automate human-level intelligence. While this is a long way off, it is likely that such competence is not going to be achieved by a single algorithm or even a single program. Rather, it will probably take an agency of intelligent systems, where each system comprises many programs designed to perform specific tasks. While we have a hyper-linked global knowledge base (the internet), there is no comparable network of programs which tasks and subtasks can be passed around until a solution to a particular problem is found. However, there are certain projects which aim to combine systems so that the whole is more powerful than the sum of the parts.

One such project is called Calculemus, which aims to combine mathematical software in such a way that the combined systems perform better than any of the stand-alone programs. For example, a general aim of the Calculemus project is to improve automated theorem provers by enabling them to perform computations (very few provers actually look at examples of the concepts which they are trying to prove a theorem about). Conversely, another aim is to improve computer algebra packages by giving them enhanced deductive power (to prove, for example, that the side conditions of a integral hold, or to formally verify that an algorithm performs as specified).

The Calculemus project was awarded a grant under the European Union Fifth Framework Programme, with nine universities in six countries participating (Saarbrücken, Edinburgh, Karlsruhe, RISC, Eindhoven, IRST, Bialystok, Genoa and Birmingham). Another major UK player is St. Andrews, although they are not officially mentioned in the EU grant. Each institute brings unique experience to tackle the difficult problem of integrating mathematical software.

The first hurdle to overcome with any project to combine systems is the language(s) to employ. Various proposals for a mathematical language are on the table, including XML, OmDoc and OpenMath. Once the programs can talk, there is a need to define the notion of a mathematical service, so that the programs can work together productively. Projects such as the Open Mechanised Reasoning Systems are working towards this. In addition, the practicalities of brokering mathematical communications over networks are being researched.

Secondly, there is a need to share stored information between the programs, and libraries are required to provide contexts for the integration. The MBase and Mizar databases are being researched under the Calculemus umbrella, and much energy is being expended on the development of authoring tools to compile large libraries of mathematical knowledge in a standardised format.

Finally, experts in the implementation and application of the systems to be combined are required, and there are Calculemus partners with much experience of both computer algebra systems and automated theorem provers. Also, it is important to identify applications, in particular challenge problems from mathematics and beyond which can be solved more efficiently with a combined approach than with stand-alone methods.

Although only part of the way into the project, there are already some promising results. A system which is rapidly becoming very important to Calculemus is the MathWeb software bus. Thanks largely to the efforts of Jürgen Zimmer from Saarbrücken on a Calculemus crusade to various universities, MathWeb now enables 23 systems to talk to each other. Such interaction is beginning to pay off, as demonstrated by two projects we are undertaking in Edinburgh. Firstly, we have enabled the Lambda-Clam theorem prover to perform calculations by calling the Maple computer algebra package. This has enhanced Lambda-Clam so that it can now prove some results about Fibonnaci numbers which were not possible before. Secondly, we have integrated the HR automated theory formation system with Maple, the Otter theorem prover and the MACE model generator. Various applications have spun off from this, including: producing new theorems for the TPTP library of test problems for provers; finding invariants of algebras; and finding conjectures about Maple functions (where Otter is used to discard those conjectures which can be proved too easily).

Letters

Calculemus is a training network, with much emphasis on the training of "Young Visiting Researchers" (of age 35 and under). Any young researcher from an EU country can be employed to work at one of the nine nodes for up to a year at a time. This is an interesting and exciting project, and if you are interested in contributing to it, please visit: http://www.calculemus.net, and consider attending the 2002 Calculemus Workshop (http://www.ags.uni-sb.de/~calculemus2002/) and/or the 2002 Autumn School (http://www.eurice.de/calculemus/autumn-school.html).

Simon Colton
Universities of Edinburgh and York

Letter to the Editor

Dear Sir,

I would like to make some immediate responses to the letter from Kyran Dale (AISBQ. 107) In addition to some rhetorical stuff, what I take him to be saying is:

(1) Steve Grand (and many others, including the whole of GOFAI) are wrong to think that they are on the royal road to AI/A-Life. Indeed, they are "hopelessly" over-ambitious in believing this.

(2) No-one else is on the royal road either. But the first steps must be at the level of "hundreds" of simple elements in a complex system — e.g. the nematode worm.

(3) The behavioural - and therefore cognitive - capacities we are interested in are hugely difficult to understand/implement. (Even in bees.)

(4) There's too much hype in this area. Some of this is down to the media, some to self-aggrandisers, but it is a general problem for AI and A/Life.

What I'd like say about that is: (a) As for (1) and (2), many others would say so also. They may or may not be right. But - for what it's worth - I think they have a plausible case. I myself am constantly pointing out, both in speech and in print, the crudeness of achievement and the over-optimism of most (yes, MOST) people in AI/A-Life (yes, ALL of them). But that doesn't mean that I think nothing of interest has been learnt. I think Kyran Dale is far too quick to imply that this is the case, and also - or maybe "and therefore" - far too quick to assume that Steve Grand won't get anywhere either. This is, in fact, a long-standing scientific (and philosophical) dispute right at the foundations of AI/A-life. On this occasion, it's been triggered by a debate between two specific individuals, but it's a serious debate in which we should all be interested.

(b) Point (3) is, surely, absolutely incontrovertible. Indeed, another thing I often say is that the main lesson of AI is how unexpectedly difficult these things are. That insight is a *real* advance, even if it's been gained at the cost of repeated semi-successes or even failures over the last 60 years.

(c) Point (4) is again hard to disagree with in the general sense. Admittedly, someone who doesn't know anything about the field (which doesn't include the readers of AISBQ) might read his piece as simply a personal attack on Steve Grand. But AI/A-Life in general has been - rightly - accused of this from the start. Steve Grand is in very good company - Newell & Simon, Minsky, McCarthy, and Rosenblatt.

If anyone can achieve what Steve Grand is setting out to do (which, as I say, I doubt) then it is he. However, even if his project turns out to be a complete dead end, it should be welcomed. As Karl Popper usefully pointed out these dead-ends aren't actually 'dead': they are "conjectures" which can turn out to be followed (perhaps many years later) by fruitful "refutations" - but the process (the "scientific research programme") was an advance. Not only did it (eventually) show us what *is not* the case, but it (throughout) showed us what *might be* the case.

Kyran Dale twice refers to people applying for funding, grants, etc. Steve Grand has never done this. He has the courage to devote his own money - indeed, almost all of it - to his research. Steve Grand is very unusual - not least, in this. Most of us have neither his vision, nor the computing/engineering skills, still less the commitment and courage. I salute all four. I suspect that Kyran Dale, in non-incandescent mode, would do so too. His rhetoric is not a model of tact.

Maggie Boden, University of Sussex

Conference Report

AISB Travel Grants

AISB operates a travel awards scheme to help fund a small number of researchers — generally research students and post-doctoral researchers early on in their careers — to attend conferences on topics within areas of artificial intelligence and cognitive science.

So that as many people as possible can benefit from a limited travel award budget, awards are generally limited to £100.

We aim to share awards around institutions and types of conference, and also to offer awards to people who can argue a good case for needing the financial support.

If your choice seems to be between missing a wonderful conference or starving in a garret to pay for it, and you are willing to write a report within 3 months of the event for the AISB Quarterly on the conference you attend, then you could try applying for a travel award by contacting:

Professor David S. Brée

Department of Computer Science University of Manchester

MANCHESTER

travel@aisb.org.uk

http://www.aisb.org.uk/awards.html

Report on the 2001 International Conference on Intelligent Agent Technology

1 Introduction

The 2001 International Conference on Intelligent Agent Technology (IAT-01) took place in Maebashi City, Japan, on October 23-26, 2001, and was held in conjunction with the 2001 International Conference on Web Intelligence (WI-01). It was a truly international conference, with many countries represented. Delegates presented practical work on applications of agent systems as well as theoretical issues such as formal agent theories. One disappointment, however, was the number of people who failed to come, including many who were due to present their work. This meant that some workshops were shorter than programmed and much opportunity for discussion lost. One reason suggested for the lack of attendance was the recent terrorist attacks which may have discouraged some from flying.

It was the first time in Japan for me and many others there, and mealtimes, evening drinks and sightseeing trips were cultural experiences as we tried sashimi (raw fish - not sushi which is soured rice), duck (which we cooked ourselves in boiling soup), sake (drunk in bars sitting on the floor at knee high tables), and outdoor baths in the nearby hot springs. Chopstick skills improved during the week.

There were six workshop themes; formal agent theories, computational architecture and infrastructure, learning and adaptation, knowledge discovery and data mining agents, distributed intelligence and agent-based applications. All workshop papers were printed in [2], and the conference homepage is at http://kis.maebashi-it.ac.jp/iat01/ Videos of full plenary and summaries of selected workshop presentations can be found at http://www.comdig.de/ComDig01-44/#1

2 Agent development and web research

Ways in which agents may be developed in order to take advantage of information published on the web was a common conference theme, with some talks being presented jointly with WI-01. In a keynote talk Feigenbaum and Hendler spoke of their "semantic web vision", in which more of the semantic content of a page is available in machine-readable formats. Current problems in applying agent technology to the web include discerning whether information is correct or not (quality of knowledge) and whether it answers the question asked (diversity of content). HTML, although sufficient for humans, is not appropriate for software programs. XML (an extension of HTML developed by W3C) is useful in clarifying ambiguities, but has limited capability to describe object relationships. Feigenbaum and Hendler recommended the use of semantic web languages, in particular the DAML language, which extends XML, using ontologies to describe objects and their relationships to other objects. (See http://www.daml.org for details.) Katia Sycara spoke further on the uses of DAML. As an example she suggests that if semantic rather than syntactic knowledge were employed then an agent would know that the statement "Wendy owns Wanda" is consistent if, say, Wanda is a fish, and inconsistent if Wanda is another human being. A way to resolve inconsistency could then be considered. If a semantic mark-up language were used then the web can be used as a knowledge base. She spoke about DAML Services, a project currently developing DAML-S (a DAML-based Web Service Ontology) and supporting tools, to help the automation of services such as automated Web service discovery, execution, interoperation, composition and execution monitoring. Problems include authentication issues such as determining whether an agent really represents the user they claim.

In the discussion afterwards the issue of responsibility arose with respect to making information - which may be misused - readily available to everyone. Most researchers agreed that easier use does not necessarily mean more ethical use, and policy is needed to ensure proper use.

3 Agents and market trend predictions

In a keynote talk Benjamin Wah discussed the role of intelligent agents in market trend predictions, arguing that prediction should consist of non-stationary time series and the abstraction and integration of non-numeric information. He proposed using intelligent

agents to abstract the information, decomposing non-stationary time series into multiple time series, and using neural networks for the prediction of trends.

4 Approximate reasoning

Andrzej Skowron outlined a methodology for approximate reasoning by agents in distributed environments, in an invited talk. It is based on Granular Computing, in which computations are performed on information granules representing vague and complex concepts. He presented methods for inducing relevant information granule constructions from data and background knowledge.

5 Query answering

Zbigniew Ras presented a query answering system which is based on distributed data mining and overcomes limits on traditional query processing systems. These are unable to answer queries about attributes which are missing in the specified database - but may be represented in other databases (although not necessarily one with the same structure or semantics of data). Ras introduces discovery and action layers, which contain rules extracted from a database and action rules which show the minimal changes to a database needed to reclassify its objects. These layers play a similar role to the intermediate model suggested in [1] which describes the content of databases at a sufficiently high level to guarantee the same representation of all databases.

6 Agents as teaching aids

In a WI invited talk Lewis Johnson spoke of the increasing level of online education, in the form of homework email submissions, online discussions and even lectures. This could lead to problems if learning is passive, or there is a lack of feedback. Johnson and his team develop automated pedagogical agents which can interact with students, model skills, keep their learning on track, act as guides, tutors, or teammates, enhance motivation and evaluate performance. Challenges in this area include improving the quality of Human-Agent interaction, and finding and realising new roles for agents. Expert tutors must attend to both motivational and cognitive factors, and inspire learner curiosity. In order to do this the agent must have the ability to develop social relationships, i.e. to build a rapport with the student. Future roles for agents include guiding them through Web-based learning materials (linking back to the DAML project), supporting collaborative learning, and use in Web-based pedagogical dramas.

7 Social intelligence design

Toyoaki Nishida gave an invited talk in which he presented issues in social intelligence design. This is a new discipline which aims to understand social intelligence by modelling intelligence as a phenomenon which emerges through agent interaction. He described several engineering approaches, while stressing that sociological and cognitive aspects are equally or more important. Focusing on the idea of designing and understanding a world in which people and agents cohabit (as opposed to inventing a system of artefacts), Nishida argued that we need to understand more about humans and society and to consider the effects of technology on human society. This will help us to design a system in which agent systems are embedded within human society.

8 Conclusion

The wide range of issues to which agent technology is relevant, its connection to web-based intelligence, and the many profitable academic-industrial partnerships makes the field an exciting one. As Sycara points out [2], p. 40: "multi-agent systems (MASs) are becoming increasingly important as a scientific discipline, a software engineering paradigm and as a commercially viable and innovative technology".

The next IAT conference is scheduled to be held in Beijing, in 2003.

Alison Pease

References

[1] Maluf, D. and Wiederhold, G. "Abstraction of representation for interoperation", Proceedings of the 10th International Symposium on Methodologies for Intelligent Systems, LNCS/LNAI, pp. 441-455, No. 1325, Springer-Verlag, 1997

[2] (Eds) Zhong, N. and Liu, J. and Ohsuga, S. and Bradshaw, J. Intelligent Agent Technology Research and Development: Proceedings of the 2nd Asia-Pacific Conference on IAT, World Scientific, Singapore, 2001

Upcoming Events

AISB'02 Convention

3rd - 5th April 2002

Imperial College, United Kingdom

Hosted by Depts. Of Computing and Electrical & Electronic Engineering

six parallel symposia on specialist AI topics:

⇒ **Second Symposium on Adaptive Agents and Multi-Agent Systems (AAMAS-II).**

⇒ **The 9th Workshop on Automated Reasoning**

⇒ **AI and Creativity in Arts and Science**

⇒ **AI and GRID Computing**

⇒ **Animating Expressive Characters for Social Interactions**

⇒ **Intelligent Agents in Virtual Markets**

Convention co-chairs
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From the Archives

Thanks to Rudi Lutz for selection of archive material.

On the difference between Psychology and Artificial Intelligence

AI has been plagued, ever since it began some twenty years ago, by disputes about its status. Is is an interdisciplinary area, a methodology or a new science? Is it part of psychology or part of Computer Science (whatever that is)? If the latter, why AI's concern (more or less formally recognised by different workers) with human performance? If the former, why its singular lack of attention to experimental corroboration of theory, and its overwhelming concern for programming?

I know that many people who work in the fireld have strong views on these questions. One might hope to be able to answer them by a poll, therefore: after all, if most people who are working in the field believe that it can be characterised in such-and-such a way, they it *can* be so characterised, more or less by definition. Unfortunately this simple plan breaks down in two ways. Not everyone, for a start, agrees abut who can be said to be working in artificial intelligence: there are many, overlapping, groups each of which regard those outside as not *really* working in AI, but in some other subject (such as pattern recognition, theorem-proving, advanced automation, brain theory. . .). And secondly, even those who almost everyone would agree are working in AI, do not themselves agree about what AI's aims are. A few years ago, in Edingburgh, then the only large group in Europe, one could find eminent AI workers who regarded themselves as experimental psychologists, as software engineers and as theoreticians of computer science: yet it did not seem to prevent useful communication between them. Several major AI projects have been staffed by people with widely divergent views on what AI really is, cooperating happily on actual AI work.

I have wondered for some time about how this is possible. There does seem to be a subject called AI, which one can study, in which one can work. There are commonly accepted intuitive standards of excellence in the subject. Yet it is hard do define it adequately. It has always seemed that AI is, or should be, relevant to understanding human behaviour and thought (both in the sense that AI work should illuminate our view of ourselves, and in the sense that data about what people actually do should be relevant to AI theories.) And yet, there has always been a clear distinction between AI work and experimental psychology, even cognitive psychology: certainly, AI workers and cognitive psychologists do different things, and *know* different things, and are often deeply suspicious of one another's work. AI work often seems, to experimental psychologists, to be sloppy and irrelevant: and psychology often seems, to AI workers, to be naïve and irrelevant.

Pat Hayes,
Department of Computer Science
Essex University
AISB Quarterly Issue No 34 – July 1979

Automated programs en route at MIT

The programming of computers could be completely automated by 1990. This is the view expressed by Gregory Ruth, a researcher at the Massachusetts Institute of Technology in a presentation to the recent National Computer Conference in Anaheim, California. Ruth has divided the programming into four parts. The first two, concerned with language comprehension, model formation and problem solving, are currently be worked upon as part of MIT's Protosystem I. The second two, concentrating on the generation of code and optimisation are already complete.

When complete, the first two stages will link up with the code generator to form a complete automatic programming system. Ruth claimed that a satisfactory model for the automation of the process has been developed and the Protosystem I project is a tool to demonstrate the feasibility of the model.

The code generator produces PL/1 and JCL code for use on IBM OS/360 systems and Ruth says the results are 'capable of producing acceptable implementations'. He went on to say: 'The automation of the remaining two phases should easily fall within realm of presently developing technologies in the next decade.'

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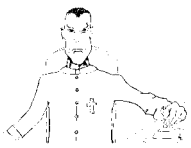

Father Hacker's Guide for the Young AI Researcher

Cognitive Divinity Programme
Institute of Applied Epistemology

NEW

We continue the series of articles, begun in the last AISB Quarterly, in which we provide invaluable advice to the young AI researcher. In this second article we address the vital art of ....

2) How to Become a Media Tart

It's not enough to be a well-respected colleague within a small, esoteric band of specialists. To go down in history as a major figure, you must become equally well known to the general public. Nowadays, this requires your frequent appearance in the media — and not just in the science columns; no game show, pop programme or advertisement should be neglected. But before the paparazzi stake out your house, some preparation is required.

♦ Develop an outrageous, but dependable, viewpoint on your field. Journalists need to spice up their articles and programmes, but they also want to plan the confrontation of views. If you can be guaranteed to contradict the other contributors and create a heated debate, then you will get lots of invitations.

♦ 50 years from now is a good date for the realisation of your boldest predictions, e.g. robots taking over the world. This date is close enough to be within the lifetimes of many of your audience and, so, to make an impact on their lives. But it is sufficiently far in the future that even your most controversial speculations cannot be easily dismissed — and it provides plenty of time for memories to fade if you prove to be wrong.

♦ Make lots of predictions. The more you make the higher the chances that one will come true. Remind people, loudly and frequently, of any predictions that do work out or which become more likely over time. You will be surprised at how quickly people will forget those that don't.

♦ Play to the anti-science culture. The scientifically ignorant will be delighted to hear their worst fears confirmed and embellished, arrogant experts criticised and contradicted, and scandalous cover-ups exposed and denounced.

♦ Make yourself available to the media at a moment's notice. Journalists work to tight deadlines. Cancel other engagements, return their phone calls and get to the studio. No appointment with a student, conference or vice-chancellor is more important. Never turn down a press invitation or miss a deadline. The more reliable a contributor you become, the more you will be asked to contribute.

♦ Don't wait for invitations: go out and create them. Employ a press secretary to broadcast your views and solicit invitations to express them.

♦ Develop a thick skin. Lesser colleagues will be jealous of your popularity and irritated by your public criticisms of their work and views. Be steadfast: you have a new and much larger circle of admirers and friends.

Following these few simple rules will ensure your place in history.

Email anything fun or interesting (AI jokes and cartoons, artistic impressions of Father Hacker, interesting news, letters to the editor, etc.) to: aisbq@aisb.org.uk