

## NCAF's New Deal

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to play in  
promoting  
widespread  
exploitation of  
natural  
computing*

NCAF, the Natural Computing Applications Forum, celebrated its 10th anniversary in September 2000. Originally formed from a user support group for commercial neural network software, the forum soon flourished into a thriving community with a lively mix of vendors, users, researchers and applications developers, with equal representation from academia and industry. Now eleven years on, the extravagant expectations of the early researchers have been put into perspective and the technology has matured into many mainstream uses. NCAF, supported by the DTI and EPSRC, helped the community through this transition.

Although the high levels of interest and excitement experienced in the mid-nineties have now subsided, the natural computing field is still very active. NCAF has a very valuable role to play in promoting widespread exploitation of natural computing by:

- providing a focus for natural computing practitioners
- disseminating information on all aspects of natural computing
- encouraging close co-operation between industrialists and academics

These have always been our aims and they are as relevant today as they were when we formed the organisation in 1990. However, the year-on-year decline in our membership and the disappointing levels of attendance at our quarterly meetings points to the realisation that we are falling short of our goals. There is a much larger community that could benefit from NCAF than we are currently servicing, and the more active members we attract the greater the benefit to our membership. We want to provide the maximum benefit to the maximum number of people.

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## Global Optimum in Exeter Exeter University 23-24 January 2002

Most natural computing applications involve optimisation of some kind or other, be it a likelihood, an error rate or a cost/performance trade-off. As well as being an integral part of many natural computing applications, natural computing paradigms, such as genetic algorithms and reinforcement learning, provide algorithms for locating the global maximum - often in very high dimensional search spaces.

The theme of the January NCAF meeting is 'Machine Learning for Global Optimisation', and it aims to concentrate on recent advances in techniques for global optimisations and their applications.

### Recent advances

The first day starts with a workshop on global optimisation in which recent advances in global optimisation will be discussed and participants are encouraged to bring their own optimisation problems and successes for general discussion.

Ian Parmee (Advanced Computational Systems & UWE) begins the talks with a survey of techniques and applications, concentrating on the interactive role that the domain expert plays in guiding and

learning from the optimisation process. Dragan Savic (Optimal Solutions & School of Engineering, Exeter University) will describe how new genetic algorithms have led to multi-million savings in water distribution.

Xin Yao (Department of Computer Science, Birmingham University) continues the discussion on GAs with two case studies exploring the mechanisms at work in evolutionary algorithms. He will focus on the impact of search operators, such as mutation operators, on the evolutionary algorithm's behaviour, and on a simple and effective constraint handling technique.

Often one wants to simultaneously optimise more than one objective; for example, speed, fuel consumption and manufacturing cost. David Corne (Department of Computer Science, Reading University) will concentrate on new methods for multi-objective optimisation, which make these problems accessible. Improvements to multi-objective algorithms and their application to computational finance are also the subject of the talk by Jonathan Fieldsend (Department of Computer Science, Exeter University).

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## NCAF's New Deal *Continued from page 1*

NCAF is a non-profit making organisation heavily supported by volunteer effort. As such, our charges are already very low, but we realise that they still present a significant obstacle to some parts of the community. Also, having four two-day meetings a year is both administratively taxing for NCAF and logistically demanding for attendees.

The Committee has therefore taken the decision to restructure NCAF and lower entry costs in order to make it more attractive and accessible to a wider community. These changes will not disadvantage our existing membership as there is a comprehensive package of credits and extensions proposed to compensate those who have already paid the higher charges.

The following changes will take place from 1 January 2002:

- There will be three two-day meetings per year. These will be held late January, early June and mid September.
- Memberships will be annual and can be taken out or renewed at only three points during the year: 1 January, 1 May and 1 September.
- There will be only three classes of membership: Corporate, Individual and Student.
- Membership rates will be £185 for Corporate, £95 for Individual and £30 for Student.
- Memberships will not automatically include the journal, *Neural Computing & Applications* (NCA). Instead, all members will be eligible to take the journal at a specially reduced rate (Volume 11 in 2002 has been set at £40). Each volume comprises four quarterly issues per year, and members can subscribe for multiple copies at the same special rate.

- Meeting attendance fees will be £25 for members, £15 for student members, £80 for non-members, and a special rate of £60 for BCS-SGES members. (NCAF members already have a reciprocal arrangement with SGES whereby we can attend their annual conference at the SGES-member rate. Their next conference is ES2001 in Cambridge, 10-12 December 2001, see <http://www.bcs-sges.org/es2001/> for details.)

- Existing members may also be eligible for membership extensions and credits. Specifically, current memberships that have not yet spanned four meetings will be extended to the renewal date following their fourth meeting. Individual memberships may also be eligible for a credit against their next attendance fees. The table below provides the details.

- Current memberships that include the NCA journal will continue to receive the journal up to their new expiry date. This will ensure that all existing journal subscribers will receive at least four issues.

- Full details of the new membership arrangements will be available on our web site at <http://www.ncaf.org.uk/memb1.htm>.

We have been careful to ensure that these changes will not jeopardise the short-term financial stability of the organisation. If, as we hope, these changes are successful in attracting more members and higher attendance at meetings, then we will be achieving our objectives and safeguarding the long-term future of the organisation.

**Graham Hesketh**  
NCAF Chairman

Memberships taken out	New expiry date	Individual membership credit
Before January 2001 meeting (Aston)	1 Jan 2002	None
After Aston but before April 2001 meeting (York)	1 May 2002	£5
After York but before July 2001 meeting (Oxford)	1 Sept 2002	£10
After Oxford but before Sept 2001 meeting (Royal Holloway)	1 Jan 2003	£15
After Sept 2001 meeting (Royal Holloway)	1 May 2003	£20

## Global Optimum in Exeter *Continued from page 1*

### New applications

The second day covers a broader range of topics, together with global optimisation topics. Global optimisation can naturally be cast as a reinforcement learning problem, and James Pettinger (Exeter University) will describe recent work on reinforcement learning methods for optimising the GA optimisation process.

Ajit Naranayan (Exeter University) will describe a new application of neural networks for the prediction of viral protease cleavability, an area of bioinformatics where neural network methods have enjoyed recent success. Moving from the biological to the chemical, Sean Holden (Computer Science, UCL) will describe applications of support vector machines to combinatorial chemistry. The EU 'disappearing computer' programme is the subject of the talk by Peter Herdman's (ArjoWiggins R&D). In particular, 'Paper++', a novel intelligent paper for computer input will be described.

The Baum-Welch algorithm for learning the parameters of Hidden Markov Models is a well known optimisation method. Stephen Roberts (Oxford University) will talk about generalisations of Hidden Markov Models to permit missing data and sensor fusion, with applications to pigeon navigation and brain-computer interfacing.

### Balmy weather in Exeter

The meeting is 23-24 January at the Crossmeads Conference Centre, Exeter University. January weather in Exeter is balmy, so start the New Year in an optimistic vein and come to the meeting. There is, as usual, a prize-draw for early bookings, details of the programme and the draw are on the NCAF website: <http://www.ncaf.co.uk>

**Richard Everson**  
Exeter University

# Review of Royal Holloway Meeting

A high quality meeting at Royal Holloway was enjoyed by all the delegates. The only way to hear as good a collection of speakers would be to fly to Vancouver for the NIPS workshop on kernel methods; thankfully for most of us, a short journey to Egham is a great deal easier!

We were very grateful for the efforts made by the keynote speaker, Vladimir Vapnik, to attend and he gave a challenging talk. His main thesis is that statistics took a wrong turn when Fisher introduced statistical models with parameters since parameter estimation is inherently an ill-posed problem and the curse of dimensionality is unavoidable. By contrast, the principle of structural risk minimisation (SRM) acknowledges that we are trying to minimise risk over a space rather than just at training data points. By way of contrast, the next speaker (Mike Tipping) showed how Bayesian methods could be used in the Relevance Vector Machine to significantly reduce the number of 'support vectors' used and improve generalisation. His models are (essentially) generalised linear regression using kernels and so belong to the Fisher tradition. The question was revisited in the panel discussion at the end, which also discussed the relevance of the bounds provided by SRM to

practical applications and whether these were more or less useful than Bayesian approximations, such as the evidence procedure. I suspect that this debate will run for some time yet.

A key question in the application of kernel methods is the choice of the kernel and its parameters. Just as in the early days of neural networks, there has been quite a lot of work which presents overly-optimistic results because the kernel is being tuned on test data. Peter Sollich's talk on the relationship between support vector machines and Bayesian inference (in a quite different way from Mike Tipping) addresses this issue and allows us to apply the evidence procedure to support vector machines. The first day also covered applications of support vector machines to bioinformatics (Colin Campbell) and motor engines (Steve Gunn). At the moment these have not been incorporated into products, but this cannot be far off.

Finally, it is a pleasure to thank the local organiser, Craig Saunders, for all his hard work: getting speakers for the themed day, persuading students and postdocs to present posters, and liaising on the conference facilities.

**Ian Nabney**  
Aston University

## ICANN, Vienna, Austria

21–25 August 2001

In August Vienna (Austria) hosted International Conference on Artificial Neural Networks (ICANN). This is one of the largest and most important meetings of neural network and machine learning communities in Europe. The last day of the conference was devoted to workshops.

Typically, meetings of this kind no longer concentrate solely on neural network theory and applications. Instead, they provide a forum for presentation of developments in a wide variety of fields loosely related (sometimes only historically) to what we would conventionally call 'neural networks'. Oral and poster presentations at the conference were organised into eleven major categories: Data Analysis and Pattern Recognition, Theory, Kernel Methods, Topographic Mapping, Independent Component Analysis, Signal and Time-Series Processing, Self-organisation and Dynamical Systems, Robotics and Control, Vision and Image Processing, Computational Neuroscience, and Connectionist Cognitive Science.

Each day, the oral presentations (in three parallel tracks) were interleaved with three (single-track) invited lectures. The invited lectures, each one hour long, mirrored the wide range of issues presented at the conference. For example, A. Smola (Australian National University) discussed on-line learning in kernel-based methods – an important issue, since kernel methods (a promising alternative to other regression and

classification methods) suffer from unfavourable scaling with respect to the number of training examples. V. Cherkassky (University of Minnesota) came with a seemingly obvious, but often neglected message: predictive models should always be constructed by directly addressing the problem at hand, instead of trying to address related problems, as is so often the case, for example, in computational finance. A. Sperdutti (University of Pisa) talked about his approach to code recursive symbolic structures (such as trees) in recurrent neural networks. Such (continuous space) representations of potentially complex discrete structures can be used e.g. in classification using soft-computing techniques. E. Baum (NEC Research Institute, Princeton) described evolution of co-operative problem solving in agent-based artificial economies. S. Roberts (Oxford University) defended his (rather strong) Bayesian bias in approaching problems facing the machine learning community. In particular, he formulated independent component analysis (ICA) from a Bayesian perspective.

I found many oral and poster presentations interesting, innovative and stimulating. In conclusion, this year's ICANN was worth attending and I am convinced that all attendants took home much more than they came with.

**Peter Tino**  
Aston University

### PUZZLE CORNER

#### Number 19

Lisa studied the schematic carefully. The enemy had three mortar emplacements in the nearby hills, all within range of her position. She knew exactly where they were, and realised that they would soon know where she was. Intelligence confirmed that the one to the North had 7 shells left, the one to the West had 5 and the one to the East had 2. Lisa also knew that every shell fired in her direction had a 50% chance of hitting her camp with fatal consequences, so it was imperative to eliminate the opposition first.

Her own camp was armed with three mortars: one was functioning perfectly and never missed a target, one was completely useless and never hit anything, and the third had a random intermittent problem that made it successful only 50% of the time. Unfortunately the mortars were all identical and unmarked. A further problem was that the target locations were out of sight so Lisa could not directly tell if an attack had been successful. Fortunately her squad had the services of a mobile spotter who could relay the results back, but unfortunately he could only monitor one of the three sites in the time they had available for their pre-emptive strike.

"How many shells have we got?" Lisa asked the Colonel. The answer turned out to be one less than she needed to guarantee their survival. After a few choice expletives she despatched the spotter to watch the Northern emplacement. On his signal she selected a mortar at random and fired her first shell. The report from the spotter was the best possible news.

What did the spotter say, how many shells did Lisa have left, how did she continue and what was the overall survival probability for her squad?

The answers will be given at the next NCAF meeting (23–24 January 2002, University of Exeter).

**Fenella the Rottweiler**



## COMMITTEE NOTES

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### NEXT EDITION

Review of the Exeter  
University meeting  
Preview of the May meeting

# SGES News

This article is the first of a regular series in *Networks*, keeping you up to date with what is going on in NCAF's affiliated group, SGES (the British Computer Society's Specialist Group on Knowledge Based Systems and Applied AI). As you will have read in previous editions of *Networks*, SGES and NCAF have been forging closer links over the last few months, building on our complementary skills and interests in the world of artificial intelligence.

The main activity in SGES right now (apart from changing all the logos to match the new BCS branding, but that is another story) is preparation for our 21st annual conference, ES2001, which will be held in Cambridge from 10-12 December.

The ES2001 conference committee have managed to attract a wide range of excellent papers, forty in all, covering the whole gamut of AI technologies including induction, constraint satisfaction, autonomous agents, knowledge management, knowledge based systems and model based reasoning. Neural networks are also well represented this year, with 10% of the papers being related to neural technologies. Keynote speeches will be given by Professor Derek Sleeman from Aberdeen University on 'Re-use of Knowledge', and by Rudolf Burger, CEO of Media Lab Europe, on 'Innovative Applications of Technology'.

The day before the main conference (10 December) will be devoted to tutorials on a range of topics, including a half day tutorial on 'How to build a Practical Neural Network', by Dr Anthony Browne of London Guildhall University. As reported in the last *Networks*, the conference will also feature the 'First Annual BCS prize for Progress Towards Machine Intelligence'. Some half dozen competitors have signed up for the competition and they will

demonstrate their systems on the second day of the conference, aiming to persuade the delegates that they deserve the trophy and cash prize, to be awarded at the conference dinner.

The conference has always proved to be a great event for making new contacts and friends, for renewing old acquaintances, for extending your knowledge of AI and even for some pre-Christmas shopping in the delightful surroundings of Cambridge. And the best news of all: NCAF members are entitled to attend the conference at the heavily discounted SGES Members' Rate of £325, saving £70 on the standard rate.

Full details of ES2001, and other SGES activities can be found at <http://www.bcs-sges.org>.

In addition to ES2001, all NCAF members will be welcome to attend our next public evening lecture, where Professor John Daugman from the University of Cambridge will be giving a lecture on 'Iris Recognition'. The lecture will be held on Wednesday 21 November 2001 from 6 to 7 pm at the Department of Computer Science, Birkbeck College, Malet Street, London (nearest underground: Goodge Street).

Details of all the Evening Lectures are available on the SGES website at <http://www.bcs-sges.org>.

If you have any questions about SGES or ES2001 feel free to contact me.

See you in Cambridge!

**Richard Ellis**  
**Stratum Management Ltd**

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## DIARY DATES 2002

### 23-24 January NCAF - Exeter University

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11-15 February Third WSES International Conferences on 'Neural Networks and Applications (NNA '02)', 'Fuzzy Sets and Fuzzy Systems (FSFS '02)', 'Evolutionary Computation (EC '02)', Interlaken, Switzerland.

Contact: [interlaken2002@worldses.org](mailto:interlaken2002@worldses.org)

12-15 February ICAIS 2002 First International ICSC Congress on Autonomous Intelligent Systems Deakin University, Waterfront Campus, Geelong, Australia

[www.icsc-naiso.org/conferences/icais2002](http://www.icsc-naiso.org/conferences/icais2002)

3 April EVOIASP2002 - Fourth European Workshop on Evolutionary Computation in Image Analysis, Kinsale, Ireland:  
[http://evonet.dcs.napier.ac.uk/evoweb/news\\_events/conferences/conf636.html](http://evonet.dcs.napier.ac.uk/evoweb/news_events/conferences/conf636.html)

3-4 April EvoCOP 2002 Second European Workshop on Evolutionary Computation in Combinatorial Optimisation, Kinsale, Ireland:  
[http://evonet.dcs.napier.ac.uk/evoweb/news\\_events/conferences/conf634.html](http://evonet.dcs.napier.ac.uk/evoweb/news_events/conferences/conf634.html)

16-17 April Operational Research Society (UK): Local Search Study Group Two Day Workshop, City University, London, UK <http://www.orsoc.org.uk>

### 28-29 May NCAF - Sheffield University

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17-20 June IEA/AIE-2002 Fifteenth International Conference on Industrial & Engineering Applications of Artificial Intelligence & Expert Systems, Cairns, Australia  
<http://iea2002aie.bsee.swin.edu.au>

15-18 July AID 2002, Seventh International Conference on Artificial Intelligence in Design, Cambridge University, Cambridge, UK:  
<http://evonet.dcs>

## MEMBERS' NEWS AND VIEWS

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