Networks 24 – August 1999

Cambridge Revisited
28 - 29 September 1999 Fitzwilliam College, Cambridge

The final NCAF meeting of 1999 (or for that matter, the millennium) will be hosted by Fitzwilliam College of the University of Cambridge. The structure of the meeting continues from the Bristol meeting with the first day on a specific theme and the second day on general theory and applications. The theme for the Cambridge meeting is 'Biometrics, Speech and Image Processing'.

On the biometrics front, the presentations are mainly concerned with methods of verifying the identity of individuals on the basis of biological features. The features used must clearly be unique to the individual and amenable to measurement and comparison. The keynote speech for the meeting will be given by Dr John Daugmann of the Computer Laboratory at Cambridge. The features which concern him are the patterns of blood vessels in the iris of the eye and as well as discussing his methods, he will be presenting results from an iris recognition system which is being considered by British Telecom. Dr Brian Kett of Neusciences will also be talking about current research on vein recognition. One of the problems in biometrics is to establish sensible and objective performance metrics so that systems can be compared. This is the subject of a talk by Dr Tony Mansfield of the National Physical Laboratory. He will presenting results of a study within the ESPRIT project BIOTEST. In a related vein, Steve Attfield of the Royal Derbyshire Hospital will be making a presentation on 'Intelligent Data Processing of Clinical Gait Analyis'. His problem is to diagnose certain medical conditions - notably Cerebral Palsy - from the pattern of movements of the limbs during walking.

The remaining three presentations of the first day are concerned with speech and image processing. There have been many talks at previous NCAF meetings in these areas and the Cambridge meeting will hopefully be bringing us up to date with progress in certain areas. The tutorial for the day will be given by Dr Steve Renals of the University of Sheffield and will range over various AI-based approaches to the subject. The other two talks are concerned with image processing and both have a medical flavour. In the first, Professor Maria Petrou of the University of Surrey will be speaking about 'Textural Features for Medical Imaging'. The second presentation is by Dr Richard Prager of the Engineering Department of the University of Cambridge on 'Sequential 3D Diagnostic Ultrasound'.

The social event for the meeting will be a banquet in the college. This promises to be a rather interesting event, with the college offering main courses like 'kangaroo in chilli sauce' and intriguingly-titled deserts like 'Witches-Bombe'. Whatever the final menu, the evening is sure to be memorable.

The second day of the meeting is concerned with general applications and is composed of a smaller number of longer presentations. In a welcome return to NCAF, the former chairman Professor Chris Bishop, currently of the Microsoft Research Centre, Cambridge, will be making a presentation on 'Probabilistic Graphical Models'. Also on a theoretical note, Dr Phil Husbands of the University

of Sussex will be discussing thoughts on evolutionary robotics in a talk entitled 'GAsnet Robot Controllers'. Three of the talks are concerned with Engineering applications. First, Dr Barry Crabtree will be presenting recent research from the British Telecom Research Laboratory on intelligent software agents. Professor Asoke Nandi of the University of Liverpool will be showing some of his group's recent applications of computational intelligence to problems of condition monitoring. Finally, Chris Kirkham of Brunel University will be giving an overview of a European project NEURAL-MAINE, which seeks to establish a flexible and robust plant-monitoring system based ultimately on ideas of novelty detection and Case-Based Reasoning.

With the close of this meeting, NCAF brings an end to the activities of this millennium and looks forward to continuing in the next.

Keith Worden
University of Sheffield

Digging Deep at Bristol
'Data Mining' 13 - 14 July 1999, Wills Hall, Bristol University

The latest NCAF meeting took place at Bristol University's Wills Hall, where the topic for the first day was data mining. The meeting attracted speakers and audience members with interests ranging from financial modelling to fault identification in structures. However, a number of common themes emerged, including the importance of understanding the data and of involving data owners in the interpretation of data.

Understanding the data

Simon Cumming of British Airways spoke about data mining methods in the travel industry. They can be employed as desktop tools, to guide analysis and to provide specialist 'bureau' services. A familiar example is the use of data mining methods to match special offers to customers' stated preferences. A major challenge of the industry is that the business environment changes very quickly and models must adapt.

A point raised by Tom Khabaza of SPSS concerned the difference between models in data mining and those in traditional statistical analysis. In his overview of the Clementine data mining package, he argued that data mining often uses 'throw-away' models - the models themselves are not of intrinsic importance but are tools to guide the learning process. He suggested that information could be gained by combining models and by learning over models - following their evolution during the data mining process. Tom's talk also countered several myths about data mining, amongst them the belief that data mining is the province of 'technical' people. He argued for the involvement of data owners in explaining what is meaningful in the patterns observed in their data.

Large-scale and distributed data sets

Large-scale and distributed data sets can pose problems for data mining systems. Yike Guo of Imperial College spoke about the development of a data mining system to meet this challenge. He described a distributed data mining package developed within his group and gave an on-line demonstration of the

system, which is available on the Internet.

A world of applications

The applications presented over the course of the meeting were extremely varied. Rick Adderley of the West Midlands Police Force described the use of Clementine, for data visualisation, in the investigation of crimes such as burglary. Jim Baldwin of Bristol University spoke on machine learning using fuzzy methods. He gave a number of examples based on real-world applications, including lip-reading based on fuzzy rules.

Kathryn Burn-Thornton focused on two case studies, drawn from work she has been carrying out with colleagues at Plymouth University and with researchers at the Computing Laboratory at the University of Oxford. The first case was a pharmaceutical one. The aim was to develop a system to assist people tasked with determining common features responsible for key functionality in large organic compounds. An unsupervised data mining approach provided several important features, including the ability to determine common substructures irrespective of compound size. Kathryn also discussed work on web-based Artificial Intelligence for diagnostic use - the WeAidU project. Currently, the project is concerned with diagnosis of heart disease, but future work will also consider brain disease.

Has data mining research overturned any commonly held views? This question was posed by a member of the audience, following a talk by Vic Rayward-Smith from the University of East Anglia on applications of data mining in the insurance industry. In fact, the research challenged the notion that young men with fast cars represent an increased insurance risk. It was found that young men with fast cars and 'X' are a low risk. The X-factor remained a mystery, however, as the information is commercially confidential. Vic also spoke about projects on applying data mining to detection of fraudulent telephone use and to medium-term weather prediction.

A weather forecasting application was also discussed in a talk by Ian Nabney of Aston University. Scatterometry concerns the understanding of wind behaviour over oceans as an aid to better weather forecasting. Physical models of such processes are very complex. Ian's research has applied neural networks to scatterometry, allowing global and local problems to be separated, as well as offering high levels of accuracy.

Three talks focused on aspects of fault detection or condition monitoring. Simon Hickinbotham of York University described work in conjunction with British Aerospace on monitoring the structural health of airframes. This is usually done on the basis of FOOMs, or frequency of occurrence matrices, which record stress events. FOOMs can be corrupted due to sensor degradation. Simon described a means of automating the detection of sensor faults. Tshlidzi Marwala of Cambridge University described research on fault identification in structures which makes use of neural networks for the analysis of vibration data. Kevin Bossley of Southampton Parallel Applications Centre, discussed neural network approaches applied to power station turbine condition monitoring.

Colin Campbell of Bristol University detailed fundamental and new research on support vector machines. He gave an introduction to Bayes Point Machines,

active selection (a form of query-based learning) and model selection.

Graham Hesketh presented a lively pantomime-style solution to the Puzzle Corner problem. He was assisted in this by a team of 'volunteers' from the audience. He also organised a very popular outing to a skittles hall for the first evening of the meeting.

The organisers and speakers are to be congratulated on an enjoyable and informative meeting.

Simukai Utete
University of Oxford

Conference Report: COMADEM '99

Twelfth International Conference on Condition Monitoring and Diagnostic Engineering Management

The COMADEM '99 Conference was held between 6-9 July at the St. Peters Campus of the University of Sunderland, home of the School of Computing and Information Systems.

One of the running themes of the conference was the need to bridge the gap between condition monitoring expertise and management, a point enthusiastically brought to the fore by Roger Hutton from Entek IRD, who kicked the conference off to a rousing start. Roger stressed how, at present, condition monitoring is frequently considered as delivering no measurable value and as such is often subject to cutbacks. He suggests that this could be rectified through integration into maintenance management systems through personnel and technology.

Also presenting was Giles Oatley from the University of Sunderland, who showed how previous AI attempts to model diagnosis in the field of vibration analysis have been of limited success due to the complexity of the domain. He then moved on to demonstrate how Case Based Reasoning can be implemented in a decision support tool, providing assistance to an engineer by accessing cases similar to the current problem.

To open the second day, Scott Dow of Vibe-Assist spoke on the failings of current training techniques in the field of condition based monitoring, different approaches to this training and ways in which the situation could be improved. Scott highlighted in particular the problems with short courses where an individual is expected to take in and memorise a large amount of technical information in a short time, and then pass certification tests that do not truly assess the individual's ability to apply this knowledge. He also demonstrated how some of these difficulties could be circumvented by the use of an interactive training package such as Vibe-Assist's V-Trainer software.

Chris Kirkham from Brunel University and Odin Taylor from Sunderland University expounded on the Neural-Maine project - more of which will be heard at the NCAF Cambridge meeting.

The third and final day of the conference was opened by Trevor Holroyd of Holroyd Instruments Limited, who spoke of how current low frequency vibration

monitoring techniques are useful for detecting cyclic stress variations, but that they are not best suited to the early detection of wear. He then neatly followed up by pointing out how monitoring of elastic wave activity by acoustic emission can be used to perform this very task.

Paul White from the University of Southampton gave a review of his work into the classification of heart conditions based on heart sounds. The work he spoke of focuses mainly on the detection and classification of paediatric heart murmurs, which has been attempted previously through the use of supervised neural networks. Here it has been achieved by using an unsupervised self-organising map to highlight the inherent differences between four patient groups.

Adrian Long
Brunel University

Conference Report: DAMAS '99

Third International Conference on Damage Assessment of Structures Conference Report

The DAMAS '99 conference was held between 28-30 June 1999 in Dublin, Ireland and attracted a wide range of international speakers from as far afield as Poland, Italy and the USA.

Professor Phil Irving of Cranfield University spoke on impact damage detection in carbon fibre composites using acoustic emission, and how this can be made more effective through the application of neural computing. In the work being presented, a back-propagation network was trained to reproduce the acoustic emission transient waveforms produced by the least damaging events. Phil Irving explained how the mean squared error produced by more damaging impacts could be used as an effective indicator in some cases, but that currently in other cases acoustic emission energy provides a better indicator.

Simon Hickinbotham of York University presented his paper entitled 'Detecting Strain Gauge Failure in Stress-Cycle Count Matrices' reported in more detail from the NCAF Bristol meeting.

Other presentations of interest included an enlightening paper on the use of Kalman filters for fault diagnosis in mining equipment used in long wall coal mining, presented by John Penny of Aston University. Also presented was a collection of three papers on the Neural-Maine project, detailing a modular system for on-line machine condition monitoring, which will also be reported at the Cambridge meeting in September.

Adrian Long
Brunel University

PUZZLE CORNER Number 10

Lisa and a few of her philosopher friends were having a night out in their favourite watering hole, the John Stuart Mill.

"Did you hear about Nietzsche?", asked Bill. "He got done for blasphemy and Judge Verax sentenced him to be hanged at noon one day this month. The judge also said that Nietzsche could never be certain which day it would be before the morning of the day itself. So Nietzsche, knowing that Judge Verax was incapable of lying, said he couldn't be hung!"

"Excellent reasoning!" said Ted. "Yeah", interjected Lisa, "but he was gobsmacked when they strung him up on the 13th."

The following morning Lisa and the nine other philosophers awoke in the same room, each one replete with a hangover and a brand new forehead tattoo (a rather tasteful 'Nietzsche is dead - God'). Upon seeing a tattoo on someone else, everyone erupted into laughter. Of course, if anyone had realised that they had a tattoo themselves they would have instantly become morose. As the ubiquitous merriment continued, Lisa, despite the absence of any reflective surfaces, slowly came to the inevitable conclusion that she too must own some dubious facial graffiti. However, much to her relief and bewilderment, Lisa did not turn out to have any artistic extras.

What was Nietzsche's line of reasoning and where was the fallacy? What was Lisa's line of reasoning and where did it go horribly wrong? The answers will be given at the next NCAF meeting (28 - 29 September 1999, Fitzwilliam College, Cambridge).

Fenella the Rottweiler

New MSc in Data Fusion

Today's electronic sensors and communications networks make available vast quantities of data and information. The recent trends for the Internet and data warehousing have brought the problem of data deluge into everybody's office and home. The need to make such data do useful work necessitates the use of data fusion technologies. Data fusion includes a range of models, architectures and algorithms (including neural networks) for combining and refining data from different sources and/or over time. Data fusion is able to increase certainty and timeliness, improve accuracy or relevance and reduce system costs.

Data fusion has its origins in the defence community of the early 1980's. Its successfulness is such that the technology is already beginning to be used by large organisations to maintain a competitive edge in an increasingly information-centric market place. It is expected that by the year 2005 all successful companies will be using some form of data fusion. Those that do not pursue this technology nor apply the evolving standards will inevitable fall by the wayside.

Until now data fusion education has been rather ad hoc - some undergraduate and postgraduate courses give a cursory overview of data fusion (the field is so big that they can do little more) and PhDs involving data fusion are rather narrow. Other people learn by attending a short course, which can do little more than give a brief introduction, or picking it up as they go along whilst at the same time trying to apply what they are learning. None of these are satisfactory and has resulted in the current worldwide shortage of trained data fusion practitioners.

At the recent FUSION'99 conference held in Sunnyvale, USA the world's first MSc course in data fusion was announced. This much-needed course is being run by the School of Computing at the University of Central England in Birmingham. The course runs for one year starting in January 2000 and is aimed at allowing people in employment to continue to work with minimal disruption. The first part of the course comprises taught modules delivered either during an intensive week or on a one-day a week basis over the semester. (The course is designed in such a way that anybody may attend the one-week 'Introduction to Data Fusion' module without taking the full MSc). The second part of the course involves carrying out an appropriate research project culminating in a dissertation. It is hoped that many students will identify a practical data fusion problem within their own company on which they can work to the benefit of both themselves and their company.

Further details can be found on the Internet at http://www.cis.uce.ac.uk/faculty/comput/courses/msc_DFroute.htm or by contacting John Perkins, MSc Course Director by e-mail at

john.perkins@uce.ac.uk or by phone on 0121 331 6209.

John Perkins
University of Central England

EuroFusion 99

The international data fusion conference based in Europe, 5 - 7 October 1999 in Stratford-upon-Avon.

EuroFusion99 aims to bring together an international group of researchers, developers and users of data and information fusion. The conference comprises a three-day technical programme of papers and posters on the theory and application of data fusion from researchers and practitioners around the world. There will also be an exhibition and the opportunity to meet many new people interested in different aspects of fusion. The social programme comprises a ghost-walk around Stratford and a conference banquet in the house of Dr John Hall, Shakespeare's son-in-law.

Full details of the conference, the technical and social programmes, accommodation, directions and registration can be found on the conference web pages:
http://www.datafusion.clara.net/EuroFusion99.htm
http://www.surrey.ac.uk/EuroFusion99.htm

For further information or to be added to the mailing e-mail, contact the conference chair, Jane O'Brien, at jane.obrien@datafusion.clara.co.uk

If you are interested in an exhibition stand please contact Professor John MacIntyre at john.macintyre@sunderland.ac.uk

The International Society of Information Fusion (ISIF) is now an official sponsor of EuroFusion99. Full details of ISIF can be found on their home page at:
http://www.inforfusion.org

Jane O'Brien

EuroFusion Conference Chairman

WELCOME TO NEW MEMBERS

The Committee is pleased to welcome the following new members to NCAF:

Dr Andy Starkey, University of Aberdeen
Mr Inderjit Sandhu, Barclays Life Assurance
Dr Kate Clibbon, Mars Electronics International

Diary Dates

7-10 September ICANN99. International Conference on Artificial Neural Networks, Edinburgh. http://www.iee.org.uk/Conf/ICANN/

13-15 September. Engineering applications of neural networks, Warsaw. http://www.phys.uni.torun.pl/eann99/

13-16 September. British Machine Vision Conference, Nottingham. http://www.nott.ac.uk/meom/bmvc99.html

28-29 September, NCAF Meeting. Fitzwilliam College, Cambridge.

Contact: Sally Francis. Tel: +44 1784 477271 or +44 1784 431341 ext 270, fax: +44 1784 472879, e-mail: ncafsec@brunel.ac.uk

5-7 October EuroFusion99. Stratford-upon-Avon.
http://www.datafusion.clara.net/EuroFusion99.htm
http://www.surrey.ac.uk/EuroFusion99.htm
Contact Jane O'Brien at jane.obrien@datafusion.clara.co.uk

28-30 October. Intelligent Systems and Control. Santa Barbara.
http://www.iasted.com/conferences/1999/santabarbara/isc.htm

29 Nov-4 Dec NIPS. (Neural Information Processing Systems) Denver, Colorado. http://www.cs.cmu.edu/Web/Groups/NIPS

January 2000, NCAF Meeting. University of Strathclyde - date and venue to be confirmed.

Contact: Chris Kirkham. Tel: +44 1784 477271 or +44 1784 431341 ext 270, fax: +44 1784 472879, e-mail: ncafsec@brunel.ac.uk

Neural Technologies Recruiting

Neural Technologies are currently recruiting. See their web site http://www.neuralt.com or e-mail them on dt@neuralt.com

Members' news and views

Deadline for the next edition is 15 October 1999.

Next Edition

Review of the Cambridge Meeting.

Preview of the January Meeting in Strathclyde.