IAPR

International Association for Pattern Recognition, Inc.

An affiliate member of the International Federation for Information Processing

NEWSLETTER

Editor
Josef Kittler
Dept. Electronic and Electrical Engineering,
University of Surrey,
Guildford GU2 5XH,
UK.
Telephone: (44 483 571281 x 2272)
kittler@uk.ac.surrey.ee

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FROM THE EDITOR'S DESK

Apart from the usual newsletter sections this issue features two main items. The first provides a brief profile of the winner of the 1988 round of the K S Fu Award competition. The second exceptional item is the IAPR Directory giving the membership of IAPR committees, the addresses of their members and a list of the IAPR National Member Organizations. The directory still contains one or two omissions, specifically in the Technical Committee Chairmen section, which will be rectified as soon as possible and the appointments together with their particulars published in a future issue of the Newsletter.

The Editor

K S FU AWARD WINNER

Prof Azriel Rosenfeld

The name of the winner of the 1988 nominations for the K S Fu Award -Professor Azriel Rosenfeld of University of Maryland- was already announced in the last issue of the IAPR Newsletter. Although Prof Rosenfeld and the standing of his work must surely be known to everybody working in the field of image processing and computer vision and therefore the outcome of the competition is hardly surprising, it is no doubt very fitting, and for me great pleasure, to summarize and put on record his achievements over the last three decades.

Azriel Rosenfeld received his university training in the late nineteen forties and early nineteen fifties from Yeshiva University. He graduated in Physics in 1950 and subsequently received Ordination (Rabbi) in 1952. He then continued with his rabbinic training at Yeshiva University while reading for the MA and PhD degrees in mathematics at Columbia University. Although Azriel opted for a scientific career, his pastoral skills come over very strongly in his tutorial activities as the author of several excellent texts on Image Processing but also as a speaker capable of totally captivating and fascinating his audience during his lectures which are characteristically supported by slides or transparencies at the rate of two or three per hour!

Dr Rosenfeld commenced his scientific career in industry. In 1964 he changed his role as Manager of Research in the Information Sciences Center of the Budd Company for the post of Research Associate Professor, University of Maryland. By 1966 he was promoted to Full Research Professor and on formation of the Center for Automation Research at University of Maryland in 1983 he became its Director.

Although the widespread citation of Prof Rosenfeld's books and research papers is witness to his prolific and fruitful research output, perhaps only a few of us have realised that the number of his publications in refereed journals exceeds the figure of 300(!), many of these containing revolutionary ideas that stimulated other researchers for decades.

The rules of the K S Fu Award competition have been stipulated very carefully so as to reflect and equally merit significant contributions to the field of Pattern Recognition of a different nature. There is the scope for recognising cumulative contributions over a period of time as well as seminal contributions of significant impact on the direction of research. The IAPR Awards Committee in putting forward Prof Rosenfeld's name, and the IAPR Governing Board in their unanimous approval of his nomination recognised the magnitude of Azriel Rosenfeld's contribution on both fronts. Setting such a high standard for the K S Fu Award by selecting Azriel Rosenfeld as its first recipient will not only help to establish its prestige very rapidly but is also the best way to pay tribute to Prof King Sun Fu himself.

J Kittler

NEWS IN BRIEF

NEW MEMBERS FOR IAPR? Preliminary discussions are now taking place between IAPR and a Computer Vision Group in the German Democratic Republic, Fachausschuss Automatische Bildverarbeitung, which is part of the national engineering society KDT (Kammer der Technik). The approximate membership of this group is 150 and their Chairman, Professor Reinhard Klette, is now exploring the possibility of his group becoming the national IAPR member. We hope to be able to report a successful outcome to these discussions within the next few months.

Similar discussions with a Bulgarian group are also proceeding but can be expected to take somewhat longer to reach fruition.

A REVIVAL OF TC10 Technical Committee 10 (Applications in Map and Line Drawing Processing) has been lying dormant for some years and is now coming to life again, thanks to the efforts of Professor Rangachar Kasturi of Penn State University. Professor Kasturi is in the process of forming his committee and planning a programme to start as soon as possible. TC10 will co-sponsor, along with TC6 and TC8, a workshop in Tokyo in 1990 and intends to fully support the proposed workshop on Document Image Analysis scheduled to be held just before 10ICPR, chaired by Dr Baird of Bell Labs. Members interested in this research area should write now to Professor Kasturi (address in the Directory in this Newsletter) who will be delighted to hear from them.

THE PORTUGUESE ASSOCIATION FOR PATTERN RECOGNITION held its first national meeting RECPAD 89 at the Oporto University on March 17. The meeting was attended by 64 researchers.

BOOKSHELF

A Robot Ping-Pong Player

*Russell L. Andersson, MIT Press,
Cambridge, MA, 1987, ISBN 0-262- 01101-8*

The first thing to say about this book is that it is both an inspiration and a delight. It explains the formidable problems associated with the real-time, intelligent control of a robot to play the "apparently simple" game of ping-pong. The topics covered extend from sensing through vision processing to decision making and consequent actuation of a robot.

Chapter 1 provides an admirable discussion of the motivation for this research effort. The limitations of current robot technology are related to the demands of the ping-pong game and an overall preview of the rest of the book is provided. Ping-pong playing is a powerful examplar as it requires the confrontation of real problems and the criteria of success or failure is highly visible. All parts of the system, vision/robot/software, have to be well integrated and need high performance if even minimal functionality is to be achieved.

Chapter 2 discusses the internationally adopted rules for ping-ping played by immobile robots. Typical ball speeds in the range 3.5 to 8 metres/sec enforce reaction times in the range 0.4 to 0.8 seconds. After subtracting 0.1 seconds for the time needed to capture 5 image frames from which the ball trajectory can be estimated, less than half a second is typically left in which to position the robot arm and select the appropriate bat orientation and speed!

Chapter 3 describes the overall system design which utilises a distributed network of Motorola 68020 and 68000 based microprocessors. Seperate processors are involved with trajectory analysis, expert decision making, robot kinematics and dynamics calculation, robot joint servo control, strategy analysis and real-time debugging.

Chapter 4 concerns the real-time stereo vision system which incorporates a custom chip for the calculation of gray level moments. The balls location needs to be determined to sub-pixel resolution and this is achieved by calculating moments over an image area determined by gray level thresholding an image of the white ball seen against a black velvet backdrop. Several subtle problems relating to the acquisition and analysis of images in such a highly dynamic scene are discussed.

The major elements of control of the PUMA 560 robot are discussed in Chapter 5. This includes mechanical hardware, electronics hardware and software architecture. Trajectory analysis, prediction and following are considered in detail using quintic polynomials as a basic representation.

Chapters 6 and 7 describe and discuss the design of a real-time expert controller i.e. an integrated "expert system" and "robot controller" which can efficiently find a high quality answer to the question of what positions, velocities and accelerations are needed for the robot to return the ball successfully. The controller must be capable of both numeric and symbolic calculation and a "model" data structure is introduced to achieve this. The controller must also be capable of updating its decisions as new data becomes available. For example,

spin on a ball is a difficulty as it leads to highly nonlinear effects. With a spinning ball a 1cm deviation over the first half of its flight can become a 16cm deviation at the end of the ping-pong table. It is not possible to estimate spin from images of ball and bat contact and therefore the balls flight must be followed and the robot arm movement must be planned to accomodate these "unexpected" circumstances.

The last two chapters of the book provide details of execution case studies of the system and conclusions about the present systems and future developments. The author reports that the robot can play a reasonable game against human opponents with a longest rally of 21 strokes apiece by both the human and the machine. The single element which degrades the performance of the system is inaccuracy in the prediction of the bounce of the ball and improvement will require a more detailed empirical study of the physics of a bouncing ball.

The work discussed in the book is a major achievement and represents significant progress in the understanding of problems involved in developing tightly coupled robot and vision systems. It is presented in a clear and entertaining manner with many surprising observations. For example, who would have anticipated that cheap ping-pong balls give rise to specular reflections which upset the gray level moment based calculation of ball position! In summary, I enjoyed this book very much and would recommend for both serious and recreational reading.

J Illingworth
University of Surrey

Parallel Distributed Processing

D E Rumelhart and J L McClelland, MIT Press, Cambridge MA, 1986, ISBN 0- 262-18123-1

Anything you wanted to know on neural nets and you were afraid to ask is somewhere there, in the 1100 or so pages of these two volumes! Unfortunately, the key points are like gold buried in the sand, obscured by rambling and repetition. But! Beware of my prejudice: this is a scientist talking; scientists are used to cut and dried answers and find tiring the psychologists' way of elaborating their points.

So, I found this book difficult to read. Having to see page after page of solid writing without much interruption by equations, I often got tired and lost interest, until something caught my eye and having woken up, I busied myself underlining it in red so that I will find it more easily in the future!

The book consists of two volumes. The first volume is called Foundations and is divided into three parts. Part I introduces the Parallel Distributed Processes, exemplifies their attraction and answers the arguments of their critics. Part II examines the basic mechanisms of learning, starting from the unsupervised competitive learning through to the learning processes of the multilayer perceptrons and the Boltzmann machines. It also includes a comprehensive chapter on Harmony theory which formalises the way of learning in these machines. Part III is all about Mathematical details and actual implementation problems. Unfortunately, as is usually the case for books written by several authors, this part is also haunted by varying depth in the various chapters. For example, while we are given lots of details on Linear Algebra, which after all can be found in any elementary book on the subject, we are left with only a small taste of the logic of activation functions referred for more details to a technical report of some Univerity or other!

The most fascinating aspect of these processes is that they may bear some resemblance to the processes that are going on inside our brains. This relationship, if any, is examined in the second volume. Its title is Psychological and Biological Models and it deals exactly with that: from Parallel Distributed models which simulate the past tense learning by English speaking children, to the physiological details of the brain. The most interesting aspect of these models is that some of them not only immitate ways of human learning, but also make specific predictions about aspects of human behaviour, always in the context of learning, which have not been studied yet. From the physiologist's point of view, there is no one to one correspondance between the types of neurons present in the brain and the types of simulated 'neurons' used in the various distributed processes. So, although psychological and physiological studies, including deficiencies like amnesia, indicate that parallel distributed processes are on the right track for modelling the brain, it seems that they still have a long way to go.

All in all, this book is an impressive piece of work. It is difficult to be read from cover to cover and inappropriate to be used as a reference book. The best way to use it is to dip into it. Leaf the pages and if something catches your eye, stop and read the relevant paragraph. It is bound to be interesting, if not exciting!

M Petrou
University of Surrey

IAPR DIRECTORY

Please send any corrections or changes to this directory to the IAPR Secretary Prof M J B Duff. His full address is listed in the directory.

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Directory of Addresses

(OF: office phone HF: home phone TE: telex EM: electronic mail FAX: telefax)

Prof J K Aggarwal
  Computer and Vision Research Center
  College of Engineering
  University of Texas
  Austin
  Texas 78712 -1084
  USA
  OF:+1 512 4711369 HF:+1 512 4514697
  TE: 910 874 1305 UTINTERNAT-AUS
  FAX: +1 512 4715532
  EM: jka@emx.utexas.edu

Prof Dr E Backer
  Dept. Electrical Engineering
  Delft University of Technology
  Postbus 5031
  4 Mekelweg
  2600 GA Delft
  The Netherlands
  OF:+31 15 786176 HF:+31 1802 2089 TE:31448 BITD-NL
  EM: backer@hdetud53.bitnet

Prof P W Becker
  Electronics Institute
  Technical University of Denmark
  Bldg 349
  DK 2800 Lyngby
  Denmark
  OF:+45 2 881566 Ext 2844 HF:+45 1 194794
  TE:37529 DTHDIA DK FAX:+45 2 882239

Dr G Borgefors
  Swedish Defence Research Establishment
  Box 1165
  S-581 11 Linkoping
  Sweden
  OF:+46 13 118000 HF:+46 13 172355 FAX:+46 13 131665
  TE:50073 FOATRE S EM: gunbor@folke.se (uucp)

Prof V Cantoni
  Dipartimento di Informatica e Sistematica

Universita di Pavia
Via Abbiategrasso 209
I-27100 Pavia
Italy
OF:+39 382 391358 HF:+39 382 469252
FAX:+39 382 422881 TE:312841 UNIPAV I
EM: cantoni%ipvmv1.infn.it@iboinfn.bitnet

Prof S Castan
  Departement Informatique
  Institut Universitaire de Technologie
  Avenue de Rangueil
  F-31077 TOULOUSE Cedex
  France
  OF:+33 6152 1351 HF: +33 6127 7674

Prof T Chang
  Dept of Automation
  Tsing-Hua University
  Beijing
  Peking
  People's Republic of China
  OF:282451 Ext 2447 HF:282451 Ext 2692

Dr R Chellapa
  Department of Electrical Engineering Systems
  University of Southern California
  LOS ANGELES
  CA 90089-0272
  USA
  OF:+1 213 7438559 HF:+1 213 3725964
  FAX:+1 213 7433289 EM: rama@brand.usc.edu

Dr D Chetverikov
  Hungarian Academy of Sciences
  Computer and Automation Institute
  P O Box 63
  H-1502 BUDAPEST
  Hungary
  OF:+36 1 665644 TE: 22 5066

Prof P-E Danielsson
  Dept of Electrical Engineering
  Linköping University
  S-518 83 Linköping
  Sweden
  OF:+46 13 281306 HF:+46 13 172672 FAX:+46 13 139282
  TE:50966 UNILIN S EM: ped@uucp.carola

Dr P A Devijver
  Philips Research Laboratory
  Avenue Em Van Becelaere 2
  Box 8
  B-1170 Brussels
  Belgium
  OF:+32 2 6742237 HF:+32 2 6738992 TE:61511 PHEMB B
  FAX:+32 2 6742299 EM: devijver@prlb2.uucp

Prof V Di Gesù
  Dipartimento di Matematica ed Applicazioni
  Universitá di Palermo
  Via Archirafi 34
  I-90123 Palermo
  Italy
  OF:+39 91 6162824/332977 TE:911051 IFCI I
  FAX:+39 91 332889

Prof M J B Duff
Dept of Physics and Astronomy
University College London
Gower Street
London WC1E 6BT
England
OF:+44 1 3807010 HF:+44 1 3982766 FAX:+44 1 3807145
TE:28722 UCPHYS G EM: mduff@uk.ac.ucl.cs

Prof D Dutta Majumder
Indian Statistical Institute
203 Barrackpore Trunk Road
700 035 Calcutta
India
OF:+91 33 526694 HF:+91 33 522475 TE:21-2210 STAT IN

Dr M Ejiri
Hitachi Central Research Laboratory
1-280 Higashikoigakubo
TOKYO 185
Japan
OF:+81 3 423 231111 HF:+81 3 429 430353
TE: 283 2522 CHUKEN J FAX:+81 3 423 231900
EM: ejiri%harl86.harl.hitachi.junet@uunet.uu.net

Prof J O Eklundh
Dept Numerical Analysis and Computer Science
Royal Institute of Technology
S-100 44 Stockholm
Sweden
OF:+46 8 7908161 HF:+46 8 7478190 TE:10389 KTHB S
EM: joe@bion.kth.se

Prof H Freeman
CAIP Center
Rutgers University
P O Box 1390
Piscataway
NJ 08855-1390
USA
OF:+1 201 9323443 HF:+1 609 3957034
FAX:+1 201 9324775 TE:6502497820 MCI
EM: freeman@caip.rutgers.edu

Prof E S Gelsema
Dept of Medical Informatics
Erasmus University
P O Box 1738
The Netherlands
OF:+31 10 4087050 TE:25076 MBRT NL
FAX:+31 10 4362841 EM: gelsema@hroeur51.bitnet

Prof M Goldberg
Department of Electrical Engineering
University of Ottawa
770 King Edward Avenue
OTTAWA
Canada K1N 6NS
OF:+1 613 564 2495 TE: 053 3338 FAX:+1 613 5647681

Mr S Grinaker
Norwegian Defence Research Establishment
P O Box 25
N-2007 KJELLER
Norway
OF:+47 6 807521 HF:+47 6 839397
TE:21682 ELECT N FAX:+47 6 807212

Prof R M Haralick
Department of Electrical Engineering
FT-10
University of Washington
Seattle
WA 98195
USA
OF:+1 206 5454974 HF:+1 206 5222836
EM: haralick@june.cs.washington.edu

Prof J-P Haton
CRIN, INRIA
Universite de Nancy 1
BP 239
54506 Vandoeuvre-les-Nancy Cedex
France
OF:+33 8 3281566 HF:+33 8 3320185 FAX:+33 8 3413079
TE:960646 NANCYUN F EM: jph@crin.crin.fr

Prof A K Jain
Department of Computer Science
Michigan State University
EAST LANSING, MI 48824
USA
OF:+1 517 3535150 HF:+1 517 3499153 TE: 650 273148
MCI
FAX:+1 517 353 1980 EM: jain@cps.msu.edu

Prof R Kasturi
Department of Electrical Engineering
Pennsylvania State University
121 Electrical Engineering East
UNIVERSITY PARK, PA 16802
USA
OF:+1 814 8634254 HF:+1 814 2387585
FAX:+1 814 8634789
EM: r1k@psuecl.bitnet EM: r1k@ecl.psu.edu

Dr T Kasvand
National Research Council
Room 346, Bldg M-50
Montreal Road
Ottawa
Canada K1A 0R8
OF:+1 618 9932003 HF:+1 613 2255461 TE:053-4134 CA

Prof H Kazmierczak
FIM-FGAN EV
Eisenstockstrasse 12
D-7505 Ettlingen 6
Federal Republic of Germany
OF:+49 7243 992(0)-11 HF:+49 721 472442
TE:782981 FIM D FAX:+49 7243 99229

Dr J Kittler
Department of Electronic and Electrical Engineering
University of Surrey
Guildford
Surrey GU2 5XH
England
OF:+44 483 509294 HF:+44 483 578256
TE:859331 UNIVSY G
FAX:+44 483 300803 EM: kittler@ee.surrey.ac.uk

Dr P P Koltsov
Computer Centre of the USSR Academy of Sciences
40 Vavilov Street
117967 MOSCOW

USSR
OF:+7 095 1356231

Dr W G Kropatsch
Institute for Image Processing
& Computer Graphics
Graz Research Centre
Wastiangassse 6
A-8010 GRAZ
Austria
OF:+43 316 8021 Ext 57 HF:+43 316 518465 TE:31265 A
FAX:+43 316 8021 Ext 20 EM: dibag@tuvie.uucp

Prof M Kunt
Département dÉlectricité
Ecole Polytechnic Federale de Lausanne
Ecublens
CH-1015 Lausanne
Switzerland
OF:+41 21 6932626 HF:+41 21 7992834
TE:454062 EPFE CH EM: kunt@clsepf51.earn

Dr M Kuwahara
Osaka Sangyo University
3-1-1 Nakagaito, Daito-shi
OSAKA 574
Japan
OF:+81 6 720 753001 OF:+81 6 756 113430
FAX:+81 6 720 711253

Prof S Levialdi
Dipartimento di Matematica
Università degli Studi di Roma
Piazzale Aldo Moro 2
00185 Roma
Italy
OF:+39 6 49913250 HF:+39 6 4241324 TE:613255 INFNRO
I
EM: levialdi%astrom.dnet@cernvax.earn

Prof M D Levine
McGill Research Center for Intelligent Machines
McGill University
3480 University Street
Montreal, Quebec
Canada H3A 2A7
OF:+1 514 3925413 HF:+1 514 4887929
TE:5268510 MTL McGILL UNIV CA
FAX:+1 514 3984470 EM: levine@larry.mcrcim.mcgill.edu

Prof C C Li
Department of Electrical Engineering
University of Pittsburgh
Pittsburgh
PA 15261
USA

Prof J P Marques de Sá
Centro de Engenharia Electrotécnica
Universidade do Porto - GPRP
Rua dos Bragas
4099 Porto Codex
Portugal
OF:+351 2 27505 TE: 27323 FEUP P
FAX:+351 2 319280

Prof M Nagao
Department of Electrical Engineering
Kyoto University
Sakyo-ku, Yoshida-Honmachi
Kyoto 606
Japan
OF:+81 75 7535344
HF:+81 720 430933 TE:5422455 DEEKYU J
FAX:+81 75 7511576
EM:nagao%nagao.kuee.kyoto-u.junet%japan@relay.cs.net

Prof H Niemann
Universität Erlangen-Nürnberg
Lehrstuhl für Informatik 5 (Mustererkennung)
Martensstrasse 3
D-8520 Erlangen
Federal Republic of Germany
OF:+49 91 3185-7774 HF:+49 91 3145569
EM: niemann@fauern.informatik.uni-erlangen.edu

Prof E Oja
Department of Information Technology
Lappeenranta University of Technology
P O Box 20
SF-53851 Lappeenranta
Finland
OP:+358 53 571 12820 TE:58290 LTKK SF
FAX:+358 53 571 2350 EM: oja@ltkka.lut.fi

Prof S Peleg
Department of Computer Science
The Hebrew University of Jerusalem
91904 Jerusalem
Israel
OF:+972 2 585236 HF:+972 2 820642 TE:25391 HU IL
FAX:+972 2 666804 EM: peleg@humus.bitnet
EM: peleg%humus.huji.ac@relay.cs.net

Prof R Plamondon
Department of Electrical Engineering
Ecole Polytechnique
P O Box 6079
Station A
MONTREAL
Quebec
Canada H3C 3A7
OF:+1 514 3404539 TE: 524146 BIBPOLYTECHMTL
FAX:+1 514 3404147 Email: ha03@polytec1.bitnet

Prof Dr J S Pöppl
GSF
MEDIS-Institute
Ingoldstadter Landstrasse 1
D-8042 NEUHERBERG
Federal Republic of Germany
OF:+49 89 31875440 HF:+49 81 054025
TE: 898947 STRAL D FAX:+49 89 31873322
EM: poeppl@dmogsf11.earn

Prof A Sanfeliu
Instituto de Cibernética
Universidad Politecnica de Cataluña
Diagonal 647
08028 Barcelona
Spain
OF:+34 3 3347704

Dr G Sanniti di Baja
Istituto di Cibernetica CNR
Via Toiano 6

I-80072 Arco Felice
Napoli
Italy
OF:+39 81 5261255 HF:+39 81 378422
TE: 710483 CIBARC I FAX:+39 81 8673654
EM: imag@arco.uucp

Dr J L C Sanz
IBM Almaden Research Center, K54-802
650 Harry Road
San Jose, CA 95120-6099
USA
OF:+1 408 9271822 HF:+1 408 2242144
FAX:+1 408 9272100 EM: sanz@ibm.com

Prof L Shapiro
Department of Electrical Engineering, FT-10
University of Washington
Seattle, WA 98195
USA
OF:+1 206 5432196 HF:+1 206 5222836
TE: 910 4740096 UWUI FAX:+1 206 5433842
EM: shapiro@lillith.ee.washington.edu

Prof J Sklansky
Dept of Electrical Engineering
University of California
Irvine
CA 92717
USA
OF:+1 714 8566726 HF:+1 714 8543383
FAX:+1 714 8564152 EM: sklansky@ics.uci.edu

Prof C Y Suen
Department of Computer Science
Concordia University
1455 Boulevard de Maisonneuve West
Montreal
Quebec
Canada H3G 1M8
OF:+1 514 8483006 HF:+1 514 8483000

Prof M Takagi
Institute of Industrial Sciences
University of Tokyo
22-1, Roppongi 7 Chome
Minato-ku
Tokyo 106
Japan
OF:+81 3 4790289 HF:+81 3 4725074
TE:02423216 ILSTYO J FAX:+81 3 4232834
EM: takagi%tkl.iis.u-tokyo.junet@relay.cs.net

Prof S L Tanimoto
Department of Computer Science, FR-35
University of Washington
SEATTLE, WA 98195
USA
OF:+1 206 5434848 HF:+1 206 6341286
TE:910 4740096 EM: tanimoto@cs.washington.edu

Prof J Toriwaki
Department of Information Engineering
Nagoya University
146, 2-66, Yada-cho, Higashi-ku
NAGOYA-SHI
Japan

Prof J T Tou
Center for Information Research
University of Florida
314 CSE Building
GAINESVILLE, FL 32611
U.S.A.

Dr K Yamamoto
Image Understanding Section
Electrotechnical Laboratory
1-1-4 Umezono, Tsukuba-City
IBARAKI 305
Japan
TE: 3652570 AIST J
EM: yamamoto%etl.jp@relay.cs.net

Prof Yu I Zuravlev
Computer Centre of the USSR
Academy of Sciences
40 Vavilov Street
117967 MOSCOW
USSR
OF:+7 095 1353229

CALLS FOR PAPERS

3rd INTERNATIONAL CONFERENCE ON INFORMATION PROCESSING AND MANAGEMENT OF UNCERTAINTY IN KNOWLEDGE-BASED SYSTEMS

Paris, France - July 2-6, 1990

Program

The aim of this conference is to bring together researchers working on various methodologies for the management of uncertain information and to provide a useful exchange between practitioners and theoreticians using these different methods. Topics include knowledge representation and manipulation, expert and decision making systems under uncertainty, nonmonotonic logics, temporal reasoning, artificial neural networks, pattern recognition and image processing, knowledge acquisition, learning, etc.

Deadlines

Dec 1, 1989	Abstracts (4 pages, 3 copies)
Jan 31, 1990	Authors notified
June 1, 1990	Camera-ready manuscript

Paper Submission

Secretariat de la Conférence IPMU
ENSTA
32 Boulevard Victor
75015 Paris
France

THE SECOND INTERNATIONAL CONFERENCE ON VISUAL SEARCH

Durham, UK - September 3-6, 1990

Program

The Applied Vision Association is organising the second international conference devoted totally to the multidisciplinary topic of visual search. The conference will attempt to address all aspects of visual search processing from theory to practice, and will include (but not be limited to) the following sessions: Attention and Segmentation; Eye Movements; Computer Vision; Search Modelling; Applied Aspects of Search. There will also be a workshop. The conference proceedings will be published.

Paper Submisson

Bell-Howe Conferences (SICVS)
    Gothic House
    Barker Gate
    Nottingham
    NG1 1JU
    UK

TUTORIALS

STATISTICAL PATTERN RECOGNITION: Introduction

University of Surrey, Guildford, England- September 11-13, 1989

The course sponsored by the IAPR Technical Committe TC1 will discuss fundamental methods of statistical pattern recognition. Several example classes will be aimed at familiarizing the participants with the material presented. The course will include seminars on application of pattern recognition methods to specific problems in which a step by step description of the design of practical pattern recognition systems will be outlined.

The topics covered will include *elements of statistical decision theory, nonparametric pattern classification, learning machines, probability density function estimation, classification error probability estimation, feature selection, feature extraction and cluster analysis.*

Course textbook: P A Devijver and J Kittler, Pattern Recognition: A statistical approach, Prentice/Hall, Englewood Cliffs, NJ, 1982.

Course lecturers: Dr P A Devijver and Dr J Kittler

STATISTICAL PATTERN RECOGNITION: Advanced Topics

University of Surrey, Guildford, England- September 14-15, 1989

The course will feature a number of advance topics in statistical pattern recognition. In particular, it will focus on the use of contextual information in decision making with the emphasis on Markov models. The methodology will be illustrated on applications in speech recognition, image restoration, image segmentation, computer vision and character recognition.

The topics covered will include: *role of context, Markov chain, Markov mesh and Markov random field models of apriori world knowledge, Gibbs distributions, hidden Markov models, elements of compound decision theory, Baum's algorithm, Derin's algorithm, Viterbi algorithm, labelling in hidden Markov meshes and random fields, discrete relaxation, probabilistic relaxation, learning contextual relationships, learning Markov models.*

Course lecturers: Dr P.A.Devijver and Dr J.Kittler

For further information and registration form concerning either of the two courses write to:

Mrs Marion Harris
    Department of Electronic
    and Electrical Engineering
    University of Surrey
    Guildford GU2 5XH
    England
    tel.:(+44 483) 571281 ext. 2271

CALENDAR OF EVENTS

Date	Event	Location	Sponsor/Information
July 18-20, 1989	3rd International Conference on Image Processing and its Applications	University of Warwick, United Kingdom	IEE Secretariat, Conference Services, Savoy Place, London WC2R 0BL, United Kingdom
August 20-26, 1989	11th International Joint Conference on Artificial Intelligence	Detroit, Michigan, USA	

August 21-25, 1989	NATO Advanced Research Work-shop on Mapping and Spatial Modelling for Navigation	Denmark	Prof L F Pau, Technical University of Denmark, Building 348/EMI, DK 2800 Lyngby, Denmark
Agust 28 -Sept 1, 1989	IFIP XI World Computer Congress	San Francisco, California, USA	11th World Computer Congress, Convention Service Center, PO Box 18-P, Denver, Colorado 80218, USA
August 31 - Sept 2, 1989	3rd International Conference on Computer Analysis of Images and Patterns	Leipzig, DDR	Präsidium KDT, WGMA, Conference Secretary of CAIP '89, Clara-Zetkin-Str 115/117, Berlin, DDR
September 4-8, 1989	5th European Congress for Stereology	Freiburg im Breisgau, West Germany	Dr O Leder, 5ECS, Anatomisches Institut, Albertstr. 17, D-7800 Freiburg im Breisgau, West Germany
September 5-8, 1989	International Conference on Image Processing (ICIP '89)	Pan Pacific Hotel, Singapore	Meeting Planners Pte Ltd, 100 Beach Road 33-01, Shaw Towers, Singapore 0718, Republic of Singapore
September 20-22, 1989	5th International Conference on Image Analysis and Processing	Positano, Italy	Dr Gabriella Saniti di Baja, Chairman 5ICIAP, c/o Instituto di Cibernetica, CNR, 80072 Arco Felica, Naples, Italy
October 4-6, 1989	IEEE Workshop on Visual Languages	Rome, Italy	Prof S Levialdi, Dip. Matematica, University of Rome, P.le A Moro 2, 00185 Rome, Italy
October 17-18, 1989	1st IEE International Conference on Artificial Neural Networks	IEE, Savoy Place, London, United Kingdom	IEE, Conference Services, Savoy Place, London WC2R 0BL, United Kingdom
November 22-24, 1989	4th Latin American Symposium on Remote Sensing	Bariloche, Argentina	CICELPA-INTI, Secretaria del 4 Simposio Lati-noamericano de Sensores Remotos, C.C. 157 - (1650) San Martin, Provincia de Buenos Aires, Republica Argentina
November 22-24, 1989	International Workshop on Sensorial Integration for Industrial Robots	Zaragoza, Spain	A Alcolea, Dpt. Ing. Eléctrica e Informática, C/ Maria de Luna 3, E-50015 Zaragoza, Spain
November 27-29, 1989	IEEE Workshop on Interpretation of 3D Scenes	Austin, Texas, USA	Eric Grimson, AI Lab, MIT, 545 Technology Square, Cambridge MA 02139, USA
December 11-14, 1989	Intelligent Autonomous Systems 2	Amsterdam, The Netherlands	IAS-2 Conference Secretariat, PO Box 41882, NL-1009 D B Amsterdam, The Netherlands
December 26-27, 1989	6th Israeli Conference on Artificial Intelligence and Computer Vision	Tel-Aviv, Israel	Dr Y Yeshurun, 6th IAICV, Dept Computer Science, Tel Aviv University, 69978 Tel Aviv, Israel
March 6-8,1990	Neural Networks: Biological Computers or Electrical Brains	Lyon, France	AFCET, Conference Department, 156 Boulevard Péreire, 75017 Paris, France
June 17-21,1990	10th International Conference on Pattern Recognition	Bali Hotel, Atlantic City, NJ, USA	10th International Conference on Pattern Recognition, c/o Conference Department, IEEE Computer Society, 1730 Massachusetts Avenue, N.W., Washington, DC 20036-1903, USA
July 2-6, 1990	3rd International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems	Paris, France	Secretariat de la Conférence IPMU, ENSTA, 32 Boulevard Victor, 75015 Paris, France