INTERNATIONAL ASSOCIATION FOR PATTERN RECOGNITION

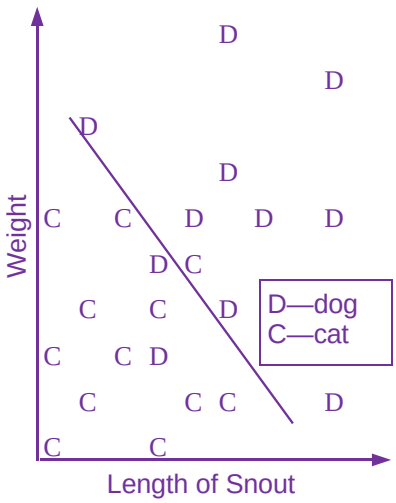
IAPR Newsletter

Volume 25 Number 1
Winter 2003

What is Pattern Recognition?

What is pattern recognition? While it may seem out of place to be asking this question in a newsletter aimed at experts in the field, we can often find a fresh perspective to our work by returning to the fundamentals.

In a broad sense, pattern recognition has been around since our earliest ancestors learned which animals they could approach to hunt and which they should flee from. Although they probably never stopped to analyze it, they were doing classification based on features: size, length of teeth, temperament, etc. A definition of pattern recognition, then, is a field whose objective is to assign an object or event to one of a number of categories, based on features derived to emphasize commonalities. In practice, features are often extracted from sensory signals, such as images or audio, and this step distinguishes pattern recognition from fundamental statistical classification whose starting point follows data acquisition.



The term *pattern recognition* can be misleading. The *patterns* associated with *pattern recognition* are not single instances of patterns in a signal–not an area of stripes in an image or an interval of sinusoids in a sound clip. Instead, they are patterns of features that repeat across different samples. For instance, an image of a plowed field may have a stripe pattern whose feature can be found by Fourier analysis. Pattern recognition pertains not to the single stripe pattern, but to the pattern of a number of different image areas having that same stripe pattern, by which they are *classified* together (and distinguished from areas of other features).

Now lets focus on the word *recognition*. In a broad sense, *recognition* implies the act of associating a classification with a label. Using the figure, that would say that those samples falling into the upper right region are recognized as dogs and those in the lower left are recognized as cats. Strictly speaking, pattern recognition doesn't go that far. Pattern recognition says only that the upper right samples are classified as having higher weight and longer snouts. Determining that this category is that of dogs is one step above pattern recognition. In this sense, *pattern classification* more correctly describes this field.

What is pattern recognition? could also be addressed by describing tasks to which it is applied. I did an unscientific

(Continued on next page)

INSIDE

www.iapr.org

What is Pattern Recognition?

(Continued from previous page)

study, examining topics of papers that appeared in 2001 in the journals *Pattern Recognition Letters, Pattern Recognition, Machine Vision and Applications,* and *IEEE Transactions on Pattern Analysis and Machine Intelligence*. Here is a rough breakdown of applications in these papers (sampling of 105): 35% body recognition, 28% character recognition, 11% robotics and motion, 6% industrial inspection, 6% satellite and aerial, 5% biomedical, and 9% novel and other. I also looked outside of our own literature and found the term and techniques are used for a wide variety of other applications including psychology, chemistry, economics, and computer security.

This analysis says two things to me. The breadth of application of pattern recognition is wide. And, many researchers, 63%, are pursuing (or at least publishing in IAPR-related literature) just two application areas.

So, what can we say by returning to the fundamentals? Pattern recognition can be defined narrowly as dealing with feature extraction and classification. However, tools and methods of the field can be applied broadly. Much of the effort at this time seems to be concentrated in just a couple of application areas. While this depth of investigation is important, it is my belief that researchers achieve innovation as well by choosing novel and neglected problems. By pursuing breadth as well as depth we can have impact in two ways: by advancing the task at hand and by influencing others in our field to explore a variety of interesting problems. ***~Larry O'Gorman***

From the ExCo

The different committees have now been appointed (see **IAPR Directory** in this issue), and some of them are already working hard on their respective tasks. Under the leadership of Prof. Ablameyko, the Membership Committee has chosen a proactive policy, by contacting a number of potential new members, in various parts of the world.

The Conference and Meetings Committee, which is now chaired by Larry Spitz, has a new organization: one person within this committee, Denis Laurendeau, is specifically in charge of coordinating all activities related to the next ICPRs.

The Education Committee is working on getting the different Technical Committees more involved in providing material and insight in pattern recognition related resources.

After the many amendments voted by the Governing Board in Québec City, the Constitution and Bylaws Committee has been working on cleaning up the C&B, tracking inconsistencies in wording, etc. The result of this work will be submitted in due time to the Governing Board for approval.

We are also working on providing tools for better interaction within the Governing Board, especially in discussions before ballots. One idea is to provide an online forum, reserved to the Governing Board members, for discussion of proposals such as creation/dissolution of Technical Committees, changes to the C&B which cannot wait for the next GB meeting, etc.

Also with respect to communication, we are regularly asked by conference and workshop organizers for access to the mailing list of the ICPR. The ExCo has discussed which policy to adopt on this matter and has come up with the following general rules:

1. The general principle is **not** to distribute any list of emails or addresses of ICPR attendees to anybody, with a few exceptions: the organizers of the next ICPR, and exceptionally, other **major** conferences organized by the IAPR. All other events, as well as messages from IAPR affiliated journals, can be announced through the general scientific announcements sent through the GB and TC channels, and by posting on the IAPR web site for IAPR-sponsored events.
2. In **all** cases, recipients of such a list (ICPR organizers included) must request approval by the ExCo, on a case-by-case basis, and will have to sign a non-disclosure agreement, stating that the property of the list remains with the IAPR, and that they are not allowed to use the list for other purposes than those agreed upon with the IAPR, nor to include it in a larger list, nor, obviously, to pass it on to anybody else.
3. The ExCo encourages IAPR conference and workshop organizers to include a statement in their attendee lists that such lists are for exclusive use of the attendees for personal non-commercial use, and that any other use is prohibited.
4. In the longer term, we aim at setting up an IAPR mailing list service to provide better facilities for managing all this.

Let us use this opportunity to extend to all IAPR members our best wishes for 2003, with professional success and personal happiness.

Conference Report: MCS 2002

Third International Workshop on Multiple Classifier Systems

June 2002, Cagliari, Italy

This very successful conference is evidence of the continuing interest in the theory and application of multiple classifier systems (MCS). Work on MCS began independently in a number of separate fields, and one of the valuable contributions of the MCS Workshop series is that it provides a forum where members of these disparate communities can mingle and educate one another. (And the beautiful Sardinian countryside, excellent Italian food, warm weather, and efficient conference facilities all contributed to a relaxed environment that encouraged such mingling and discussion.) MCS 2002 included representatives from the fields of machine learning, neural networks, pattern recognition, feature design, and pure statistics.

A frequent theme in the presentations was unexpected and useful points of connection, even equivalence, among these fields. In the opening talk, *Multiclassifier Systems: Back to the Future*, Prof. JoydeepGhosh led us on an entertaining and educational review of the history of multiple classifier systems, which turns out to stretch back to the French Revolution and the 1700s, as that is the period which gave us both Borda ranking and Condorcet's rule.

Another example was the talk titled *Support Vector Machines, Kernel Logistic Regression and Boosting* by Trevor Hastie. Much of the talk was devoted to teasing out and demonstrating the unexpected connection between boosting and kernel logistic regression. Not only is this theoretically interesting, but by placing boosting on a firm statistical basis, it is possible to see how to improve it. Thus the statistical method of "lassoing" can now suggest that AdaBoost can be improved by "shrinking", giving each new tree a very small weight.

Also in the theme of cross-field connections was *Types of Multinet Systems* from Amanda Sharkey. Dr. Sharkey's contribution was to survey the terms with which multiple classifier systems are discussed across various fields, and then to attempt to unify them, to propose a pared-down shared vocabulary that we all can use to discuss matters with more clarity.

The general discussion periods (which capped each session, and the conference as a whole) were certainly just as valuable as the talks themselves. Not least because they focused on what we don't know, rather than what we do. All agree that bagging and boosting are demonstrated successes, but that still leaves many important questions in place. An incomplete list:

- What is a theoretical basis for deciding between bagging and boosting in a given circumstance?
- How to deduce the best combination method, or which classifiers to combine, without actually exhaustively trying them?
- Is diversity a useful surrogate for MCS performance? Why? What measure of diversity is best in what circumstance? What are the trade-offs of diversity against the combination method?

Many of these outstanding issues can be summarized by the question Prof. Ghosh raised at the end of his opening talk: how can we develop a meta-theory for when to use what MCS technique, and with what parameters? Happily, there will be a follow-up MCS Workshop, June 11-13, 2003, in the UK, where these questions can be revisited.

~Philip Kegelmeyer

New Greek Association

Newly formed GAIPDM at ICIP2001

The Greek Association for Image Processing and Digital Medai (GAIPDM) was formed in October , 2001, at the ICIP2001 held in Thessaloniki, Greece. Greek scientists have exhibited significant internationally recognized achievements in the fields of Digital Signal Processing, Digital Image Processing, Pattern Recognition, and Digital Media. Many of them are distinguished professors at well-known universities worldwide. Communication and cooperation were the most important reasons for creating the new society. Other important aims include:

- affiliation with other similar scientific communities;
- promotion and advancement of research through seminars, courses, and conferences;
- establishment of distance learning facilities;
- participation in national, European, and worldwide networks of excellence in areas of interest;
- book and journal editing, and
- motivation of young researchers to enroll in image processing and digital media studies through scholarships and grants.

Greece was among a few European Countries that had not joined IAPR. Immediately after the decision for the form the GAIPDM, a proposal to join IAPR was made by Professor Maria Petrou who encouraged and considerably supported us, and our new association became one of your members.

We believe that joining IAPR is an event of utmost importance for us. We are looking forward to actively contributing to your activities and meeting our goals. Taking this opportunity, I would like to wish you both personal prosperity and successful accomplishment of IAPR scientific mission.

~Nikos Papamarkos
President, GAIPDM

TC15 Graph-Based Representations in Pattern Recognition, www.iapr-tc15.unisa.it

Message from the Chairman: Goals of TC15

Graphs, left unused in many areas because of the computational complexity required by their processing, are now gaining popularity in many disciplines of Pattern Analysis and Recognition. In fact, along the chain of processes from a stimulus to its interpretation, graphs are used for several distinct tasks: *Hierarchical graphs* for image segmentation and control of perceptual strategies, *Graph Matching* and *Graph Clustering* for recognition and image understanding, *Conceptual Graphs* for representation of relational and structural knowledge, and so on. Of course, graphs are also one of the most popular data structures for the description of patterns in the framework of structural pattern recognition in the learning and in the classification process.

Since its formation in 1996, TC15 has promoted the use of graph-based techniques within the Pattern Recognition community by exchanging algorithms and by integrating ideas and approaches. TC15 has addressed topics related to representational issues (Graph Representation of Shape, Irregular Graph Pyramids, Aspect Graphs, Graphs vs. rigid structures and so on), to classification problems (Graph Clustering, Grouping, Prototyping and Matching), and finally to specific application-dependent, graph-based techniques.

Future activities of TC15 will be devoted to increasing the interchanges with groups in the Pattern Recognition field and other fields—Artificial Intelligence, Machine Learning, Bioinformatics and Chemoinformatics—that could benefit from the use of graph-based techniques. These communities are generally interested in the use of graphs, yet often discouraged by the belief that graphs are theoretically attractive but practically unusable because of the computational complexity of the algorithms.

However, this is no longer true. It is worth citing that TC15 started a benchmarking activity aimed at comparing some well-known graph matching algorithms on a wide, standard database of

graphs (about 150,000) of different sizes (up to 1000 nodes) and types (Randomly Connected Graphs, Meshes both Regular and Irregular, Bounded Valence Graphs, etc.). The algorithms and the database are now accessible through the TC15 website.

An ambitious goal would be to make validation and reproduction of experimental results easier. TC15 hopes to promote activities to encourage the construction of standard databases and to define benchmarking protocols for the different kinds of graph-related problems that are of interest for the TC15 members. This graph repository could be a reference source for graph test data. It should be thought out and built as a collective effort. The graphs should also be linked to bibliographic data that refers to papers that have used them, or that describe the way they have been generated or obtained.

We expect to have good results on this topic at the next TC15 workshop, to be held in 2003, at York, U.K..

I ask your pardon if I conclude this message with a short personal note. I would like to express my gratitude to the two previous TC15 chairmen (Prof. W. Kropatsch and Prof. J.M. Jolion) and to Prof. H. Bunke for their support to stand myself as a candidate to the chairmanship of TC15 for the biennium 2002-2004 and to warmly thank all the other TC15 members.

~Mario Vento

Artificial Neural Networks for Pattern Recognition:

Anything new in the sea?

In the last fifteen years, we have seen impressive advances in the field of pattern recognition using connectionist models. The sub-symbolic nature of most problems makes these models, which strongly emphasize learning, a valuable alternative to related decision-theoretic approaches. Some argue that their biological inspiration is the key to their inherent power. Others emphasize that classical methodologies are the reason for successful experimental results. Regardless of where the truth lies, further theoretical work and experimental analyses are still required to understand the capabilities of neural networks for pattern recognition tasks.

Recent developments in this field range from biologically-inspired neural networks to mathematically-based models like kernel machines. However, the extension to learning in structured domains may be one of the most promising near-term research areas. Here, classical neural networks-based approaches have been extended by giving patterns rich graphical representations. This approach, which is referred to as adaptive graphical pattern recognition, lies between decision-theoretic and structural pattern recognition in methodology. Interestingly, some classical algorithms, like back propagation, have been extended to deal with graphical inputs. The corresponding learning algorithms turn out to be closely related to graph matching and other methods used in structural pattern recognition. This new methodology represents an interesting challenge for pattern recognition researchers, since many tasks faced using feature-based representations (vectors) may also be attacked from a different point of view in which the pattern structure is emphasized. In particular, these structural domains do not have a special metric; instead, pattern classification is performed by learning from examples. This is just one example of many different hybrid schemes that go beyond brute force learning to try to incorporate prior knowledge as much as possible.

One of the tasks of TC3 is to stimulate discussion on recent advances so as to identify promising research directions. We have seen large efforts in experimenting with traditional architectures and learning algorithms, like LVQ and back propagation. But, as an Irish proverb puts it, "There are finer fish in the sea than have ever been caught." We hope that the TC3 will offer some guidelines for discovering finer fish. The first official opportunity for bringing together researchers in the field will be the workshop "Artificial Neural Networks in Pattern Recognition", which will be held in Florence, Italy, on 12-13 September 2003. There will be a strong emphasis on a contest, which will play a central role in the workshop. We really hope that this first workshop will be a lively market place for fine fish.

~Marco Gori, Chair
~Simone Marinai, Vice Chair

I a p r d i r e c t o r y

EXECUTIVE COMMITTEE (ExCo)

Professor R Kasturi	President
Professor W Kropatsch	First Vice President
Professor Y Shirai	Second Vice President
Dr G Sanniti di Baja	Past President
Professor K Tombre	Secretary
Professor M Petrou	Treasurer

MEMBERS OF THE GOVERNING BOARD

Australia	Dr B C Lovell
Austria	Professor W G Kropatsch
Belarus	Professor S Ablameyko
Belgium	Dr Ir C Perneel
Bulgaria	Dr R Kunchev
Canada	Dr F Nouboud
China	Professor N Zheng
Cuba	Dr R R Rodriguez Morales
Czech Republic	Dr P Pudil
Denmark	Professor K Conradsen
Finland	Dr J Parkkinen
	Professor M Pietikainen
France	Professor G Lorette
Germany	Professor J M Buhmann
	Professor Dr-Ing H Burkhardt
Greece	Professor N Papamarkos
Hong Kong	Professor H H S Ip
Hungary	Professor A Kuba
India	Professor D D Majumder
Ireland	Dr P Whelan
Israel	Dr M Porat
Italy	Professor L P Cordella
Japan	Professor Y Ohta
	Dr J Tajima
Korea (South)	Professor Y-B Kwon
	Professor S-W Lee
Netherlands	Professor Dr Ir A W M Smeulders
	Professor Dr Ir M A Viergever
New Zealand	Ass. Prof P J Bones
Norway	Dr H C Palm
Poland	Dr L Chmielewski
Portugal	Professor J S Marques
Russia	Dr-Eng I Gurevich
	Professor A P Nemirko
	Professor V Soifer
	Professor Y Zhuravlev
Slovenia	Dr A Leonardis
South Africa	Professor B Herbst
Sweden	Dr K Astrom
	Dr I Nystrom
Switzerland	Professor Dr H Bunke
Taiwan	Professor Z Chen
	Professor W-H Hsu
Turkey	Dr A Ercil
Ukraine	Professor T K Vintsiuk
United Kingdom	Professor J Kittler
	Professor M Petrou
USA	Professor A Jain
	Professor R Kasturi
	Professor C R Dyer
	Professor K Boyer

STANDING COMMITTEES

K S Fu Prize Committee
Professor T Huang, *Chair*

Professor T Pavlidis, Professor A Rosenfeld, Professor Dr Ir A W M Smeulders, Professor K Yamamoto

Conferences & Meetings Committee
Mr A L Spitz, *Chair*
Professor D Laurendeau, *Coordinator of ICPR Activities*

Dr A Antonacopoulos, Dr A Bagdanov, Dr D P Lopresti, Dr B C Lovell, Professor Y Nakano

Constitution & Bylaws Committee
Professor G Borgefors, *Chair*

Dr M Ejiri, Dr J Parkkinen, Professor L Shapiro, Professor Dr Ir M A Viergever

Education Committee
Professor P Flynn, *Chair*

Dr G Bebis, Dr H I Christensen, Professor B Draper, Professor F Ferrie, Professor A L N Fred, Professor T Tan

Fellow Committee
Professor Dr H Bunke, *Chair*

Professor J K Aggarwal, Dr C Arcelli, Dr D Chetverikov

IFIP Representative
Professor Y Shirai, *Chair*

Industrial Liaison Committee
Dr A K Chhabra, *Chair*

Membership Committee
Professor S Ablameyko, *Chair*

Professor A Marcelli, Dr R R Rodriguez Morales, Dr M Shah, Professor K Yamamoto

Nominating Committee
Dr G Sanniti di Baja, *Chair*

Professor C R Dyer, Dr A Ercil, Dr A Leonardis, Dr B C Lovell

Publications & Publicity Committee
Dr S Srihari, *Chair*
Professor Dr E Backer, *PRL Editor*
Dr D S Doermann, *IJDAR Representative*
Dr M Haindl, *Web Editor*
Dr L O'Gorman, *Newsletter Editor*
Professor M Shah, *MVA Editor*

Dr H Fujisawa, Dr U Miletzki, Dr M N Murthy

AD HOC COMMITTEES

Advisory Committee
Professor M Duff, *Chair*
Professor H Freeman, Professor J Kittler

Conference Software Committee
Professor K Boyer, *Chair*
Dr R Bowden, Professor D Laurendeau, Professor G Medioni, Professor K Tombre

TECHNICAL COMMITTEES (TCs)

Professor W Kropatsch, *General Chair*

TC1 Statistical Pattern Recognition Techniques
Professor R P W Duin, *Chair*

TC2 Structural & Syntactical Pattern Recognition
Professor T Caelli, *Chair*

TC3 Neural Networks & Computational Intelligence
Professor M Gori, *Chair*

TC4 Computer Vision & Image Understanding
Professor B Draper, *Chair*

TC5 Benchmarking & Software
Dr S Lucas, *Chair*

TC6 Special Hardware & Software Environments
Dr M Vincze, *Chair*

TC7 Remote Sensing and Mapping
Professor P Gamba, *Chair*

TC8 ***(Currently not active)***

TC9 Biomedical Applications
Professor F Pernus, *Chair*

TC10 Graphics Recognition
Dr J Llados, *Chair*

TC11 Reading Systems
Dr L Schomaker, *Chair*

TC12 Multimedia Systems
Dr C H C Leung, *Chair*

TC13 Pattern Recognition in Astronomy & Astrophysics
Professor F Murtagh, *Chair*

TC14 Signal Analysis for Machine Intelligence
Dr G Matas, *Chair*

TC15 Graph Based Representations
Professor M Vento, *Chair*

TC16 Algebraic & Discrete Mathematical Techniques in Pattern Recognition & Image Analysis
Professor A P Nemirko, *Chair*

TC17 Machine Learning & Data Mining
Dr P Perner, *Chair*

TC18, Discrete Geometry
Prof. A Montanvert, *Chair*

Also of interest to IAPR members may be the following:

- ICDAR is seeking nominations for awards. For information, please see, **http://www.essex.ac.uk/ese/icdar2003/**
- For US pattern recognition researchers, the National Science Foundation (NSF) is soliciting grant proposals for their Information Technology Research program. This funds basic research in pattern discovery. Applications may include biometrics, tracking and surveillance, information from fusion of data sources, etc. **http://nsf.gov/pubs/2002/nsf02168/nsf02168.htm**

Upcoming IAPR Sponsored Conferences

10th International Conference on Computer Analysis of Images and Patterns
25-27 August 2003
Groningen, The Netherlands

Topics include, but are not limited to:

- Image analysis
- Computer vision
- Pattern recognition
- Object recognition
- Medical imaging
- Motion analysis
- Augmented reality
- Image and video compression
- Image and video indexing
- Shape representation
- Industrial applications
- Segmentation and grouping.

Further information:

Email: caip@cs.rug.nl
Website: http://caip.cs.rug.nl

Submission deadline: **14 February 2003**
Acceptance notification: **11 April 2003**

13th Scandinavian Conference on Image Analysis
29 June-2 July 2003
Göteborg, Sweden

The main technical areas are:

- Image feature extraction
- Image understanding
- Grouping and segmentation
- Motion analysis
- Texture analysis
- Color analysis
- Shape analysis
- Computer vision
- Cognitive vision
- Medical image processing
- Measurement and quantification
- Measurement and visualization
- Image coding and compression
- Multi-modal processing
- Indexing and databases
- Images and the 3-D geometry
- Standards and best practices
- Images and pattern recognition
- Applications

Further information:

Email: SCIA2003@gbg.congrex.se
Website: http://www.hh.se/scia2003

Submission deadline: **22 January2003**
Acceptance notification: **22 March 2003**

11th International Conference on Discrete Geometry for Computer Imagery
19-21 November 2003
Naples, Italy

Original and unpublished papers are welcome, concerning theory and applications on:

- Discrete Geometry and Topology
- Models and Geometric Transforms
- Surfaces and Volumes
- Discrete Shape Representation and Analysis
- Morphological Analysis—Shape Recovery, Image Generation, Reconstruction and Visualization

Further information:

Email: dgci@dgci.cib.na.cnr.it
Website: http://dgci.cib.na.cnr.it/

Submission deadline: **15 March 2003**
Acceptance notification: **15 June 2003**

IAPR Newsletter

Published in association with the IAPR website, **www.iapr.org**

The deadline for submission of material for the next issue is 28 FEBRUARY 2003.

Newsletter Editor:
Lawrence O'Gorman
logorman@avaya.com

Web Site Director:
Michal Haindl
haindl@utia.cas.cz

EDITOR S NOTE

This is my first issue as editor of the *IAPR Newsletter*. Please send any comments to my email above.

My thanks to **Michael Duff** for his years of excellence as outgoing editor of the *Newsletter*, and to **Susan Duff** for her invaluable help with the transition.

~Larry O'Gorman

IAPR SPONSORED CONFERENCES & WORKSHOPS

Please check updated information on: http://www.iapr.org

2003	Event	Location	Deadlines		Contact
1-3 April ICVS'03	3rd International Conference on Computer Vision Systems	Graz Austria	Abstract: Final Manuscript:	*Deadline passed* 15/01/03	vm@itee.uq.edu.au http://dib.joanneum.at/ICVS03
21-23 May PRIP'2003	7th International Conference on Pattern Recognition and Information Processing	Minsk Belarus	Abstract: Final Manuscript:	*Deadline passed* 15/02/03	VKrasnoproshin@mmi.unibel.by http://www.prip.bsu.by
4-6 June IbPRIA'2003	1st Iberian Conference on Pattern Recognition & Image Analysis	Mallorca Spain	Abstract: Final Manuscript:	*Deadline passed* 15/03/03	IbPRIA@uib.es2003 http://dmi.uib.es/IbPRIA2003/homepage.html
9-11 June AV, BPA 2003	4th International Conference on Audio & Video Based Biometric Person Authentication	Guildford UK	Abstract: Final Manuscript:	10/01/03 01/04/03	avbpa@eim.surrey.ac.uk http://www.avbpa2003.ee.surrey.ac.uk
29 June-2 July SCIA'2003	13th Scandinavian Conference on Image Analysis Bridging Continents and Millennia	Goteborg Sweden	Abstract: Final Manuscript:	22/01/03 08/05/03	SCIA2003@gbg.congrex.se http://www.hh.se./scia2003
5-7 July MLDM'2003	International Workshop on Machine Learning and Data Mining in Pattern Recognition	Leipzig Germany	Abstract: Final Manuscript:	10/01/03 01/05/03	ibaiperner@aol.com http://www.ibai-research.de/MLDM2003
7-9 July, EMMCVPR'03	Fourth International Workshop on Energy Minimization Methods in Computer Vision and PR	Lisbon Portugal	Abstract: Final Manuscript:	06/01/03 01/04/03	anand@cise.ufl.edu .... mtf@lx.it.pt http://www.emmcvpr.org
3-6 Aug ICDAR'2003	7th International Conference on Document Analysis	Edinburgh UK	Abstract: , Final Manuscript:	*Deadline passed* 02/05/03	http://www.essex.ac.uk/ese/icdar2003/
25-27 Aug CAIP'2003	10th International Conference on Computer Analysis of Images and Patterns	Groningen Netherlands	Abstract: Final Manuscript:	14/02/03 09/05/03	caip@cs.rug.nl http://caip.cs.rug.nl
17-19 Sept ICIAP2003	12th International Conference on Image Analysis and Processing	Mantova Italy	Abstract: Final Manuscript:	28/02/03 30/05/03	Marco.ferretti@unipv.it http://www.iciap2003/unipv.it
19-21 Nov. 02 DGCI'2003	11th Int Conference on Discrete Geometry for Computer Imagery	Naples Italy	Abstract: Final Manuscript:	15/03/03 30/07/03	dgci@dgci.cib.na.cnr.it http://dgci.cib.na.cnr.it/