



International Association for Pattern Recognition, Inc
An affiliate member of the International Federation for Information Processing

NEWSLETTER

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From the Editor's Desk

I OWE EVERYONE an apology. In transferring printing and distribution of most copies of the *Newsletter* from the UK to Czechoslovakia, a major difficulty was encountered that held the previous issue up for several weeks. This is particularly unfortunate, since the whole point of the move was to *decrease* publication delays by innovations such as direct mailing to members. I am glad to say that the problem has now been sorted out, so the *Newsletter* should appear more rapidly and regularly than before.

This issue contains, in addition to the usual fayre of reviews and announcements, a most interesting article describing an annual bibliography of classification-related literature. Please keep articles of all these types coming in!

The Editor

Articles for inclusion in the *Newsletter* are always welcomed, and may be on any subject likely to be of interest to the IAPR community. They should be submitted, preferably electronically, directly to the editor at the above address.

Circulation: 14,900 copies

An Annual Bibliography of Classification-Related Literature

THE *Classification Literature Automated Search Service* is published annually on behalf of the Classification Society of North America. It provides a comprehensive view of classification research, which is a common theme shared by many different disciplines.

The *Service* is based on papers accessed from over 8000 journals. The *Service's* Editorial Board compiles a list, or profile, of books or papers, called profile items, that are indicative contributions to the theory and practice of classification. The profile for the 1990 volume of *Service*, for example, contained 81 items (book or article titles). A journal paper is considered to be classification-related if it cites one or more profile items. The 1990 volume of *Service* described 1298 citations from 887 papers in 431 journals.

The *Service* contains: a bibliography of classification-related papers in which entries are grouped together by subject area; an author index; and a citation index which identifies the classification-related papers that cite each profile item.

Bibliography

Here is a typical entry:

0593 J CLASSIF 7(2): 217-240,1990
 Weight Constrained Maximum Split
 Clustering
 HANSEN P + JAUMARD B + MUSITU K
 Rutgers State Univ,Rutgers Ctr
 Operat Res,Hill Ctr Math Sci, New
 Brunswick, NJ 08903
 GORDON AD 81; HARTIGAN JA 75;
 SPATH H 80; ZAHN CT 71

This entry has five parts: the paper's complete journal citation (line 1); the paper's title (line 2-3); the paper's authors (line 4); address of the (principal) author (lines 5-7); and a list of items from the 1990 profile that this paper cites (lines 8-9). The entry's first line begins with a four-digit sequence number identifying this paper's position in the bibliography; the indices identify papers by these sequence numbers. Immediately following the paper's sequence number is an eleven-character identification of the journal in which the paper appears. If you don't recognize the journal title from this abbreviation, you can locate the complete title in the section of *Service* entitled "Abbreviated and Full Titles of Cited Journals".

The bibliographic entries are classified by subject area. An entry's subject area is derived from the type of the journal in which the paper appears, rather than from the paper's content. Journal types are determined using *Ulrich's International Periodicals Directory 1989-1990*, which classifies

journals into subject categories (e.g. astrology, oriental studies). These categories are grouped into major subject areas. SCIENCES: COMPREHENSIVE WORKS includes papers from interdisciplinary journals (e.g. *Nature*, *Science*). Specific subject areas are:

BIOLOGICAL SCIENCES	INFORMATION SCIENCES
BUSINESS	MATHEMATICAL SCIENCES
EARTH SCIENCES	MEDICAL SCIENCES
EDUCATION	NATURAL SCIENCES
ENGINEERING	PHYSICAL SCIENCES
HUMANITIES	SOCIAL SCIENCES

Others include papers either from incompletely identified journals or from journals in subject categories (e.g., astrology) that could not be assigned to the previous subject areas. BIOLOGICAL SCIENCES, MATHEMATICAL SCIENCES, and SOCIAL SCIENCES are also classified into minor subject areas (e.g. BIOLOGICAL SCIENCES — Zoology).

Within each major or minor subject area, the bibliographic entries are sorted alphabetically by abbreviated journal title before sequence numbers are assigned. Therefore it is easy to locate all classification-related papers appearing in a journal assigned to a given subject area. For example, the 17 classification-related papers from the *Journal of Classification* appear with sequence numbers 0583-0599 in MATHEMATICAL SCIENCES — Mathematics. If you are not sure in which subject area a journal appears, a section of *Service* may be consulted which identifies each journal's subject area.

Author Index

As an example of the author index for the journal papers appearing in the bibliography, here are four consecutive entries.

HANSELL RIC	0112	A Community Perspective...
HANSEN P	0593	Weight Constrained Maximum...
HANSON SJ	0813	What Connectionist Models...
HANUSSE P	0532	Object Detection and...

(where the ellipsis indicates material truncated to fit within the typographic constraints of the *Newsletter*). Each entry contains an author's name (at the left), the sequence number of a paper written by the author, and the title of the paper (at the right). A multiple-authored paper has separate entries for each of its authors. Since the entries are sorted alphabetically by author's last name, it is easy to identify all classification-related papers written by any given researcher.

Citation Index

The index of citations relates classification-related papers to items in the given year's profile. Five consecutive entries are shown in Figure 1 for illustration. The two fields of the heading describe, by author and date, the profile item being

HARTIGAN JA 75

0533 The Use of Graphs of Elliptic Influence in Visual Hier	KRIVANEK M
0554 Knowledge based Approach to Cluster Algorithm Selectio	BALASUBR.A +
0573 Investigation of the Structure of Binary Variables	TELEGDI L
0593 Weight Constrained Maximum Split Clustering	HANSEN P +
0610 Recognition of Tree Metrics	BANDELT HJ

Figure 1: Consecutive Classification-Related Papers from a Year's Profile

cited. The fields of each entry describe a paper in which a citation appears: the first field is the citing paper's sequence number in the bibliography; the second and third fields give the title and author(s) of the citing paper. The citations are sorted alphabetically by identification of cited (profile) item, and so it is easy to locate classification-related papers citing any given profile item.

The sources of bibliographic information, which go into the making of each annual issue of *Service*, are as follows. The first step in constructing the bibliography is to collect data about journal papers. The *Service* obtains this data from Research Alert, a bibliographic service of the Institute for Scientific Information (ISI, Philadelphia). Research Alert enables the *Service* to access papers in over 8000 science, technical, and social sciences journals including those from the Science Citation Index, Social Sciences Citation Index, and Arts & Humanities Citation Index databases. To use Research Alert, the *Service's* Editorial Board compiles a list, or profile, of books or papers. A journal paper is considered to be classification-related if it cites one or more profile items. Using the profile, Research Alert provides the *Service* with bibliographic information about classification-related papers in recent issues of the 8000 journals it processes.

Research Alert's selection procedure depends completely on the profile. The Editorial Board reviews the profile regularly in order to ensure that the papers selected by Research Alert are relevant to classification and related areas of data analysis. The Editor welcomes your suggestions for improving the composition of future profiles.

The next step is to consider for inclusion in the bibliography those classification-related papers the titles of which contain one or more keywords from a list (shown in each volume of *Service*). Most classification-related papers with methodological, theoretical, mathematical, statistical, or formal contents will satisfy this criterion. In a final step, members of the Editorial Board review the titles to ensure that the bibliography includes all those papers which they think likely to interest the *Service's* readers.

Service is available for \$15 US per volume for volume 20 (1991) which covers papers in 1991 and will be mailed out in May 1992. *Service* also comes automatically with regular membership of the Classification Society of North America (\$45 US per year). Back issues are available at a discounted

rate. Further information may be obtained from the editor:

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Fionn Murtagh
 ESA

The 11th IAPR International Conference on Pattern Recognition

The 11th IAPR International Conference on Pattern Recognition (ICPR) was held in The Hague, The Netherlands from 30th August to 3rd September, 1992. As in previous years this was a very large gathering, although both the venue and the local organization, led by Drs. Backer and Gelsema, were such that an air of informality prevailed and prevented delegates becoming over-awed by the sheer size of the event. From the outset the atmosphere was relaxed and most of those to whom I spoke found it conducive to scientific discussion and debate.

The ICPR was a truly international conference with participants from almost every industrialized country. Sadly some delegates were unable to attend, notably those from such troubled parts of the world as Belgrade, but several nations were represented for the first time. Once again the majority of the papers presented were from universities or government research laboratories with few participants from industrial research laboratories.

The opening plenary session began with the usual welcome from the local organizers and proceeded with the presentation of the King-Sun Fu award to L. N. Kanal for his contributions to the field over many years. Prof. Kanal's speech of acceptance began by inviting us to consider the meaning of the noun *pattern*. In the original sense the word referred to "an example or model deserving imitation" (OED). When used of a person, then perhaps the modern equivalent would be a rôle model and Prof. Kanal went on to propose King-Sun Fu as such a pattern for us.

The conference proper began after a coffee break with four parallel sessions covering the main themes of the ICPR — 'Computer Vision and Applications', 'Pattern Recognition Methodology and Systems', 'Image, Speech and Signal Processing' and 'Architectures for Vision and Pattern Recognition'. It is a measure of the quality of the conference that the choice between tracks was often difficult, with interesting and original work being presented simultaneously in several sessions.

One of the more talked-about papers dealt with a novel active contour model applied to the tracking and analysis of the motion of *Limax flavus* or, as the paper rapidly became known, "snakes tracking slugs". In fact the paper demonstrated how research in pattern recognition continues to evolve as a scientific discipline. As with many papers presented at ICPR, the work builds on that of others to develop an applicable method with which to attack a new problem.

It was particularly encouraging to note the equal precedence of poster and oral presentation of papers. It is usual for the programme committee of a conference to profess that equal weight will be placed on both methods of presentation, so that the allocation of a poster presentation is not a judgement on the quality of the work but should rather be viewed as recognition that the subject of the work is of specialist interest. In practice, however, the logistics of the poster sessions often belie the true attitudes of the organizers to the papers presented. The ICPR committee, on the other hand, provided an exemplary series of poster sessions. The papers accepted for poster presentation were indeed of generally high quality and they were presented in a fairly spacious, well-organized room. The sessions were arranged so that there was a poster session for one of the conference tracks each afternoon and during the session there were no oral presentations for that track. Further small details, such as the alternation of the presentation periods for odd and even numbered posters, led to a poster session which was well attended and provoked genuine interest and discussion of the work on display.

Scientific matters aside, one of the main topics of discussion was the size of the conference proceedings, which this year have reached a record four volumes and four kilograms. Although we were presented with a useful satchel in which to carry the proceedings, a number of delegates left the conference with a decidedly lop-sided look after four days with one shoulder permanently weighed down. Perhaps the time has come to consider CD-ROM as the primary medium for future proceedings. After all, if our community, with its expertise in image capture, processing and retrieval, cannot even produce a usable CD-ROM containing the proceedings of one of our major conferences, what hope is there for the application of some of our more esoteric algorithms?

The Dutch have a reputation for efficiency and informality and this was reflected in the catering and social arrangements at the conference. There was ample time for speakers and

other delegates to mingle at the frequent and well-organized coffee breaks, the lunches provided a relaxed and sociable break in the day, and the conference banquet embodied the informal style. Throughout the evening we were encouraged to explore the stands dotted around the banqueting hall carrying displays of a variety of traditional Dutch crafts, such as lace-making, or an array of local culinary specialities, including raw herring. Perhaps the most popular was the ice-cream stand, complete with summer umbrella and attendants in traditional ice-cream sellers' dress.

On a final note; it really is most unfair of those responsible for timetabling the oral presentations to complicate an already difficult choice between parallel sessions by locating the least popular topics in the most comfortable venue, the Mondriaanzaal!

Simon Protheroe
Kings College London

The IAPR MVA'92 Workshop

THE THIRD BI-ANNUAL WORKSHOP on machine vision applications, MVA'92, was held with great success during 7-9 December 1992 at the NEC SUPER TOWER, Minato-ku, Tokyo under the sponsorship of three IAPR Technical Committees: TC-6 (Special Architectures), TC-8 (Industrial Applications) and TC-10 (Graphic Recognition). Vice-president Dr. Ejiri and the chairmen of above TCs, at the time this workshop was planned, composed the organizing committee for this workshop. Papers were solicited from the areas that the above three TCs cover, as well as basic algorithms and other relating areas. Some 240 articles were submitted, of which 40 were selected as oral presentations and 102 as poster presentations. In addition to them, four special speakers were invited. The authors were from 22 countries and the workshop attracted about 220 participants from 18 countries (this number of countries is less than that of presentations due to several cancellations). Some 30% of the presentations and 50% of the participants were from industry. The articles were presented in 12 sequential sessions, as follows:

- | | | |
|-------|------|-----------------------------------|
| Dec 7 | (1) | Architecture |
| | (2) | 3D Object Recognition |
| | (3) | Poster Session 1 |
| | (4) | Motion and Navigation |
| Dec 8 | (5) | Image Processing and Algorithms |
| | (6) | Poster Session 2 |
| | (7) | Map and Drawing |
| | (8) | Applications 1 |
| Dec 9 | (9) | 3D Shape Analysis and Recognition |
| | (10) | Human Motion and Face Analysis |
| | (11) | Poster Session 3 |
| | (12) | Applications 2 |

In the evening of 8th December a banquet was held.

Each day of the workshop included one or two invited talks, in appropriate sessions, corresponding to each TC above or basic algorithm. Speakers and titles were as follow:

- Prof. Kendall Preston, Jr. of Kensal Consulting (Relating to TC-6): *New Architecture for Vision*.
- Dr. Karl Tombre of INRIA (Relating to TC-10): *Technical Drawing Recognition and Understanding: From Pixels to Semantics*.
- Prof. Alex P. Pentland of MIT (Relating to Basic Algorithms): *Modal Description for Recognition and Tracking*.
- Prof. Claus-E. Liedtke of Universität Hannover (Relating to TC-8): *New Machine Vision Applications in Germany*.

As an active application area, human motion and face analysis was dealt with in an independent session. This topic was also included in the invited talk by Prof. Pentland and several poster presentations.

Prof. Mikio Takagi of the University of Tokyo served as a co-chair for the workshop and Dr. Yasuhito Suenaga of NTT served as the Programme chair. Copies of the proceedings, as well as those of previous workshops, are available at 18,000 yen, by writing to Prof. Takagi at the following address:

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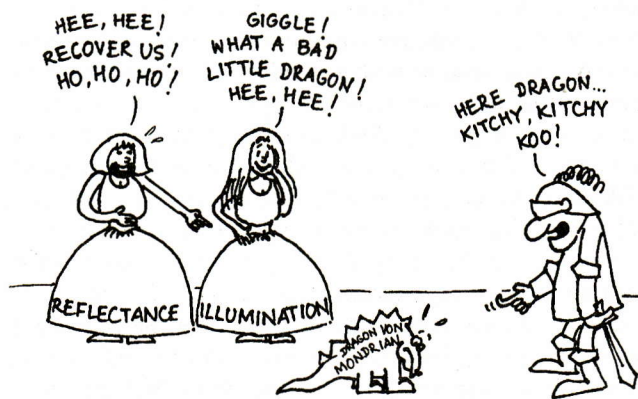
Johji Tajima
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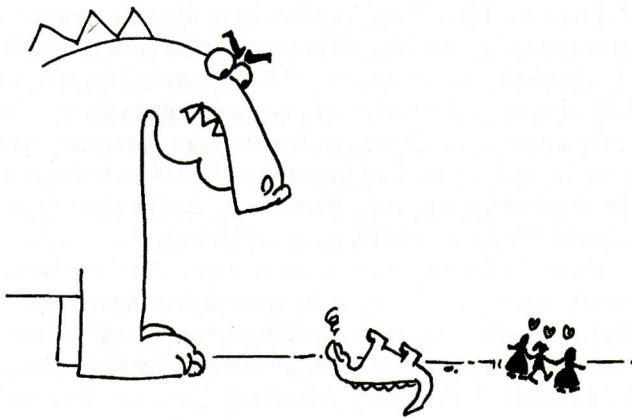
The 4th International Conference on Computer Vision

BERLIN: the place with checkpoint Charlie, Alexanderplatz and the Brandenburg gate; names that sound strange, queer, almost exotic! The 4th ICCV in unified Berlin was something I am glad I did not miss. It took place in Humboldt University, in a city trying to heal its wounds from its recent past and where the atmosphere of the whole place can be epitomized by a small detail. The auditorium where the conference was held had the metal letters with its name outside uprooted, but their dark mark on the wall was

still visible: "Marx Engels Auditorium"; all our programmes were directing us to the "Maximum Auditorium". As the vice-president of the University in his opening address informed us, the university itself has recently undergone major re-organization: 300 new professors were appointed, half from the ex-East and half from the ex-West Germany. And the whole thing was done without any interruptions to the courses. Only German efficiency could do that!

Thanks to that famous German efficiency, the conference was pretty uneventful, apart from some teething problems the first morning: the video equipment was boycotting international cooperation by refusing to show American videos! Cooper from Northwestern University USA, speaking that morning, was dismayed at the prospect of having to tell his graduate student who had broken his back for 8 days to prepare the video that it was not actually shown! (Graduate student, whoever you are, don't worry: the video was shown





From Sinha's talk on "Recovering reflectance and illumination in a world of painted polyhedra." Drawn by Pawan Sinha of MIT

the next day at the coffee break and it was received very well)

There were about 250 participants and 101 papers were presented in all, chosen from 370 submissions: 45 from North America, 45 from Europe and 11 from the rest of the world (Japan, Singapore and Israel). A large part of the conference was devoted to active vision and tracking, closely followed by illumination and colour analysis with perceptual understanding trailing behind. As usual, the odd paper was sub-standard and some talks were excellent. Among others, I enjoyed very much the talks by Cooper on an expert system that knows the rules of balance ("The purpose of a vision system is the causal explanation of the scene"); by Bascle from INRIA on stereo matching using deformable curves; by Freeman from MIT on exploiting the generic view assumption to estimate scene parameters; by Heitger from Zurich on illusionary contours and the excellent presentation by Langer from Montreal on shape from shading with a cloudy sky, who, among other things taught us how to draw draperies! However, the most heroic talk was given by Blake from Oxford: it was the very last talk on the very last day and everybody was saturated with clever ideas, after four days of conference! Well, the talk was good enough to even raise the dead: people actually woke up, stopped thinking of the flight they had to catch and even asked several questions!

The Marr prize (consisting of \$1000) for the best paper went to Rothwell, Forsyth, Zisserman and Mundy from Oxford, on *Extracting projective structure from single perspective views of 3D point sets*.

There were several amusing quotations from the speakers: Huang, in his introduction: "I don't know what I am talking about!" (somebody else was supposed to give his talk until the last moment); Vieville in his conclusions: "All this is related to the plane at infinity, and the plane at infinity is not very far!", and Blake to Baicsy who tried to ask a question during his talk: "Not now, I am operating in real time!" Unfortunately, the occasional speaker took real time

too literally and was putting up transparencies at a rate of 25 frames per second, much to the amusement of the audience! I was wondering whether it would be possible to establish a presentation prize for the best talk, not necessarily the best piece of work.

The conference and all its functions were held in the heart of east Berlin in the historic complex comprising ex-palaces and churches beautifully restored after the war, with the marks of the damage they suffered still visible in many places. The University itself was an ex-palace, the welcoming reception was in the former armoury constructed in 1695 and the banquet was held in the opera restaurant that used to be the palace of the princesses. During the conference we were generously treated at the breaks with cakes and other goodies, and at the welcoming reception with plenty of excellent food and drink. Having been spoiled by so much food, some people were disappointed at the rather scanty portions of the banquet, which however were very tasty and elegantly presented. (Personally, I think anything more would have been too vulgar for the exquisite surroundings!)

The get-together party was very nice although it didn't exist! The conference organizers had the idea to direct us all to a nearby beer garden to use it as a focal point for people as they were arriving. It was a nice idea, only that it was not exactly explained in the programme in so many words! The result was, several of us spent some time looking for a party with peanuts, only to feel very foolish at the end when we realized that the name of the beer garden in the middle of which we were holding our deliberations about peanuts was the same as the name of the meeting place in our programme!

At the special meeting to decide the location of the next conference, San Francisco, Pittsburgh, Orlando, Aspen and Boston were put forward as possible locations. At the end, the battle was between Boston and San Francisco and Boston won convincingly. The argument which swayed the participants was the offer to hold the conference in the MIT campus while there was no obvious university campus available for the San Francisco option. (I must confess, I only went along to vote for Hawaii which was rumoured beforehand as a likely location!) Further, the participants voted unanimously to maintain the character of the conference as a single track one.

At this conference, we did away with the constant intensity constraint in motion analysis; we did away with the single point illuminating source in shape from shading; we did away with Sinha's "dragon von underconstrainedness and other bad things". I am sure by the next ICCV we shall have kitchy-kitchy-koo-ed a few more dragons of vision, only to discover some more nastier ones hidden behind! (Fortunately, so that we can keep our jobs!)

Maria Petrou
University of Surrey

Report on the Italian School on Machine Vision

THE ITALIAN CHAPTER OF THE IAPR endorsed the third School on Machine Vision. The educational goal was to provide young researchers and PhD students from Italian Universities, Research Institutes and Industries with basic concepts on Image Processing and Machine Vision.

This edition was held at the Facoltà di Ingegneria of the Università di Firenze, Italy, from the 28th of September to the 2nd of October 1992. Prof. A. Del Bimbo was the director and the organizing Committee was composed by Profs. V. Cantoni, V. Cappellini, V. Di Gesù, S. Levialdi and R. Stefanelli. Prof. M. Ferretti was the Scientific Secretary.

The topics developed during the school covered: image analysis, pattern recognition, image sequence analysis, 3-D vision, artificial intelligence and neural network for vision, image databases, languages and architectures for image processing. Applications on quality control, character recognition and medicine were also presented. The 56 students attending the school had the opportunity to follow both theoretical classes and practical demonstrations.

The school was successful in both educational goals and attendance. The Italian Chapter is planning to hold the school on Machine Vision every two years.

Vito Di Gesù
President of the Italian Chapter of the IAPR

Book Reviews

Neural Network Architectures. An Introduction by Judith Dayhoff, Van Nostrand Reinhold, ISBN 0-442-20744-1.

For several years, when a student asked what was the best introductory text to neural nets, the answer used to be "Lippmann's article in ASSP magazine." Judith Dayhoff's book has changed that, at least for me! I spent several pleasant hours reading it and found it as pleasant as bed-time reading as I found it useful as an introductory text to the subject.

The book consists of 11 chapters, each with its own bibliography and notes on further reading, plus a comprehensive glossary at the end with biological and other terms. One of the most fascinating chapters was the introductory one, which briefly reviews and compares neural networks from the biological and computational point of view. I felt very humble to realize that with all our technology and ingenuity, all we have achieved so far is to be able to simulate the capabilities of the "brain" of a leech or a worm, with the fly and the cockroach still just beyond our reach — by a mere factor of 100! In chapter 2, the early adaptive networks are reviewed and the concept of linear separability is introduced.

The adalines and madalines find their place there alongside the well-known perceptrons. Chapter 3 deals with Hopfield nets and associative memories as well as their limitations. The back propagation algorithms and the solution to the exclusive OR problem are examined in chapters 4 and 5. If I had a complaint about this book, it would have been here: a lot of trouble has been taken in explaining the updating rule of back propagation in terms of differences while the rule simply drops out if one uses the chain rule of differentiation. However, avoidance of differential calculus could be an advantage if the book is to be read by people with non-mathematical backgrounds. Another interesting section in these chapters concerns the rôle of the hidden layers as feature detectors. Chapter 6 discusses competitive learning and lateral inhibition, while chapter 7 is another fascinating chapter concerning the brain and its neurons. We learn all the facts of life here (well almost all!): how processing in the brain is broken down into assemblies of neurons and how the number of possible such assemblies is greater than the number of the atomic particles in the known Universe; how the brain of the bat devotes a much larger area to the analysis of the 61 kHz frequency than to the analysis of any other frequency because that is the frequency it uses to locate objects in its environment; how cells can go from excitation to strong inhibition in only a few hundred microseconds; how some cells can selectively respond to complex visual stimuli like a waving hand; and how neurons vary with the job they are supposed to be doing, from the Purkinje cell with its 200,000 incoming synapses to the motor neuron of the fish electric ray with its insulated axon!

The synapses of biological neural nets are discussed in great detail in chapter 8. Among other interesting facts, we learn that synapses include anatomical structures so small that they must be viewed at magnifications of 5,000 or more; that the electric eel can produce discharges of hundreds of volts by tapping the membrane potential of its cells; that a nerve impulse can travel with speeds higher than 300 km/h; that the venus fly-trap can respond to movements of its prey by generating impulses by non-nerve cells, and many others. The epitome of this chapter is the quotation from David Bodian: "In synaptic systems, we see not a stereotyped mechanism for the transfer of information from cell to cell, but another display of the fact that every conceivable capability of living organisms to solve adaptive problems is likely to be put to the test in the evolution of life." There is a detailed account of the similarities and the differences between biological neural nets and the artificial ones. Probably the most impressive difference between the two is the fact that the former can learn to recognize something in one pass, while the latter are very slow to be trained.

In chapter 9, the reader is treated to an interesting insight into the artificial neural nets that best imitate the topological mapping of information which goes on in the brain,

i.e. Kohonen feature maps. Chapter 10 examines the counter propagation network and gives us the first glimpse of hope for the future. This system is made up from layers, each of which follows the architecture of a different type of network, and gave an important result: a neural net based on such an architecture learned to identify underwater targets using echo-location with an accuracy of 97%, while the dolphins could only achieve accuracy of 95%! More examples, some of which are equally optimistic, are mentioned in the final chapter which is wholly devoted to applications.

The book contains many pictures and diagrams. A lot of them are not more than the simple lines one would draw on a blackboard to express symbolically the oral presentation of the concepts, but they are evocative and contribute greatly to the readability of the book. Further, the interdispersion of historical notes makes the text come alive and exciting. As a conclusion, I would say that if you want to enthuse undergraduates into research on the topic, or you want to introduce a novice to the subject — or even to impress your spouse by what you work on(!), this text is what you need.

Maria Petrou,
University of Surrey, UK

*Connectionist Robot Motion Planning: A
Neurally Inspired Approach to Visually-Guided
Reaching* by Barlett W. Mel, Academic Press
1990, ISBN 0-12-490020-8, 165 pages

This book is one of a series of books dedicated to perspectives in Artificial Intelligence and is an excellent introduction to a very broad subject covering a wide technological field. It successfully attempts to present the three core technologies, namely motion, sensory perception and intelligence, which lie at the heart of artificial intelligence research. The author proposes that motor-action, perception and intelligence are far more tightly coupled and integrated than has been thought. Through the use of a very well-engineered experiment, the author clearly demonstrates motion control by using ecological and biological solutions rather than the more structured classical approach.

The presentation and discussion of the author's approach is fairly well balanced and, in particular, each issue raised by the experiments is clearly covered. Generally, the presentation is of a very high standard with high quality diagrams. The text is divided into eight chapters. In the first two chapters, the author introduces the objectives of his work and describes the architecture and the organization of the system. The book is strongly centred around the establishment of learning by doing heuristics and this is then subject to strict experimental work. Essentially, the experiment consists of a simple three-link robot arm which can move in a plane a fixed distance from a camera. The system, aptly named "MURPHY", is used to explore the motion control of a robot arm based entirely

upon the sensory information provided by the camera. The problem is to guide the robot arm, which is constrained to move in a plane normal to the viewing camera, in a visually cluttered scene with objects to avoid, based only upon visual sensory information.

Chapter 3 covers the philosophy and architecture of how the system learns by doing. This chapter begins with an historical perspective of learning approaches from a psychological viewpoint before covering in depth the techniques of learning by doing. This learning mechanism allows MURPHY to build a mental model of its environment from external visual sensory information.

In chapter 4, the author demonstrates the central theme of this book, namely the experiments involving visually-guided reaching in a clustered environment. The experiments reported are visually demonstrated with images of intermediate results and their limitations, such as the forced reduction in search space, do not detract from the overall experiments; they help to enhance the important issues raised by this book. System performance is also covered in relation to the imaging system, the software and the learning mechanisms. A useful section on the effects of scaling up the approach is also offered. This indicates that the system could be scaled up to meet the challenges of a full 6 DOF robot arm by employing more advanced heuristics and a parallel processing engine. The current system is limited by only being able to track what is in effect a three link planar mechanism. This is complex enough, requiring a learning régime of about five hours. In such a scenario, arm guidance in a scene with no obstacles takes about one minute to carry out. This can take up to five minutes if the scene contains obstacles.

Chapters 5, 6, and 7 contain the robotic, psychological and biological issues that have been raised by this research work. The author concentrates on discussing the implications of his approach in relation to more classical works and argues well in favour of continued research in his domain.

Finally chapter 8 summarises the overall objectives and results of the research. The author finally rounds the book up by discussing some future research directions. These include extensions to the work to encompass full 6 DOF robot system and a 3D vision system, so that full 3D trajectories could be generated, the use of more intelligent heuristics to reduce the search in solution space, and the implementation of parallel processing to allow real-time robot arm control.

A very comprehensive bibliography containing a total of 215 entries is brought together at the end of the book. This book has been very well presented with clearly defined goals and objectives, and I would not hesitate to recommend it as a student text or as an introduction for the novice in the area of learning and heuristics in artificial intelligence.

John Pretlove
University of Surrey, UK

Pattern Recognition in Practice IV

1-3 June, 1994

Vlieland, The Netherlands

Conference chairmen: Edzard S. Gelsema and Laveen N. Kanal.

The "Pattern Recognition in Practice" conference series aims at the stimulation of interaction between experts in the field of Pattern Recognition and scientists from various areas in which Pattern Recognition techniques are applied. Pattern Recognition IV will explore the relationship between Pattern Recognition, Artificial Intelligence and Neural (and other) Networks. Methodology, as well as applications will be discussed. Attendance will be limited to about 100 persons. Contributions are expected on the following topics:

- use of AI techniques in Pattern Recognition and Image Processing
- principles and use of neural networks
- principles and use of causal networks
- genetic algorithms
- hybrid systems
- comparative studies

The proceedings will be published by Elsevier Science Publishers.

The conference will be held on Vlieland, a small, picturesque island in the north of The Netherlands. The conference site is only a few steps away from the North Sea beach.

Deadlines and format

Extended abstracts (3 pages max)	1st Nov 1993
Notification of acceptance	15th Jan 1994
Camera ready manuscript	1st May 1994

For more information, please contact:

PRP IV Secretariat. c/o Prof. Edzard S. Gelsema

Erasmus University

Department of Medical Informatics

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3000 DR Rotterdam

The Netherlands

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12th ICPR International Conference on Pattern Recognition

9th-13th October 1994

Jerusalem, Israel

The 12th ICPR of the International Association for Pattern Recognition will be organized as a set of four conferences, each dealing with a special topic. The programme for each individual conference will be organized by its own Programme Committee. Papers describing applications are encouraged, and will be reviewed by a special Applications Committee. An award will be given for the best industry-related paper presented at the conference. Considerations for this award will include innovative applications, robust performance, and contributions to industrial progress. An exhibition will also be held. The conference proceedings are published by the IEEE Computer Society Press.

General Co-chairs	S. Ullman, Weizmann Inst. (shimon@wisdom.weizmann.ac.il)
	S. Peleg, The Hebrew University (peleg@cs.huji.ac.il)
Local Arrangements	Y. Yeshurun, Tel-Aviv University (hezy@math.tau.ac.il)
Industrial and Applications Liaison	M. Ejiri, Hitachi (ejiri@crl.hitachi.co.jp)

The four conference tracks are:

Computer Vision and Image Processing (T. Huang, University of Illinois). Early vision and segmentation; image representation; shape and texture analysis; motion and stereo; range imaging and remote sensing; colour; 3D representation and recognition.

Pattern Recognition and Neural Networks (N. Tishby, The Hebrew University). Statistical, syntactic, and hybrid pattern recognition techniques; neural networks for associative memory, classification, and temporal processing; biologically-oriented neural network models; biomedical applications.

Signal Processing (D. Malah, Technion, Israel Institute of Technology). Analysis, representation, coding, and recognition of signals; signal and image enhancement and restoration; scale-space and joint time-frequency analysis and representation; speech coding and recognition; image and video coding; auditory scene analysis.

Parallel Computing (S. Tanimoto, University of Washington). Parallel architectures and algorithms for pattern recognition, vision, and signal processing; special languages, programming tools, and applications of multiprocessor and distributed methods; design of chips,

real-time hardware, and neural networks; recognition using multiple sensory modalities.

Deadlines and format

Deadline for Paper Submission 1st Feb 1994
 Notification of Acceptance May 1994
 Deadline for Camera-Ready Copy Jun 1994

Each manuscript should include the following:

1. A summary page addressing these topics:
 - To which of the four conference is the paper submitted?
 - What is the paper about? What is the original contribution of this work?
 - Does the paper mainly describe an application, and hence should be reviewed by the applications committee?
2. The paper is limited in length to 4000 words. (This is the estimated length of the proceedings version.)

Send four copies of your paper to:

12th ICPR, c/o International Ltd
 10 Rothschild blvd
 65121 Tel Aviv, ISRAEL

Tel: +972(3)510-2538

Fax: +972(3)660-604

Email: icpr@math.tau.ac.il

For further information contact the Secretariat at the above mail or email addresses.

Second International Workshop on Visual Form

30th May–2nd June 1994
 Capri, Italy

The 2nd International Workshop on Visual Form (IWVF2) is organized jointly by the Department of Computer Science and Systems of the University of Naples and by the Institute of Cybernetics of the National Research Council of Italy, and is sponsored by the International Association for Pattern Recognition.

IWVF2 Chairmen

Carlo Arcelli	Istituto di Cibernetica, Arco Felice, Naples
Luigi P. Cordella	DIS-Università di Napoli, Via Claudio 21, Naples
Gabriella Sanniti di Baja	Istituto di Cibernetica, Arco Felice, Naples

IWVF2 Scientific Committee

K.Abe (Japan)	S.V.Ablameyko (Belarus)
A.Bruckstein (Israel)	L.De Floriani (Italy)
L.Dorst (The Netherlands)	M.Ferretti (Italy)
G.Granlund (Sweden)	E.Granum (Denmark)
R.Hall (USA)	B.Kimia (USA)
J.Kittler (UK)	W.Kropatsch (Austria)
O.Kubler (Switzerland)	A.J.Maeder (Australia)
E.E.Milios (Canada)	A.Montanvert (France)
G.Musso (Italy)	L.O'Gorman (USA)
D.Rutovitz (UK)	H.Samet (USA)
J.Serra (France)	R.Stefanelli (Italy)
C.Y.Suen (Canada)	A.Vossepoel (The Netherlands)
P.Zamperoni (Germany)	

The scientific programme will include the presentation of invited talks and contributed papers. The goal of IWVF2 is to provide a discussion forum for researchers and practitioners interested in 2D and 3D shape analysis. Original and unpublished work in all aspects of this field is welcome. The main topics include:

Shape Perception
 Shape Representation
 Shape Decomposition
 Shape Description
 Shape Recognition
 Other topics related to shape

Prospective contributors are encouraged to submit papers and to attend IWVF2. Each paper will be reviewed by at least two members of the Scientific Committee using a blind procedure, *i.e.* the identities of the authors will not be known to the reviewers. Accepted papers will be discussed in a single track, or presented as posters. All presented contributions will be included in the proceedings volume, which will be published in book form after the workshop.

Invited talks will be given by:

Dana H. Ballard (USA)
 Gunilla Borgefors (Sweden)
 Jan-Olof Eklundh (Sweden)
 Robert M. Haralick (USA)
 Rangachar Kasturi (USA)
 Martin D. Levine (Canada)
 Theo Pavlidis (USA)
 Shmuel Peleg (Israel)
 Steve W. Zucker (Canada)

Deadlines and format

Submission of contributions	1st Nov 1993
Notification of acceptance	1st March 1994
Camera-ready papers due	1st May 1994

Authors should send four copies of a full paper to the IWVF2 Scientific Secretariat before 1st November 1993. Paper length is limited to about 4000 words, since this is the estimated length of the proceedings version. The first page should be anonymous, containing only the title of the paper, a 200-word abstract and 3-5 keywords. A separate page including the title, the name(s) and affiliation(s) of the author(s), the abstract, the keywords, and the addressed topic of the workshop must accompany the paper. Papers submitted by telefax or email will not be reviewed.

IWVF2 Scientific Secretariat

Istituto di Cibernetica, CNR
Via Toiano 6
80072 Arco Felice, Naples
Italy

Fax: +39 81 5267654

Email: gabry@gabry.na.cnr.it

For further information contact the secretariat at the above address, fax or email.

Vision Interface '94

16th-20th May 1994

Banff, Alberta, Canada

Vision Interface '94 is the eighth Canadian conference devoted to computer vision, signal and image processing, and pattern recognition. This conference, held in various Canadian cities, is sponsored by the Canadian Image Processing and Pattern Recognition Society. The 1994 conference will be held in Banff, Alberta, 16-20th May 1994 in conjunction with Graphics Interface '94, and Artificial Intelligence '94.

Invited Speakers

Judson P. Jones	Oak Ridge National Laboratory
R. Kasturi	Pennsylvania State University
William A. MacKay	University of Toronto

Topics

Contributions are solicited (English or French) describing unpublished research results and applications in any area of computer vision, signal and image processing, and pattern recognition. This year VI '94 will have a theme: "Perception in Robotics, and Process Automation." Submissions on this theme and on other areas of Image Processing and Pattern Recognition are welcome. Topics will include, but are not limited to:

Robot Perception
Biomedical Applications

Intelligent Autonomous Systems
Modeling of Human Perception and Movement
Multi-sensor Perception
On-line and Off-line Document Processing
Active Perception
Industrial Applications
S/W and H/W Architecture
3-D Vision
Methods for Image and Scene Analysis
Remote Sensing
Neural Networks
Motion Representation
Knowledge Representation
Robust Methods for Signal and Image Processing

Four copies of full papers should be submitted to either Program Co-chairman before 31st Oct 1993. Include with the paper full name, address, phone number, fax number and electronic mail address of the contact author.

Deadlines and format

Four copies of a Full Paper due	31st Oct 1993
Workshop/Tutorial Proposals due	15th Nov 1993
Authors Notified	1st Feb 1994
Final Paper due	31st Mar 1994

Submit papers to:

Colin Archibald

Autonomous Systems Laboratory
National Research Council
Ottawa, Ontario, Canada K1A 0R6

Tel: (613) 993-6580

Fax: (613) 952-0215

Email: archibald@iit.nrc.ca

or

Paul Kwok

Dept. of Computer Science
The University of Calgary
Calgary, Alberta, Canada T2N 1N4

Tel: (403) 220-3531

Fax: (403) 284-4707

Email: kwok@cpsc.ucalgary.ca

Forthcoming Conferences, Workshops and Events

The information given in the following table is maintained in a database by the IAPR Secretariat. Please notify the editor and the Secretariat of any additions to the list. (The address of the Secretariat is given at the foot of this page.)

DATE	EVENT	LOCATION	CONTACT ADDRESS [SPONSOR]
12-13th July 1993	Geometric Methods in Computer Vision: Part of SPIE's Annual International Symposium on Optoelectronic Applied Science and Engineering	San Diego, California, USA	SPIE, San Diego '93, P.O. Box 10, Bellingham, WA 98227-0010, USA (abstracts@mom.spie.org or CompuServe 71630,2177)
25-27 Aug 1993	3 rd International Workshop on Artificial Intelligence in Economics and Management	Portland, Oregon, U.S.A.	Dale Anderson, School of Business Administration, Portland State University, P.O. Box 751, Portland, Oregon 97207-0751, USA (aiem3@PSUORVM.bitnet)
13-15 Sep 1993	5 th International Conference on the Computer Analysis of Images and Patterns (CAIP'93)	Budapest, Hungary	D. Chetverikov, Computer and Automation Institute, Budapest, P.O.Box 63, H-1518 HUNGARY (h1180cse@ella.hu) [IAPR]
20-22 Sep 1993	7 th International Conference on Image Analysis and Processing	Bari, Italy	Prof. Sebastiano Impedovo, 7 th ICIAP General Chairman, Dipartimento di Informatica, Università di Bari, Via Amendola, 173, 70126 Bari, Italy
20-23 Sep 1993	British Machine Vision Conference	Guildford, UK	Dr. John Illingworth, Department of Electronic and Electrical Engineering, University of Surrey, Guildford, GU2 5XH, UK [BMVA]
20-22 Oct 1993	Second IAPR Conference on Document Analysis and Recognition	Tsukuba Science City, Japan	Prof. Yasuaki Nakano, Dept. Information Engineering, Shinshu University, 500 Wakasato, Nagano, 380 Japan [IAPR] (icdar93@wakasato.cs.shinshu-u.ac.jp)
8-10 Dec 1993	Second Conference on Digital Imaging Computing: Techniques and Applications (DICTA'93)	Sydney, Australia	DICTA'93, Tony Adriaansen, CSIRO — Division of Wool Technology, PO Box 7, Ryde NSW 2112, Australia (dicta93@ee.uts.edu.au) [APRS]
11-14 Jan 1994	9 th Conference on Pattern Recognition and Artificial Intelligence	Paris, France	AFCET-RFIA, 156 Boulevard Péreire, F-75017 Paris, France
16-20 May 1994	Vision Interface '94	Banff, Alberta, Canada	Colin Archibald, Autonomous Systems Laboratory, National Research Council, Ottawa, Ontario, Canada K1A 0R6 (archibald@iit.nrc.ca) or Paul Kwok, Dept. of Computer Science, The University of Calgary, Calgary, Alberta, Canada T2N 1N4 (kwok@cpsc.ucalgary.ca)
30 May-2 June 1994	Second International Workshop on Visual Form	Capri, Italy	IWVF2 Scientific Secretariat, Istituto di Cibernetica, CNR, Via Toiano 6, 80072 Arco Felice, Naples, Italy
1-3 June 1994	Pattern Recognition in Practice IV	Vlieland, The Netherlands	Prof. Edzard S. Gelsema, Erasmus University, Department of Medical Informatics, P.O. Box 1738, 3000 DR Rotterdam, The Netherlands (gelsema@mi.fgg.eur.nl)
9-13 Oct 1994	12 th ICPR International Conference on Pattern Recognition	Jerusalem, Israel	12 th ICPR, c/o International Ltd, 10 Rothschild blvd, 65121 Tel Aviv, Israel (icpr@math.tau.ac.il) [IAPR]