



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.rl.vj

Volume 10

Number 4

December 1987

Contents

From the Editors Desk	1
News in Brief	2
Conference Reports	2
New Journal	3
Reports from Japan	4
IAPR Directory Update	8
Bookshelf	9
Calls for Papers	11
Calendar of Events	12

News Copy Deadlines

Last date for editorial copy:

Volume 11 Number 1 20 February 1988
Volume 11 Number 2 20 May 1988

Circulation: 4600 copies

FROM THE EDITORS DESK

It is exactly one year since I produced my first issue of the IAPR Newsletter (9-2) and perhaps a good occasion for me to reflect on the first twelve months in office as Newsletter Editor. I am pleased to be able to report that some of the objectives stated in the editorial policy, which has been incrementally developed and announced in the past issues of the Newsletter, have already been achieved. Notably, this IAPR publication now appears with the regularity of reputable journals. Some new features of the Newsletter such as Bookshelf and Conference Reports have taken off successfully and hopefully contribute to making the Newsletter more interesting and worthwhile to read.

Despite some progress, I had been concerned about the persistently limited range of contributors and consequently a likely imbalance in coverage of pattern recognition activities in the different parts of the world. This problem clearly identified the need for some form of perestroika. Correspondingly I am glad to announce, in this first anniversary issue, important changes that should broaden the information gathering base of the Newsletter. The changes involve an expansion of the

membership of the editorial team by the appointment of two new *Corresponding Editors*, Prof N G Zagoruiko of the Institute of Mathematics, USSR Academy of Sciences, Novosibirsk, USSR and Prof T Henderson, University of Utah, USA. The benefit of these recent appointments is felt already in this issue which contains some news items collected by Tom Henderson and no doubt will continue for years to come.

With season greetings and very best wishes for 1988.

The Editor

NEWS IN BRIEF

NSF WORKSHOP on Multisensor Integration in Manufacturing Automation was held at Snowbird, Utah in February 1987. About thirty researchers in that domain tried to hammer out research issues and directions. A report is available from T Henderson, Dept. Computer Science, University of Utah, Salt Lake City, Utah 84112, USA (EM: tch@cs.utah.edu)

UTAH RANGE DATABASE is available from the University of Utah. It consists of a UNIX tar tape (or a VMS tape) with about 50 range images of various sorts. Data is from several sources: Utah, SRI, North Carolina State University and IMAG in France. Contact Tom Henderson at the above address.

RANGE DATA ANALYSIS A workshop on Range Data Analysis sponsored by NSF will be held in East Lansing, Michigan, USA in March 1988. The co-organizers are Prof Anil K Jain (Michigan State University) and Prof Ramesh Jain (University of Michigan).

CAD-BASED COMPUTER VISION A special session on this topic has been organized by Prof Linda Shapiro (University of Washington) for the SPIE Southeast Symposium on Optics, Electro-optics and Sensors to be held in Orlando, Florida in April 1988. It is part of the conference on Digital and Optical Shape Representation and Pattern Recognition.

9TH ICPR PAPER SUBMISSION The deadline for submitting papers to the 9th International Conference on Pattern Recognition has been extended to 2nd January 1988 (see Calls for Papers Section in this issue).

CONFERENCE REPORTS

5th Scandinavian Conference on Image Analysis

Saltsjobaden, Sweden - June, 3-5, 1987

The 5th SCIA organised by the Swedish branch of IAPR was held in beautiful surroundings outside Stockholm in June earlier this year. The conference which was chaired by Prof Torleiv Orhaug attracted around 220 attendees from 17 countries. 81 papers were presented on various topics in computer vision, image processing, pattern recognition and application of these techniques. Furthermore, 4 invited talks were given. An exhibition features a cross-section of today's technology in image processing, including LISP machines and other work stations. On the whole, this fifth in the series of biennial conferences whose venues alternate between the Scandinavian countries turned out to be a considerable success.

The program was mainly oriented towards basic methods in low and intermediate level computer vision. Hence there were sessions on edge and feature extraction, matching and segmentation and also on motion analysis, stereo vision and on the general recovery of 3-D structure. Applications mainly concerned problems in remote sensing, office automation and industrial machine vision. The proceedings, two volumes of some 730 pages are available from the address below. The price is £20 or US\$30.

The 6th SCIA will take place in Oulu, Finland, in June 1989. Notably, Oulu is located only about 100km south of the arctic circle, so the midnight sun will be an added attraction of the next conference.

Jan-Olof Eklundh

Address for ordering proceedings of 5th SCIA (all orders must be prepaid with cheques made payable to SSAB c/o Jonas Garding):

SSAB
c/o Jonas Garding
NADA
KTH
100 44 Stockholm
Sweden

NATO Advanced Research Workshop on Real Time Object and Environment Measurement and Classification

Maratea, Italy - August 30 - Sept 3, 1987

Nearly 30 delegates from 14 different countries met at the Hotel del Mare, Maratea, in southern Italy to consider the latest developments real time object and environment measurement and classification. The workshop comprised sessions on Real-time Requirements, Feature Measurement, Object Representation and Recognition, and Architectures for Measurement and Classification. Many individually interesting papers were presented but, since there is insufficient room here for even

the briefest summary of each, this report will concentrate on more general issues. A book containing the 25 collected papers from the meeting will be published in the NATO ARW series in due course.

During the sessions, and in both formal and informal discussion groups which also took place, a small number of general themes repeatedly appeared. The first of these concerned the meaning of *real time* when applied to the field of image processing. The consensus was that *real time* only had meaning in relation to some external constraint on the solution. This might range from the need to complete the processing of one TV frame before the next arrived, to a quasi-economic requirement that processing should give equivalent to that of a man for similar costs. In all cases *real time* processing meant keeping up with the input data flow, whatever its rate.

The second general theme concerned the dichotomy between the requirements of on-line installed systems and those of development facilities. It was generally agreed that in the first case these were for minimal complexity (leading to maximum cost-effectiveness), with attention focused on sensor and lighting optimisation as well as on processing, while in the second case maximum power and generality are required, together with a suitable programming environment. The combination of Sun workstation, UNIX & C as a user interface seemed to be a *de facto* standard, although by no means all of those present subscribe to it. However, the need for an integrated approach to systems design, encompassing algorithms, software and hardware was stressed by many speakers.

The question of the economic effectiveness of available systems was considered at various times. The alternative solutions of software on a general-purpose processor, plug-in accelerator cards with specific functions and programmable, special purpose, systems were advanced and discussed. Although the latter were generally regarded as offering the potential for more power in particular applications, their high cost and (often) outdated technology meant that one of the other two alternatives was usually preferred. As an example, approximately equal performance was claimed for an MC68030-based system as for a small CLIP array used in software-scanned mode. It was though unlikely, even by their protagonists, that large parallel systems would be widely applicable to industrial problems for some time to come, although the proponents of pipelined machines claimed with some evidence, a more immediate applicability.

Finally, it became apparent as the meeting progressed that, whilst the algorithmic requirements for

low level vision were well understood (two areas receiving particular attention being optic flow and the Hough transform), some way remained to go in successfully integrating this work with higher level model based approaches. A number of papers, however, reported promising results in this area. One point of particular interest to this delegate was an emerging desire amongst some speakers for an approach to the general problem of vision which would reconcile conventional programming techniques with those of the neural network approach, although no concrete suggestions were advanced as to how this might be brought about.

The workshop was extremely successful in promoting discussion of the ideas put forward, and the gratitude of the delegates is due to NATO and to the workshop organiser, Anil Jain from Michigan State University, for providing such a stimulating and enjoyable environment.

T J Fountain
University College London

NEW JOURNAL

MACHINE VISION AND APPLICATIONS

Machine Vision and Applications is an International Journal published by Springer-Verlag. It will include high quality technical contributions in machine vision research and development. Its editorial scope will encompass all applications and engineering aspects of image related computing in scientific, commercial, industrial, military and biomedical areas. Among the topics covered are:

- architectures
- VLSI implementations
- languages
- front-end sensing applied to image related problems
- AI techniques and expert systems for machine vision
- multidimensional and multisensor machine vision
- smart sensors
- optical computing

One of the main objectives of the new journal is to provide a truly comprehensive, international forum for practitioners in the image field. Applications span industrial systems for CAD/CAM, visual inspection, metrology, and vision based robotics; Commercial applications such as imaging in office automation; defense related applications such as autonomous vehicles, identification and tracking; and other important developing technologies, e.g. imaging for nondestructive testing.

Editors-in-Chief

Ramesh Jain, University of Michigan, USA
André Oosterlinck, University of Leuven, Belgium
Jorge Sanz, IMB Almaden Research Center, USA
Jack Sklansky, University of California Irvine, USA
Masahiko Yachida, Osaka University, Japan

Paper Submission

For author instructions contact:

Donna Moore
Editorial Coordinator
Springer-Verlag
815 De La Vina Street
Santa Barbara
CA 93101
USA

REPORTS FROM JAPAN

This section contains report titles which have been submitted by corresponding editor Prof M Nagao. Most of these reports are in Japanese. For further information regarding access to these reports please contact Prof Nagao directly. His mailing address is as follows:

Prof M Nagao
Faculty of Engineering, Kyoto University,
Sakyo-ku, Kyoto 606, Japan

- Architecture of a Multidimensional-memory Processor for High Speed Feature Extraction, (PRU 86-120), *Hikaru Morita and Michihiro Yamane*, NTT Electrical Communications Laboratories
- Feature Extraction and Selection for Simulated Signature Verification, (PRU 86-121), *Maan Ammar, Yuuji Yoshida and Teruo Fukumura*, Faculty of Engineering, Nagoya University
- Writer Identification based on the Frequency of Similar Patterns, (PRU 86-122), *Mitsu Yoshimura* and Isao Yoshimura***, *Shotoku Gakuen and **Nagoya University
- On High-Speed Algorithms for Calculative Convex Hull, (PRU 86-123), *Kazuhito Murakami*, Hiroyasu Koshimizu** and Kinji Hasegawa**, *Nagoya Municipal Industrial Research Institute and **Chukyo University
- Pattern Recognition of Industrial Parts using Fourier Descriptor, (PRU 86-124), *Hidetoshi Itoh, Tatsuya Hirata and Naohiro Ishii*, Nagoya Institute of Technology
- Model-Based Approximation of Profile Edge in Human Face Recognition, (PRU 86-125), *Yun-mo Yang*, Toshiaki Ejima** and Masayuki Kimura**, *Faculty of Engineering and **Nagaoka Institute of Technology and Science
- Semantics of Expansive Graph Languages and Their Problem Reduction Based Processing, (PRU 86-126), *Chunye Li, Toshio Kawashima, Tsuyoshi Yamamoto and Yoshinao Aoki*, Faculty of Engineering, Hokkaido University
- Considerations of the CT Image Reconstruction Method Using Direct 2D Fourier Transform Method, (PRU 86-127), *Noburu Niki and Yuuji Satou*, Faculty of Engineering, Tokushima University
- High-Precision Construction and the 3D Display of the Brain Shape from Brain Contours, (PRU 86-128), *Noboru Niki, Masaru Yosida, Hiroshi Fukuda and Hideto Hayasi*, Faculty of Engineering, Tokushima University
- Range Finding and Range Data Processing: A Survey, (PRU 86-129), *Hiroyuki Yamamoto, Michihiro Tamune and Hideyuki Tamura*, Canon Inc. Information Systems Lab.
- 3D Recovery Based on Plane Symmetry from Single View Image, (PRU 86-130), *Shinichi Tamura*, Hiroshi Mitsumoto**, Atsushi Iwamoto**, Naoki Kajimi**, Kozo Okazaki** and Yutaka Fukui***, *Faculty of Engineering Science, Osaka University, **Faculty of Engineering, Tottori University
- Photometric Stereo Method Considering the Effect of Interactive Reflections, (PRU 86-131), *Yuji Iwahori, Hiroyuki Kamei, Yosuke Okugawa and Shoichiro Yamaguchi*, Faculty of Engineering, Tokyo Institute of Technology
- Measurement of Snowflake Size and Falling Velocity by Image Processing, (PRU 86-132), *Ken-ichiro Muramoto*, Department of Electrical Engineering, Toyama National College of Technology
- Measurement of Diameters of Fibers using Image Processing Techniques, (PRU 86-133), *Naohisa Kawaguchi and Naohiro Ishii*, Nagoya Institute of Technology
- Automated Inspection of Pushphone Keyboards by Feature Extraction, (PRY 86-134), *Hiroaki Ikeda, Harushige Aono, Yasuhiko Higaki and Kiyoshi Shirako**, Faculty of Engineering, Chiba University and *Electric Division, Matsukyu Co. Ltd.
- Small Screen Video Communication Using Adaptive Block-Size Vector Quantization, (IE 86-98), *Takaaki Izuoka, Masahiko Hase and Gen Suzuki*, NTT Electrical Communications Laboratories
- The Variable Block Size Coding for Color Pictures, (IE 86-99), *Takaharu San-Oh, Tetsuji Komatsu, Osamu Nakamura and Toshi Minami*, Kogakuin University
- A Consideration on Filters in the Coding Loop of Hybrid MC/DCT Coding Scheme, (IE 86-100), *Yasuhiro Kosugi*, Ki-ichi Matsuda*, Kiyoshi Sakai*, Yuukou Horita* * and Toshitaka Tsuda**, *Fujitsu Laboratories Ltd and **Fujitsu Ltd
- Stereo Matching based on Relative Order Relations between Projected Points in Stereo Images, (IE 86-101), *Kouji Kobayashi, Tetsuya Sekiguchi, Hiroshi Nagata, Osamu Nakamura and Toshi Minami*, Kogakuin University
- The Recent Research Activities on the Data Structure for Image Processing, (IE 86-102), *Eiji Kawaguchi*, Interdisciplinary Graduate School of Engineering Sciences, Kyushu University
- A Detection Algorithm for Partial Ellipse and its Application to a Compound Figure Detection, (IE 86-103), *Kazunari Tominaga, Masatoshi Mori and Akira Nakamura*, Nagasaki University

- On the Coordinate Transformation of Digital Images, (IE 86-104), *Naoki Ono, Ryuzo Takiyama*, Kyushu Institute of Design
- Realization of a High Speed Image Processing Micro-Computer System Using Newly Distributed LSI's ImPP, (IE 86-105), *Tsukasa Aiura and Akira Nakamura*, Nagasaki University
- Encoding of Document Images by Word-Unit Processing in Mixed Mode Communication, (IE 86-106), *Toyoshi Tanaka, Osamu Nakamura and Toshi Minami*, Kogakuin University
- Editing Processing Method of Documents with Geometric Graphics for Facsimile, (IE 86-107), *Kenichi Hattori, Yoshitada Gobo, Yoshinobu Tonomura and Tomio Kishimoto*, NTT Electrical Communications Laboratories
- Computing the Optical Flow by Pixel-Based Temporal Mutual Correlation Analysis, (IE 86-108), *Kazutoshi Koga*, Hid. Miike** and Masahiro Momota****, * Technical College, Yamaguchi University, **Faculty of Engineering, Yamaguchi University, ***Technical College of Tokuyama
- Spectral Analysis of Dynamic Image by Maximum Entropy Method - Image Doppler Velocimetry, (IE 86-109), *Hidetoshi Miike*, Kazutoshi Koga**, Masahiro Momota* ** and Hajime Hashimoto**, *Faculty of Engineering, Yamaguchi University, ** Technical College, Yamaguchi University and ***Tokuyama Technical College
- A Mathematical Theory of Recognizing Patterns (Part VIII. Self-Organization of Rough Classifier), (PRU 87-1), *Shoichi Suzuki*, Department of Information System, School of Information, Bunkyo University.
- Hiragana letters recognition using Facsimile, (PRU 87-2), *Tetsuo Takeshita and Shigeyuki Nozawa*, Toyota College of Technology.
- A Method of Hair Representation using Anisotropic Reflection, (PRU 87-3), *Takashi Yamana and Yasuhiro Suenaga*, NTT Electrical Communications Laboratories.
- Development of a Craniofacial Surgical Planning System using CT Images, (PRU 87-4), *Yasuhiro Hashimoto, Takami Yasuda, Shigeki Yokoi and Jun-ichiro Toriwaki*, Nagoya University.
- An environmental improvement of the Image Processing System by using a network configuration with personal and general purpose computers, (PRU 87-5), *Kazuhiro Murakami*, Kinji Hasegawa* and Hiroyasu Koshimizu***, *Nagoya Municipal Industrial Research Institute and **Chukyo University.
- Extraction of Road Map from Street Map based on Sketch, (PRU 87-6), *Harutaka Goto, Yuuji Yoshida and Teruo Fukumura*, Nagoya University.
- Description of Weather Maps and Its Evaluation, (PRU 87-7), *Yuuji Yoshida, Itaru Kontani, Shinji Mizuno and Teruo Fukumura*, Nagoya University.
- Extraction of Objects on the Sea, (PRU 87-8), *M Yamaguchi, M Uchiyama and Y Masuda*, Yamaha Motor Co., Ltd.
- Quantitative Diagnosis of Pneumoconiosis based on Recognition of Small Rounded Opacities in Chest Radiographs, (PRU 87-9), *Xuan Chen*, Jun-ichi Hasegawa** and Jun-ichiro Toriwaki**, *Nagoya University and **Chukyo University.
- Automated Construction of Image Processing Procedures for Mass Pattern Extraction by Sample-Figure Presentation, (PRU 87-10), *Akihide Takasu*, Jun-ichi Hasegawa** and Jun-ichiro Toriwaki**, *Nagoya University and ** Chukyo University.
- A Method for Deducing Image Processing Procedures using a Production System, (PRU 87-11), *Miyahiko Orita*, Jun-ichi Hasegawa**, Jun-ichiro Toriwaki***, Morio Kanasaki* and Masao Takatoo**, *Hitachi Research Laboratory, **Chyukyo University, ***Nagoya University.
- A Method of Polyhedra Identification and Position Determination by Single View, (PRU 87-12), *Hong Hai, Toshio Kawashima, Tsuyoshi Yamamoto and Yoshinao Aoki*, Faculty of Engineering, Hokkaido University.
- 3D Recovery of a Plane Symmetry Object Using Partial Rotation Symmetry from a Single View Image, (PRU 87-13), *Hiroshi Mitsumoto*, Naoki Kajimi*, Kozo Okazaki*, Yutaka Fukui*, Shinichi Tamura***, *Tottori University and **Osaka University.
- Cooperative Stereo Algorithm Based on Edge Segments, (PRU 87-14), *Yoshinobu Sato, Hideshi Awaya and Shinichi Tamura* Osaka University.
- Recognition of Continuous Quadratic Curved Surface, (PRU 87-15), *Hisao Shirasawa, Kosuke Sato and Seiji Inokuchi*, Osaka University.
- Modeling of a Smooth-Shaped Object by B-Spline, (PRU 87-16), *Toru Abe and Masayuki Kimura*, Tohoku University.
- Isolated-word Recognition Using Partial Information, (PRU 87-17), *Cuiling Huang, Hiroshi Shimodaira and Masayuki Kimura*, Tohoku University.
- The Distribution of Similarity Values in the Multiple Similarity Method, (PRU 87-18), *Hideo Segawa*, Toshiba Research and Development Center.
- Local Affine Transformation and its Application to On-line Handwritten Character Recognition, (PRU 87-19), *Toru Wakahara*, NTT Electrical Communications Laboratories.
- Character Recognition by Hierarchical Discriminant Analysis - Feature Extraction Process, (PRU 87-20), *Seiichiro Kamata, Hiroyuki Kami and Ko Asai*, C&C Information Technology Research Laboratories, NEC Corporation.
- Segment-Based Stereo Matching, (PRU 87-21), *Donguk Shin*, Sadamu Ohteru* and Shuji Hashimoto***, *Waseda University and **Toho University.
- Current Research on Pattern Information Processing and Multimedia Database System, (PRU 87-22), *Toshikazu Kato and Koreaki Fujimura*, Electrotechnical Laboratory.
- Development of an Automatic Input System for Mechanical Part Drawings - Segmentation and Recognition of Figure Elements, (PRU 87-23), *Wichiko Iwasaki, Masanari Yamamoto, Yoshikazu Ito and Kiyoshi Iwata*, Fujitsu Laboratories Ltd.
- Development of an Automatic Input System for Mechanical Part Drawings - Drawing Understanding, (PRU 87-24), *Masanari Yamamoto, Michiko Iwasaki, Yoshikazu Ito and Kiyoshi Iwata*, Fujitsu Laboratories Ltd.
- On The Relationship between Block Length and Estimation Error in a Non-Stationary Analysis, (PRU 87-25), *Tohru Kiryu*, Taizo Iijima** and Yoshiaki Saitoh**, *Niigata University and **Tokyo Engineering University.
- Classification of Digital Images using Multi-Level Heuristic Pattern Matching Model, (PRU 87-26), *Kambiz Badie*, Iran Telecommunication Research Center.

- Cognitive Aspect of Topological Feature Extraction in Shape Analysis, (PRU 87-27), *Kambiz Badie*, Iran Telecommunication Research Center.
- A mathematical theory of recognizing patterns (Part IX Membership Equivocation and Amount of Recognitive Information), (PRU 87-28), *Shoichi Suzuki*, Bunkyo University.
- On an Evaluation of Variations in Handprinted Characters, (PRU 87-29), *H Hase**, *M Yoneda**, *M Sakai**, *J Yoshida** and *M Matsuhira***, *Toyama University and **Seiko.Epson Co., Inc.
- The Properties of Characters on Different Writing Restrictions, (PRU 87-30), *Yoshimasa Kimura and Sueharu Miyahara*, NTT Electrical Communications Laboratories.
- Personal Identification Terminal using Holographic Fingerprint Sensor, (PRU 87-31), *Seigo Igaki*, *Hironori Yahagi*, *Shin Eguchi*, *Hiroyuki Ikeda* and *Takefumi Inagaki*, Fujitsu Laboratories Ltd, Atsugi.
- Study of Improving Performance for Raster Scan-Type Connected Component Labeling, (PRU 87-32), *Yoshiyuki Okuyama**, *Yoshiki Kobayashi**, *Hiroshi Takenaga**, *Morio Kanasaki**, *Kazuyoshi Asada*** and *Kazunori Fujiwara***, *Hitachi Research Lab., Hitachi Ltd. and **Omika Works, Hitachi Ltd.
- Point Source Illumination Stereo (General Solution for Each Surface Element), (PRU 87-33), *Yuji Iwahori*, *Hiroyuki Kamei* and *Shoichiro Yamaguchi*, Faculty of Engineering, Tokyo Institute of Technology.
- Recognition of Echocardiogram by Dynamic Programming Matching Method, (PRU 87-34), *Hiromitsu Yamada* and *Kazuhiko Yamamoto*, Electrotechnical Laboratory.
- A Vector Extraction Method of Road Networks from Maps, (PRU 87-35), *Tomoharu Nagao*, *Takeshi Agui* and *Masayuki Nakajima*, Tokyo Institute of Technology.
- A Data Management Method for Maps using a Plane Zonal Division, (PRU 87-36), *Takeshi Agui*, *Tomoharu Nagao*, *Hitoshi Misawa* and *Masayuki Nakajima*, Tokyo Institute of Technology.
- MD-tree: A Balanced Hierarchical Structure for Multidimensional Data, (PRU 87-37), *Yasuaki Nakamura* and *Shigeru ABE*, Mitsubishi Electric Corporation, Central Research Laboratory.
- A Study on Head Motion Detection by Facial Image Processing, (CV 47-1), *Kenji Mase*, *Yasuhiro Suenaga*, NTT Electrical Communications Laboratories.
- A Multiple-Feature Extraction Approach to Gray-Level Machine Vision Systems, (CV 47-2), *Shin-ichi Meguro*, *Mutsuo Sano* and *Akira Ishii*, NTT Electrical Communications Laboratories.
- Interactive Image Processing Handler, (CV 47-3), *Mikio Takagi* and *Masakazu Suzuoki*, University of Tokyo.
- The relation between variable slit method and Hough transformation, (CV 47-4), *Shigeyoshi Nakajima* and *Makoto Nagao*, Kyoto University.
- Extraction and Recognition of 3-dimensional Information by Projecting a pair of Slit-Rays, (CV 47-5), *Yasuo Watanabe**, *Kousichi Nakano***, *Sukeyasu Kanno*** and *Takashi Okuno***, *Kanazawa Institute of Technology and **Industrial Research Institute of Ishikawa.
- Inferring Surfaces from Boundaries, (CV 47-6), *Gang Xu* and *Saburo Tsuji*, Osaka University.
- Constraints on Length and Angle, (CV 47-7), *Ken-ichi Kanatani*, Gunam University.
- Environment Perception in Navigation of an Indoor Mobile Robot, (CV 47-8), *Jiang Yu Zheng* and *Saburo Tsuji*, Osaka University.
- Information Processing on Roads and Computer Vision, (CV 47-9), *Takeshi Agui* and *Masayuki Nakajima*, Tokyo Institute of Technology.
- Present Aspects and Future Directions of Computer Application in Medical Imaging, (CV 48-1), *Isao Horiba*, Meijo University.
- Detection of Small Local Abnormality Candidates from X-ray Images of Barium Filled Stomachs, (CV 48-2), *Yasuyo Kita* and *Yoshiaki Shirai*, Electrotechnical Laboratory, 305 Japan.
- Reconstruction of Polyhedral Object by Stereo Method, (CV 48-3), *Toshiyuki Niwa* and *Tsuneko Watanabe*, Nagoya Institute of Technology.
- Noise Robust 3D Recovery from Optical Flow, (CV 48-4), *Ken-ichi Kanatani** and *Jun-ichiro Yoshida***, *Gunma University and **Oki Firmware System, Japan.
- Hierarchical Model of Freehand Drawing Process, (CV 48-5), *Nobuyuki Kita* and *Masahiro Kawagoe*, Electrotechnical Laboratory, Ibaraki, Japan.
- A Control Method of Recognition of Diagrams with Multiple Interpreted Images, (CV 48-6), *Hidetaka Ikai* and *Keiichi Abe*, Shizuoka University.
- Performance Evaluation of the T2D2 Decomposition Method: a Fast Image-Rotation Algorithm, (CV 49-1), *Atsushi Miyazawa* Tokyo Research Laboratory, IBM Japan Ltd.
- A Color Time-Varying Image Processing System: "Color-IDATEN", (CV 49-2), *Masatoshi Komeichi*, *Shigeru Sasaki*, *Tohru Ozaki*, *Tatsuya Satoh*, *Yoshiyuki Ohta*, Fujitsu Laboratories Ltd., Japan.
- Three-Dimensional Structure Recognition for Assembled Bloc (CV 49-3), *Hiroshi Mizoguchi*, Toshiba Research and Development Center.
- Recognition of Partially Occluded 2-D Objects, (CV 49-4), *Yuichi Nakamura*, *Makoto Nagao*, Kyoto University.
- 3D Recovery of Surface Shape from Texture, (CV 49-5), *Kazuyuki Yamada* and *Ken-ichi Kanatani*, Gunma University.
- Concepts of Next Generation Image Coding Towards Analytic and Intelligent Image Coding Systems, (IE 87-1), *Hiroshi Harashima**, *Kiyoharu Aizawa** and *Takahiro Saito***, *The University of Tokyo and **Kanagawa University.
- Modeling A Person's Face and Synthesis of Facial Expressions for use in a Model-Based Synthesis Image Coding System, (IE 87-2), *K Aizawa**, *Y Yamada**, *H Harashima** and *T Saito***, *Faculty of Engineering, The University of Tokyo and **Faculty of Engineering, Kanagawa University.
- Permutation Codes and Their Application to Image Coding, (IE 87-3), *Y Kishimoto**, *H Eguchi**, *T Saito** and *H Harashima***, *Kanagawa University and **The University of Tokyo.

- An Objective Evaluation Method of Picture Quality Based on Visual Responses of Luminance and Spatial Frequency, (IE 87-4), *Sakuichi Ohtsuka, Masayuki Inoue and Kazuhisa Watanabe*, NTT Electrical Communications Laboratories.
- 3-dimensional Measurement by Use of Adaptive Pattern Matching Technique, (IE 87-5), *Shin-ichi Murakami and Hideyari Ichihara*, NTT Electrical Communications Laboratories.
- Modeling of Corrosion Pattern of an Amorphous Compound Metal Thin Film and its Pattern Generation, (IE 87-6), *Akio Yamamoto and Mikio Takagi*, Institute of Industrial Science, University of Tokyo.
- Measurement of Three Dimensional Shapes in Medicine, (IE 87-7), *Shigeru Eiho*, Kyoto University.
- Fundamental Consideration of CT Image Reconstruction - I - Reconstruction from Continuously Viewed Projection Data, (IE 87-8), *Hiroyuki Kudo and Tsuneo Saito*, Tohoku University.
- Fundamental Consideration of CT Image Reconstruction - II - Reconstruction from Discretely Viewed Projection Data, (IE 87-9), *Hiroyuki Kudo and Tsuneo Saito*, Tohoku University.
- Computer-Assisted Quantification of Coronary Cineangiograms - Effects of Drugs on the Coronary Artery, (IE 87-10), *Keisuki Mori*, Yorinobu Sonoda*, Hirofumi Yasue** and Yutaka Horio***, *Faculty of Engineering, Kumamoto University and **School of Medicine, Kumamoto University.
- Researches on image and signal processors at some universities in the United States and the United Kingdom, (IE 87-11), *Kazumasa Enami*, NHK Science & Technical Research Laboratories.
- A Note on the Application of Data Flow Processors to the Image Processing, (IE 87-12), *Yasushi Ozaki*, Kiyotsugu Satoh** and Kazumi Yamashita**, * Faculty of Engineering, Osaka City University and **Steel and Iron Technical College.
- A Study on G4 Facsimile Over Public Switched Telephone Network (PSTN), (IE 87-13), *Noboru Sonehara, Makoto Kobayashi, Ryota Suzuki and Takayuki Arimura*, NTT Communication Laboratories.
- A Study on an Intelligent Video Communication System, (IE 87-14), *Shin-ichi Murakami and Hideyari Ichihara*, NTT Electrical Communications Laboratories.
- Edge Preserved Adaptive DPCM Image Coding, (IE 87-15), *Tetsuo Shimono, Tomoaki Shirakawa, Hideo Kitajima and Yoshihiko Ogawa*, Hokkaido University.
- Development of Coded Aperture Imaging for Laser-Produced Plasma Diagnostics, (IE 87-16), *Yen-Wei Chen*, Noriaki Miyana-ga*, Masanobu Yamanaka*, Tatsuhiko Yamanaka* and Shinichi Tamura***, *Institute of Laser Engineering, Osaka University and ** Faculty of Engineering Science, Osaka University.
- Resolution of Digital-Processed SAR Images, (IE 87-17), *Tomoaki Shirakawa, Tetsuo Shimono, Hideo Kitajima, Yoshihiko Ogawa, Atsushi Itoh and Satoru Okamoto*, Hokkaido University.
- Image Processing at High Power Glass Laser System, (IE 87-18), *Hisao Kitamura, Noboru Morio, Tadashi Kanabe, Takahisa Jitsuno, Masahiro Nakatsuka, Sadao Nakai and Chiyoie Yamanaka*, Institute of Laser Engineering, Osaka University.
- 1/2-Inch 670H Quasi-FIT-CCD Image Sensor, (IE 87-19), *T Yamaguchi, T Kuriyama, S Matsumoto, Y Hiroshima, T Takamura, T Kuroda and K Horii*, Matsushita Electronics Corp.
- Analysis of Noise Generated in Hybrid IRCCD Charge Injection Circuit, (IE 87-20), *Takafumi Tsuji*, Toshiba R&D Center.
- Consideration on Predominant Factors for the Resolution of Hi-Vision Camera Tubes, (IE 87-21), *Norifumi Egami, Mitsuhiro Kurashige*, NHK Science Technical Research Laboratories.
- Numerical and Experimental Results for High Speed Shuttering of Proximity Focused Image Intensifier, (IE 87-22), *Takeaki Enoto*, Masanori Kimura* and Kazuo Haruyama***, *Faculty of Engineering, Hokkaido University and **Nihonn Gakki Company Ltd.
- 2-dimensional detection method of ultra weak light and its applications, (IE 87-23), *Tsuyoshi Hayakawa and Shinji Ohsuka*, Hamamatsu Photonics K.K.
- Contact Type Image Sensor Using a New Scanning Circuit, (IE 87-24), *K Moritoki*, T Murata*, Y Yamamoto**, K Yamaguchi**, S Fujiwara**, *Matsushita Electric Components Co Ltd, and **Matsushita Electric Industrial Co Ltd.
- High-speed contact type color image sensor using switched light sources, (IE 87-25), *Hisao Ohta* and Hiroo Wakabayashi***, *NTT Video and Record Communications Divisions, and **NTT Electrical Communications Laboratories.
- Linear Optical-Shutter Array Using Ferroelectric Liquid Crystal, (IE 87-26), *Shohei Naemura, Hideo Ichinose, Toyokazu Nakamura and Yuji Kato*, Opto- Electronics Res. Labs., NEC Corporation.
- Image Processing Technology of Color Laser Copier 1, (IE 87-27), *Shizuo Hasegawa and Toshio Honma*, Copier Development Center, CANON Inc.
- Fourier Optical Analysis of Image Upconverter - In the Case of Plane Wave Pumping, (IE 87-28), *Atsushi Okamoto*, Kunihiko Sato**, Teruhito Mishima* and Ichiro Sakuraba**, *Hokkaido University and **Presently, Sony Corporation.
- Study of Pseudo Color CRT Display, (IE 87-29), *Yukihiro Asari*, Heiji Okada* and Mitunobu Sato***, *Shibaura Institute of Technology, **Aroka Co. Ltd.
- Relay Lens Plate for Displacement of Real Image Plane in the Depth Direction - Experiments and Barrier Positions, (IE 87-30), *Shohei Utsunomiya, Joji Hamasaki and Mitsuo Okada*, University of Tokyo.
- Basic Study on the Possibility of CAD in a Gas-Discharge Panel for Color TV Display, (IE 87-31), *Hideomi Matsuzaki, Tetsuo Sakai, Hiroshi Murakami, Hiroyasu Kitada and Yoshimichi Takano*, NHK Science and Technical Research Laboratories.
- Writing Characteristics of SD-PDP by Using 3-Phase Driving Method, (IE 87-32), *Akio Niwa, Hideki Ohashi, Heiju Uchiike and Yoshifumi Fukushima*, Faculty of Engineering, Hiroshima University.
- Study of Measurement on Dynamic Characteristics in AC-PDP, (IE 87-33), *Minoru Yokozawa, Tatsumi Hamafuji, Yoshihiro Uchida and Toshihiko Matsumura*, Japan Broadcasting Corporation.
- High Resolution Large Area 1000 x 700 dots Thin-Film Electroluminescent Display Panels, (IE 87-34), *Junichi Ohwaki, Noriyoshi Yamauchi, Haruki Kozawaguchi and Bunjiro Tsuyiyama*, NTT Electrical Communications Laboratories.

- An Optimum Aging Sequence of Thin Film El Panel, (IE 87-35), *H Kanno, M Koizumi, J Mita, T Hayashi, Y Sekido and I Abiko*, OKI Electric Ind. Co. Ltd. Research Lab.
- Electrical and Optical Characteristics in AC Thin-Film Electroluminescent Devices, (IE 87-36), *Takashi Tasumi, Shuuji Hirao, Heiju Uchiike and Yoshifumi Fukushima*, Hiroshima University.
- Properties of Flat Light Panel, (IE 87-37), *Tetsuya Sawano and Tokihiko Masuzawa*, Mitsubishi Rayon Co. Ltd. Prodnet Development Center.
- The Legibility of Reflective LCD: The Effect of Surface Reflection, (IE 87-38), *H Kubota, C M Gomes and S Kobayashi*, Tokyo University of Agriculture and Technology.
- Matrix Driving Method for Ferroelectric LCD, (IE 87-39), *Takao Minato and Akira Ogawa*, Electronic Precision Components Research Lab. Technical Research Institute, Toppan Printing Co. Ltd.
- Matrix LC Video Display Controlled by Nonlinear Device Consisted of As₂Se₃, (IE 87-40), *S Fujita, S Yoshida, H Yamazoe, Y Kobayashi and I Ota*, Matsushita Electric Industrial Co Ltd.
- A new overhead projection system using a 640 x 400 pixel active matrix LCD together with an input pad, (IE 87-41), *Yukio Takahashi, Tomoyoshi Nomura, Shigeto Kohda, Tadamichi Kawada, Tomohiko Arikawa*, NTT Electrical Communications Laboratories.
- A restoration of pulse density modulation wave by a visual model, an analytical method by one dimensional model, (IE 87-42), *Junji Kawasaki* and Taizo Lijima***, *Kanazawa Technical College and **Tokyo Engineering University.
- Multi Processing System for Fast Image Processing, (IE 87-43), *Hiroimitsu Hamada and Kazumi Yamashita*, Faculty of Engineering, Osaka City University.
- Reconstruction of Processing for Thermal Video Pictures, (IE 87-44), *Hidemitsu Kobayashi, Takuji Watanabe*, Nihon University.
- CT-Image Reconstruction of Objects Including a Beam Opaque Obstruction, (IE 87-45), *Hiroyuki Kudo and Tsuneo Saito*, Tohoku University.
- Automated Visual Inspection for LSI Wafer Multilayer Patterns by Cascade Pattern Matching Algorithm, (IE 87-46), *Shunji Maeda, Hitoshi Kubota, Hiroshi Makihira, Takanori Ninomiya and Yasuo Nakagawa*, Production Engineering Research Laboratory, Hitachi Ltd.
- Input Position Detection System for a Transparent Tablet, (IE 87-47), *Tetsuo Tajiri and Yuichi Sato*, NTT Electrical Communications Laboratories.
- Vector Quantization and Its Application to Image Coding, (IE 87-48), *Takahiro Saito* and Hiroshi Harashima***, *Kanagawa University and **The University of Tokyo.
- A Note on Learning Vector Quantization for Picture Signals, (IE 87-49), *Hideaki Eguchi*, Takahiro Saito* and Hiroshi Harashima***, *Kanagawa University and ** University of Tokyo.
- Image Coding Using Weaved Vector Quantization, (IE 87-50), *Takashi Komatsu*, Takahiro Saito* and Hiroshi Harashima***, *Kanagawa University, ** The University of Tokyo.
- Adaptive BTC of HVC Color Image, (IE 87-51), *Makoto Miyahara, Toshiro Yasima and Noboru Aono*, The Technological University of Nagaoka.
- Characteristics of prediction error signals for hybrid coding method using motion-compensated prediction and discrete cosine transform, (IE 87-52), *Atsushi Koike, Masahide Kanenko and Yoshinori Hatori*, KDD Research and Development Laboratories.
- Study on Coding Error due to Carry-Over in Arithmetic Coding - for the application of the DPCM coding, (IE 87-53), *Masahiro Saito and Shuichi Matsumoto*, KDD Research & Development Laboratories.
- Considerations on the Baseband Transmission Characteristics of Compressed Picture Signals, (IE 87-54), *Fukusei Ryu and Masayuki Tanimoto*, Faculty of Engineering, Nagoya University.
- Still Picture File for Video Response System, (IE 87-55), *Syogo Yokoi*, Manabu Kondou*, Masahiko Achiha**, Yoji Sibata* Nobumichi Yukawa***, Kazuhito Hirose****, *NTT, Video & Records Communications Division, ** Central Research Laboratory, Hitachi Limited and ***Totsuka Works, Hitachi Ltd.
- A study on the configuration of the multipoint video control unit, (IE 87-56), *Toshihiko Wakahara, Michiaki Matsuura and Takeshi Fujii*, *NTT Electrical Communications Laboratories.

IAPR DIRECTORY UPDATE

Please send any corrections or changes to the IAPR Directory published in the IAPR Newsletter 10-1 to the IAPR Secretary Prof M J B Duff. His full address is listed in the directory.

Members of the Governing Board

Norway	Mr S Grinaker
Portugal	Prof J P Marques de Sá
Spain	Prof A Sanfeliu
United Kingdom	Prof M J B Duff Dr J Kittler

National Member Organizations

Austria	Oesterreichische Arbeitsgemeinschaft Für Mustererkennung
Cat A1 Rep	About 40 members Dr W Kropatsch
Portugal	The Portugese Group for Pattern Recognition
Cat A1 Rep	Prof J P Marques de Sá

Spain	The Spanish Working Group for Pattern Recognition of the CEA-IFAC 36 members Prof A Sanfeliu
Cat A1 Rep	
United Kingdom	British Pattern Recognition Association About 300 members Prof M J B Duff Dr J Kittler
Cat B Reps	

Directory of Addresses

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

Mr S Grinaker

Norwegian Defense Research Establishment
P O Box 25
N-2007 Kjeller
Norway
OF: +47 6 807521 TE: 21682 elect n
HF: +47 6 839397

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

Prof A Sanfeliu

Instituto de Cibernética
Diagonal 647
08028 Barcelona
Spain
OF: +34 3 3347704

Prof J Sklansky

Dept of Electrical Engineering
University of California
Irvine
CA 92717
USA
OF: +1 714 8566726 EM: sklansky@uci.edu

BOOKSHELF

Knowledge-Based Speech Pattern Recognition

M. Allerhand, Kogan Page, London, 1987

Michael Allerhand's monograph published in the Fifth Generation Computing Series of Kogan Page proposes an integration of parametric and structural approaches to Automatic Speech Recognition (ASR) using the formalism of attributed grammars.

The first chapter introduces the problem and its difficulties and discusses possible approaches to ASR. The Author supports the use of Knowledge Based (KB)

approach when **unrestricted** speech recognition is the goal. According to the Author other approaches merely based on statistical methods have the advantage of using learning algorithms with acceptable complexity but have a relatively restricted performance.

Chapter 2 contains a review of syntactic pattern recognition and fuzzy set theory and introduces an isolated word recognizer in which lexical access is based on the order and duration of only voiced, voiceless and silence features.

Word patterns are described using structural information (segment order) and quantitative information (duration distributions).

A context free description of syllable structure in terms of features is used. Phonotactic constraints upon sequences of intermediate manner of articulation categories are expressed. The syllabic grammar is used to parse strings of features into manner of articulation classes. Strings of these classes are matched with strings in the lexicon to access particular words.

Chapter 3 starts with an important statement that seems to be confirmed by recent results in ASR. The Author says that the use of simple models creates an inherent performance limitation; a plateau is reached and further improvement cannot be made. Models of sufficient detail cannot be inferred from observations of speech data alone. A context-free grammar is then proposed based on linguistic knowledge obtained by expert linguistics.

Methods based on dynamic time warping and Hidden Markov Models (HMM) are also reviewed and their limitations are discussed.

Chapter four discusses feature extraction through property detectors. Mathematical techniques for feature selection are reviewed. Methods based on hierarchical linear regression are discussed in detail and applied to waveform segmentation.

Chapter 5 contains a useful review of decision algorithms and introduces a composite pattern recognition model for ASR. This model is based on rewriting rules of the form:

$$q_i \rightarrow P_{ij} \{ \delta_{ij} \} q_j$$

where P_{ij} is the probability of the rule and δ_{ij} is a collection of a priori probability distributions relating extracted features to class hypotheses. It can be shown that HMM can be represented by rules of this type. The relevant parameter distributions can be estimated using known methods.

If decisions are based on mini-max rules rather than probability products, an admissible strategy leading to optimal sequential decision can be used.

The role of the knowledge captured by rewriting rules is that of guiding search by eliminating sequences in conflict with phonotactics. This facilitates a reduction in the problem complexity that otherwise would be exponential.

Chapter 6 is dedicated to modelling allophonic and phonotactic constraints. The pattern constraints contained in the hybrid model introduced in Chapter 5 take the form of structural constraints in the domain of phonotactics and quantitative constraints in the domain of allophonic variants.

Allophonic variants are represented by symbolic qualifiers (for example high, low). These qualifiers reference probabilistic likelihood functions which describe the quantitative characteristics of each allophonic variant. Various examples of probability distributions are reported.

Chapter 7 contains conclusions with a perspective on the possibility of using the proposed methods with parallel computers.

The book is well written, well structured, rich in interesting considerations and ideas for future development. It contains some provocative statements which, rather than disappointing the reader, should stimulate further thinking.

Renato de Mori

The Elements of Artificial Intelligence : An introduction using LISP

*Steven L. Tanimoto, Computer Science Press,
Rockville, MA, 1987, ISBN-881175-113-8*

This book by Steven Tanimoto is a welcome addition to the relatively small field of serious introductory texts in Artificial Intelligence, AI. The coverage of the book is wide. As one would expect there are comprehensive chapters dealing with the key subject areas of AI methodology, knowledge representation, heuristic search and logical reasoning as well as chapters on the principal application domains of expert systems, vision and natural language understanding. In addition, there are two good chapters on the more advanced topics of learning and reasoning with uncertainty. All chapters are rounded off by useful bibliography and reference sections as well as some exercise problems. The basics of LISP are introduced early in the book and this language is used throughout to support the development

of some imaginative programs which illustrate, in a fun way, the ideas of the text. Philosophical and social aspects of AI are discussed only briefly in the introductory and concluding chapters. The authors affiliation is with computer science and engineering departments and students from these areas form an obvious target for the book. The book price of \$40 is very reasonable for a 500 page hardback edition and I would expect it to capture a large share of the market if issued in a student or softback edition.

John Illingworth

Uncertainty in Artificial Intelligence

*L N Kanal and J F Lemmer, eds., North
Holland, Amsterdam, 1986, ISBN-0444700587*

This edited volume, fourth in the Machine Intelligence and Pattern Recognition Series of North Holland, is the outcome of the workshop on Probability and Uncertainty in AI held in Los Angeles in 1985. It contains papers covering a wide range of perspectives and diverse opinions on combining evidence in AI systems which may be incomplete, uncertain, ambiguous or even erroneous.

The contributions are organised into seven sections. The first section sets the scene by reviewing the main theories for handling uncertainty of information including probability theory, Shafer's evidence theory, Zadeh's possibility theory, Cohen's theory of endorsements and the non-monotonic logics. The papers in the second section provide more detailed explication and critique of current approaches to uncertainty. The next set of papers presents a synthesis of current methods. Section 4 describes specific examples of decision making systems designed to cope with uncertain evidence. The problem of representation of uncertainty is addressed in Section 5. The remaining contributions to the volume are concerned with alternative perspectives on uncertainty in AI.

The volume is very useful as it compiles all the most important theories for handling uncertain information put forth to date (in many cases presented by their main proponents). But the book is not only a unique and excellent source of reference material. The inclusion of a critique of these theories helps the reader to obtain a balanced view of the state of the art. The collection is fascinating to read and is bound to stimulate more interest in this important topic from which the AI field can only benefit.

Josef Kittler

CALLS FOR PAPERS

9th INTERNATIONAL CONFERENCE ON PATTERN RECOGNITION

Beijing, China- October 17-20, 1988

Program

The conference is sponsored by the International Association for Pattern Recognition and organized by the Chinese Association for Automation. The meeting is the major international event in the fields of pattern recognition, computer vision and image processing. The conference program will be organized into four major tracks as follows:

1. Computer vision
2. Pattern recognition systems and applications
3. Image, speech and signal processing
4. Algorithms and architectures for pattern recognition

Papers related to any of the following topics and describing work not previously published are invited for submission:

- Computer vision and image understanding
- Robot and machine vision
- Image segmentation and edge detection
- Shape and texture analysis
- Optic flow and stereo vision
- Knowledge based pattern recognition systems
- Feature selection and pattern classification
- Motion representation and analysis
- Modelling of human perception
- Image data structures and image coding
- Speech and signal processing
- Character recognition and text processing
- Parallel algorithms and architectures
- Biomedical applications
- Industrial applications
- Remote sensing and other applications

Deadlines

Jan 2, 1988	Full papers (4 copies)
April 5, 1988	Authors notified
May 31, 1988	Camera-ready manuscripts

Paper Submission

Submitted papers must be typewritten in English and double spaced. The first page should contain the

paper title, the names and addresses of the authors and an abstract of from 70 to 100 words. Four copies of complete drafts of submitted papers should be sent to Program Chairman at the following address:

Prof Herbert Freeman
9ICPR Program Chairman
CAIP Center, Bush Campus
Rutgers University
New Brunswick
NJ 08903
USA

Further Information

For further information about any aspect of the conference including post-conference tours please contact

9ICPR Secretariat
Chinese Association for Automation
P.O.Box 2728
Beijing
China

Tel.: Beijing 284294
Telex.: 20035 CAST CN ATTN

IAPR WORKSHOP ON COMPUTER VISION

Tokyo, Japan - October 12-14, 1988

Program

This international workshop on Computer Vision is sponsored by IAPR Technical Committees TC6 and TC8. The workshop will be held at Nihon Daigaku Kaikan, Tokyo just before the 9th ICPR. The discussion at the workshop will concentrate on two themes: *Special Hardware and Industrial Applications*. In particular it will include the following topics:

- High speed image processors
- VLSI for image processing
- Image understanding workstations
- PC-based low cost image analysis systems
- Special purpose pattern recognition machines
- Intelligent sensor
- Software environments for special hardware
- Visual inspection
- Robot vision
- Engineering automation for documents and line drawings
- New imaging techniques
- 3-D information usage
- AI vision techniques in practical applications

Deadlines

May 15, 1988 Abstract (400 words, 4 copies)
 July 1, 1988 Authors notified
 August 31, 1988 Camera-ready manuscripts

Paper Submission and Further Information

Mikio Takagi
 Institute of Industrial Science
 University of Tokyo
 7-22-1, Roppongi Minato-ku
 Tokyo 106
 Japan

CALENDAR OF EVENTS

<i>Date</i>	<i>Event</i>	<i>Location</i>	<i>Sponsor/Information</i>
Jan 12-15, 1988	Parallel Processing for Computer Vision and Display	Leeds, United Kingdom	Dr P M Dew, Dept Computer Studies, University of Leeds, Leeds LS2 9JT, UK
Jan 31 - Feb 5, 1988	SPIE Conference on Medical Imaging	Newport Beach, California, USA	SPIE, P.O.Box 10, Bellingham, WA 98227-0010, USA
Feb 2-4, 1988	7th International Conference on Robot Vision and Sensory Controls	Zurich, Switzerland	IFS (Conferences) Ltd., 35-39 High Street, Kempston, Bedford MK42 7BT, England
March 28-30, 1988	BPRA 4th International Conference on Pattern Recognition	Queens College, Cambridge, England	Dr J Kittler, Dept Electronic and Electrical Engineering, University of Surrey, Guildford GU2 5XH, England
April 24-29, 1988	IEEE International Conference on Robotics and Automation	Franklin Plaza Hotel, Philadelphia, PA, USA	The Computer Society of the IEEE, 1730 Massachusetts Avenue, N.W., Washington, DC 20036-1903, USA
May 18-20, 1988	Pattern Recognition in Practice III	Amsterdam, The Netherlands	Prof E S Gelsema, Dept Medical Informatics, Erasmus University, P.O. Box 1738, 3000 DR Rotterdam, The Netherlands
June 5-9, 1988	IEEE Computer Society Conference on Computer Vision and Pattern Recognition	University of Michigan, Ann Arbor, Michigan, USA	CVPR88, c/o The Computer Society, 1730 Massachusetts Ave., N.W., Washington, DC 20036-1903, USA
June 6-10, 1988	Vision Interface 88	Edmonton Convention Centre, Edmonton, Alberta, Canada	Wayne A Davis, General Chairman Conference 88, Department of Computing Science, 615 General Services Building, University of Alberta, Edmonton, Alberta, Canada T6G 2H1
June 6-10, 1988	2nd International Conference on Vector and Parallel Computing Issues in Applied Research and Development	Tromso, Norway	Berit Hilt, Bergen Scientific Centre, IBM, Allegaten 36, 5007 Bergen, Norway
June 20-27, 1988	3rd International Workshop on Data Analysis in Astronomy	Erice, Italy	M C Maccarone, IFCAI/CNR, Via Mariano Stabile 172, 90139 Palermo, Italy
Sept 5-8, 1988	4th European Signal Processing Conference	Grenoble, France	Eusipco-88 Conference Secretariat, Cephag-ENSIEG, BP46, 38402 St Martin d'Heres cedex, France
Sept 5-8, 1988	1st International Conference on Visual Search	University of Durham, UK	David Brogan, FIC VS, Department of Psychology, University of Durham, Science Laboratories, South Road, Durham DH1 3LE, UK
October 17-20, 1988	IAPR 9th International Conference on Pattern Recognition	Beijing, China	9ICPR Secretariat, Chinese Association of Automation, P.O.Box 2728, Beijing, China