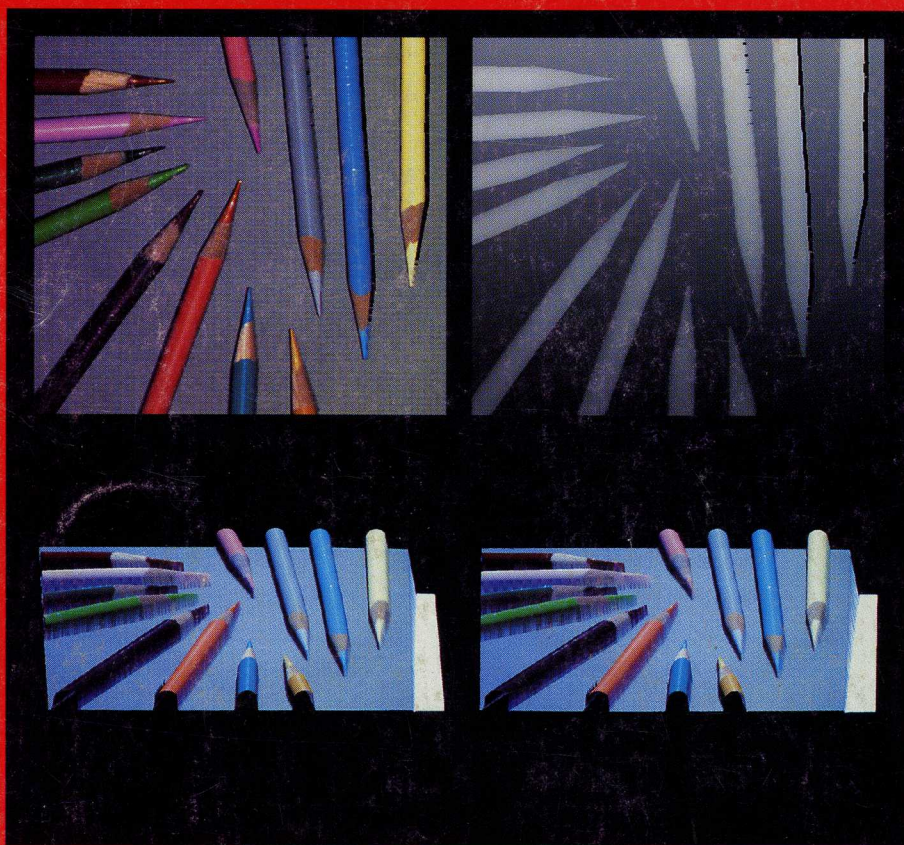


Proceedings



Vision '91 Interface

Compte rendu



Canadian Information
Processing Society

3-7 June/juin 1991
Calgary, Alberta



Canadian Image
Processing and Pattern
Recognition Society

Message from the Program Co-chairmen

During the preparations over the last several months many people contributed to make this the most successful Vision Interface conference to date. The program committee, the contributing authors, and the local organizers are to be warmly thanked for their efforts.

Having attended many conferences in this field around the world we are very proud of the atmosphere which has become a tradition at Vision Interface. It is not only an occasion to exchange technical information and learn, but an opportunity to relax while examining the field from a perspective other than the usual *nose-to-the-grindstone*. This is often the atmosphere required for that one insight that has been so elusive in our own labs.

This year we have participants from many countries, with about half of the papers originating in Canada. We hope that in the Canadian way, each of the Canadian participants will be playing the role of host to our foreign guests. We are glad that they have chosen to come to Canada to describe their work, and to hear about ours.

Welcome to Vision Interface '91!

Colin Archibald
National Research Council

Emil Petriu
University of Ottawa

Message des coprésidents du Programme

Au cours des préparatifs des derniers mois, plusieurs personnes ont été associées aux préparatifs de la conférence Vision Interface de cette année, qui connaît un immense succès. Il faut en remercier chaleureusement le Comité du programme, ceux qui présentent des communications de même que les organisateurs locaux.

Ayant nous-même assisté à plusieurs conférences dans ce domaine un peu partout au monde, nous sommes très fiers de l'atmosphère qui règne à Vision Interface. L'événement offre non seulement la possibilité d'échanger des renseignements techniques et d'apprendre, mais aussi d'examiner le sujet en prenant un peu de recul, dans la détente. Souvent, cette approche permet de trouver l'étincelle qui vous échappe si souvent en laboratoire.

Cette année, nous accueillons des participants de plusieurs pays, et plus de la moitié des communications nous viennent du Canada. J'espère que chacun des participants canadiens saura faire honneur à nos traditions d'accueil à l'endroit de nos visiteurs de l'étranger. Nous sommes heureux qu'ils aient choisi de venir au Canada pour nous parler de leurs travaux et pour prendre connaissance des nôtres.

Bienvenue à tous à Vision Interface '91!

Colin Archibald
Conseil national de recherches

Emil Petriu
Université d'Ottawa

Canadian Image Processing and Pattern Recognition Society Association canadienne de traitement d'images et reconnaissance des formes

President / Président

Réjean Plamandon
Dépt. de génie électrique et de informatique
École Polytechnique
Case postale 6079, succ. A
Montréal, Québec
H3C 3A7

Secretary-Treasurer / Secrétaire-trésorier

Morris Goldberg
Department of Electrical Engineering
University of Ottawa
Ottawa, Ontario
K2N 6N5

IAPR Governing Board Representatives / Représentants du bureau de direction d'AIPR

Ching Y. Suen
Department of Computer Science
Concordia University
1455 de Maisonneuve Blvd. W.
Montréal, Québec
H3G 1M8

Réjean Plamandon
Dépt. de génie électrique et de informatique
École Polytechnique
Case postale 6079, succ. A
Montréal, Québec
H3C 3A7

Newsletter Editor / Éditeur du bulletin

Colin Archibald
Autonomous Systems Laboratory M-50
National Research Council of Canada
Ottawa, Ontario
K1A 0R6

Organizing Committee / Comité Organisateur

**Conference '91 General Chairman /
Président général de Conference '91**

Wayne A. Davis, University of Calgary

**VI '91 Program Co-chairmen /
Coprésidents du programme de VI '91**

Colin Archibald, National Research Council
Emil Petriu, University of Ottawa

**Program Committee /
Comité du programme**

David Coll, Carleton University
Roy Eagleson, University of Western Ontario
Amelia Fong, University of Guelph
Guy Godin, National Research Council
Omer Hageniers, Diffracto Ltd.
Adam Krzyzak, Concordia University
Alan Mackworth, University of British Columbia
Evangelos Milios, University of Toronto
Amar Mitiche, I.N.R.S. Telecommunications
Gerhard Roth, National Research Council
John Tsotsos, University of Toronto
Tet Yeap, University of Ottawa

**GI '91 Program Chairman / Président du
programme de GI '91**

Brian Wyville, University of Calgary

Proceedings Editor / Éditeur du compte rendu

Colin Archibald, National Research Council

Electronic Theatre / Cinéma électronique

Brian Wyville, University of Calgary

Publicity / Publicité

Wayne A. Davis, University of Alberta
Colin Archibald, National Research Council
Billie Summers, University of Calgary
Camille Sinanan, University of Calgary
Zoran Alesic-Kacic, University of Calgary
Paul Kwok, University of Calgary

Local Arrangements

Lois Kokoski, University of Calgary
Billie Summers, University of Calgary

Registration

Billie Summers, University of Calgary

Conference Co-ordinator

Camille Sinanan, University of Calgary

TABLE OF CONTENTS

3-D Vision

- Inferring Volumetric Descriptions from Slice Data*
Emanuele Trucco, Dept. of Artificial Intelligence, University of Edinburgh, Scotland 1
- 3-D Object Model Synthesis in a Monocular Imaging System*
Mark Earnshaw and Andrew K. C. Wong, Dept. of Systems Design, University of Waterloo 5
- A Survey of 3-D Thinning Algorithms*
Paul C. Kwok and Vishwa Ranjan, Dept. of Computer Science, University of Calgary 13

Robotics

- Behaviour Based Assembly Experiments using Vision Sensing*
Prabhas Chongstitvatana and Alistair Conkie, Dept. of Artificial Intelligence, University of Edinburgh, Scotland 21
- Robot Localization by Sensor Data Fusion*
M. Göksin Bakir and Hong Zhang, Dept. of Computing Science, University of Alberta 27
- Evolving Speed Control in Mobile Robots: From Blindness to Kinetic Vision*
J. G. Donnett and B. O. McGonigle, Dept. of Artificial Intelligence, University of Edinburgh, Scotland 35

Invited Paper

- Real-time Systems for Tracking Articulated 3-D Objects*
David Lowe, Dept. of Computer Science, University of British Columbia 42

Model-based Scene Analysis

- Delaying Commitment in Dynamic Stereo Vision*
John D. Lewis and Ian H. Witten, Dept. of Computer Science, University of Calgary 49
- Automatic Configuration of Medium-level Vision Routines Using Domain Knowledge*
Tilo Messer and Michael Schubert, FORWISS, FG Cognitive Systems, Munchen, Germany 56
- Experiments in Parallel Scene Labeling*
Monroe Thomas and Xiaobo Li, Dept. of Computing Science, University of Alberta 64
- On Circles Recognition*
Anca Tamas, Territorial Computing Center, Clug-Napoca, Romania 74

Feature Extraction

- Perceptual Grouping and Directionality Determination Using an Electromagnetic Model*
Thierry Pun, Michel Regamey, Philippe Narbel and Juan Mosig, Computer Science Center,
University of Geneva, Switzerland 81
- Roof Edge Detection by Mathematical Morphology*
Jin-Chang Cheng and Hon-Son Don, Dept. of Electrical Engineering, State University of New York,
Stoney Brook, NY, U.S.A. 89
- Phase-Based Edge and Bar Detection*
Zhengyan Wang and Michael Jenkin, Dept. of Computer Science, York University. 97
- Random Sampling for Pose Determination and Refinement*
Gerhard Roth and Martin Levine, Institute for Information Technology, National Research Council 104

Invited Paper

- Robust High Breakdown Estimation and Consensus*
Peter Meer, Dept. of Electrical and Computer Engineering, Rutgers University 112

Perception and Image Processing Architectures

- Visuo-Tactual Coarseness Estimation Tasks 1. Experiments 2. Modeling*
Isidore Rigoutsos, Robotics Lab. New York University, New York, NY, U.S.A. 117
- A Data Flow Digital Image Processing System and Its Real-Time Morphological Algorithms*
Ning Xu and Xiaoqing Ding, Dept. of Electronic Engineering, Tsinghua University, Beijing, China. 124
- Architecture parallèle basée sur des TMS320C30 pour la comparaison de signaux*
Pierre Fréchette, Laboratoire Scribens et Les systèmes électroniques Matrox Ltée., Québec and
Réjean Plamondon, Laboratoire Scribens et École Polytechnique de Montréal 128

Neural Networks For Image Analysis

- ARisTotle: A Neural Net Architecture for the Auto-classification, Grouping and Recognition of Partially Distorted Binary Images*
D. Boulanger and D. Poussart, Laboratoire de Vision et Systèmes Numériques, Département de génie électrique, Université Laval 135
- Multi-font Alpha-numeric Recognition using Multi-layer Neural Networks with a Rejection Function*
Keiji Yamada, C&C Information Technology Research Laboratories, NEC Corporation, Kawasaki, Japan 142

Biomedical Image Processing

- Supervised Mitotic Index Scoring as a Tool in Cytotoxicity Studies*
Maria Garza-Jinich, Claudia Rodriguez-Carranza, Gabriel Corkidi, Ricardo Toledo, Regina Montero, Patricia Ostrosky-Wegman, Instituto de Investigaciones en Matematicas Aplicadas y en Sistemas, UNAM, Mexico 150
- Homology Mapping between an Atlas and a Biological Section*
Sheng-Yih Guan and Bruce H. McCormick, Scientific Visualization Lab., Dept. of Computer Science, Texas A & M University, U.S.A. 154
- Analysis of Retinal Images Using Mathematical Morphology*
Piotr Jasiobedzki and Chris J. Taylor, Wolfson Image Analysis Unit, Dept. of Medical Biophysics, University of Manchester, United Kingdom 162

Texture and Image Analysis

- Visual Textural Properties Based on Feature Frequency Matrices*
H. C. Shen and C. Y. C. Bie, Dept. of Systems Design Engineering, University of Waterloo 170
- An Adaptive Convex Projection Method for Resolution Enhancement of Tomographic Images*
Shyh-shiaw Kuo and Richard J. Mammone, Dept. of Electrical and Computer Engineering, Rutgers University, U.S.A. 176
- Image Restoration by Using Adaptive Row Action Projection Method*
Shyh-shiaw Kuo and Richard J. Mammone, Dept. of Electrical and Computer Engineering, Rutgers University, U.S.A. 183

Applications

- A Multi-Operator Approach for the Segmentation of 3-D Images of Dental Imprints*
Jean Côté, Denis Laurendeau and Denis Poussart, Computer Vision and Digital Systems, Department of Electrical Engineering, Laval University 189
- Curvature Analysis for Recognition and Structural Verification of Industrial Objects*
Q. M. Wu and M. G. Rodd, Dept. of Electrical and Electronic Eng., University College of Swansea, United Kingdom 197
- The Chirplet Transform: A Generalization of Gabor's Logon Transform*
Steve Mann and Simon Haykin, Communications Research Lab., Dept. of Electrical Engineering, McMaster University. 205
- A Multi-Surface Model of Sonar Range Sensing*
David Wilkes, Greg Dudek, Michael Jenkin, and Evangelos Milios, Dept. of Computer Science, University of Toronto 213
- Authors Index/Répertoire des auteurs 220