

Proceedings

Vision Interface 2000



Canadian Image Processing
and Pattern Recognition Society

International Association for
Pattern Recognition



Montreal, Canada
May/Mai 14-17, 2000



Canadian Image Processing and Pattern
Recognition Society

Association Canadienne de Traitement
et de Reconnaissance de Formes

Publié/Published Mai/May 2000 par/by :

Association Canadienne de Traitement d'Images et
Reconnaissance de Formes / *Canadian Image Processing
and Pattern Recognition Society*

Il est permis de citer de courts extraits et de reproduire des
données ou tableaux du présent compte rendu, à condition
d'en identifier clairement la source.

*Permission is granted to quote short excerpts and to
reproduce figures and tables from these proceedings,
provided that the source of such material is fully
acknowledged*

ISBN 0-7717-05573

Des renseignements sur l'ACTIRF et sur ce compte rendu
sont disponibles à l'adresse suivante:

*Memberships information for CIPPRS and as well as on
this proceeding are available from :*

L'Association Canadienne de l'Informatique / *Canadian
Information Processing Society*
430 King St. West, Suite 205
Toronto, Ontario
Canada, M5V 1L5
Tel: (416) 593-4040

Imprimé au Canada par Tristar Printing, Montreal (Qc)

Printed in Canada by Tristar Printing, Montreal (Qc)

Palais des Congrès, Montreal, Québec (Canada)
14-17 Mai / May 2000



**Canadian Image Processing and Pattern
Recognition Society**

**Association Canadienne de Traitement d'Images et
Reconnaissance de Formes**

Co-Présidents de Programme / Program Co-Chairs

*Gregory Dudek
McGill University, Canada*

*Mohamed Cheriet
École de Technologie Supérieure, Canada*

Actes / Proceedings

Comité de Programmes / Program Committees

Vision Interface ' 2000

*Jean-François Avelin, Université de Bourgogne, France
ACR, Canada
Badr-Edine Bourfeng, University of Windsor, Canada
Frank Farris, McGill University, Canada
Laura Gagnon, CRIM, Canada
Jacques de Gooze, École de technologie supérieure, Canada
Robert M. Haralick, University of Washington, USA
David Hogg, Xerox Palo Alto Res. Center, Queens U., USA
Michael Jenkin, York University, Canada
Tony Kuvshinov, Concordia University, Canada
Denis Laurendeau, Université de Laval, Canada
Richard Leung, École de technologie supérieure, Canada
David Love, University of British Columbia, Canada*

*Dominic Misque, University of Pennsylvania, USA
Amel Mitiche, INRS-Telecom, Canada
Moulin Mubarek, IBM Almaden Research Center, USA
Fathallah Neoulat, Université de Trois-Rivières, Canada
Régis Plamondon, École polytechnique de Montréal, Canada
Kareem Siddiqui, McGill University, Canada
Georges Sapiro, U. de Paris 5-Sorbonne, France
Ching Y. Suen, Concordia University, Canada
John Tenenbaum, York University, Canada
Steve Tomaskovic, Carleton University, Canada
Kazuhiko Yamamoto, Gifu University, Japan
Berber Yang, University of Saskatchewan, Canada
Jing Zhang, University of Alberta, Canada*

**Palais des Congrès, Montreal, Québec (Canada)
14-17 Mai / May 2000**

Comité Organisateur et Comité de Programme Organizing and Program Committee

Co-Présidents de Programme / Program Co-Chairs

Gregory Dudek
McGill University, Canada

Mohamed Cheriet
École de technologie supérieure, Canada

Comité de Programme / Program Committee

Jean-Pierre Asselin de Beauville, Université de Tours, France /
AUF, Canada
Boubekeur Boufama, University of Windsor, Canada
Frank Ferrie, McGill University, Canada
Langis Gagnon, CRIM, Canada
Jacques de Guise, École de technologie supérieure, Canada
Robert M. Haralick, University of Washington, USA
David Fleet, Xerox Palo Alto Res. Center/Queens U., USA
Michael Jenkin, York University, Canada
Tony Kasvand, Concordia University, Canada
Denis Laurendeau, Université de Laval, Canada
Richard Lepage, École de technologie supérieure, Canada
David Love, University of British Columbia, Canada

Demitri Metaxas, University of Pennsylvania, USA
Amar Mitiche, INRS-Telecom, Canada
Moidin Mohiuddin, IBM Almaden Research Centre, USA
Fathallah Nouboud, Université de Trois-Rivières, Canada
Réjean Plamondon, École polytechnique de Montréal, Canada
Kaleem Siddiqi, McGill University, Canada
Georges Stamon, U. de Paris 5-Sorbonne, France
Ching Y. Suen, Concordia University, Canada
John Tsotsos, York University, Canada
Steve Beauchemin, Carleton University, Canada
Kazuhiko Yamamoto, Gifu University, Japan
Herbert Yang, University of Saskatoon, Canada
Hong Zhang, University of Alberta, Canada

51- Human-Computer Interfaces

Temporal Registration Using a Kalman Filter for Augmented Reality Applications 1
C. Jaynes and J. Hou (The MetaVerse Lab, University of Kentucky, USA)

Foreword

Recognizing Activity for Computer Assisted Learning 2
C. Hu, T. Fang, S. Ma and H. Lu (National Lab of Pattern Recognition, P.R. China)

Vision Interface 2000, the thirteen Canadian conference sponsored by the Canadian Image Processing and Pattern Recognition Society and the International Association of Pattern Recognition, being held in Montreal, Canada, one of the oldest cities in North America. This year, in addition to being co-located with Graphics Interface 2000 and Artificial Intelligence 2000, VI is also being jointly held with the International Symposium on Robotics (ISR 2000), the IRIS/Precarn Conference and the International Machine Tools Show. While one of the advantages of Vision Interface is that it has traditionally been an intimate meetings that affords greater opportunities for meeting one's colleagues, we hope that this year's meeting will provide greater exposure for VI and allow greater networking across traditional disciplinary boundaries.

As usual, all submissions were refereed based on full papers. The 43 papers accepted for oral presentation represent slightly over half of the submissions. We have attempted to be as inclusive as possible and many interesting papers that could not be accepted for oral presentation were accepted as posters and also appear in the proceedings.

We are very grateful for all the efforts of all of people that worked to make Vision Interface 2000 a success. Most important, we would like to extent a particular thanks to all the authors for contributing their research work, to the members of the program committee and to the reviewers.

Mohamed Cheriet
Gregory Dudek

Next Generation Computing 53
Alex Pentland, The Media Laboratory, Massachusetts Institute of Technology, USA

53- Medical Imaging

Peel-Off Scanning to Obtain Radial Differentiation of Fractal and Complexity Features in Cell Nuclei 54
B. Nelson, F. Albreghsen, and S. Sankaranarayanan (University of Oslo, Norway)

Unsupervised Restoration of Brain SPECT Volumes 55
M. Hignette and J. Meunier (Université de Montréal, Canada)

Table of Contents / Table des Matières

S1- Human-Computer Interfaces

| | |
|---|-----------|
| Temporal Registration Using a Kalman Filter for Augmented Reality Applications | 1 |
| C. Jaynes and J. Hou (The Metaverse Lab, University of Kentucky, USA) | |
| Recognizing Activity for Computer Assistant Posture Learning | 9 |
| C. Hu, T. Feng, S. Ma and H. Lu (National Lab of Pattern Recognition, P.R. China) | |
| Active Perception in Virtual Humans | 16 |
| T. Rabie and D. Terzopoulos (University of Toronto, Canada) | |

S2- Recognition and Shape

| | |
|--|-----------|
| Physics-Based Skeletons | 23 |
| S. Bouix, P. Dimitrov, C. Phillips, and K. Siddiqi (McGill University, Canada) | |
| A Self-Adjusting Mechanism for Active Contour Models | 31 |
| J. Wang and X. Li (University of Alberta, Canada) | |
| Face Recognition in Fourier Space | 38 |
| H. Spie (Univ. of Heidelberg, Germany), and I. Ricketts (Univ. of Dundee, UK) | |
| Face Recognition from Range Images Using Point Signature | 45 |
| F. Han, C.S. Chua and Y.K. Ho (Nanyang Technological University, Singapore) | |

Invited Talk

| | |
|---|-----------|
| Next Generation Computing | 53 |
| Alex Pentland, The Media Laboratory, Massachusetts Institute of Technology, USA | |

S3- Medical Imaging

| | |
|---|-----------|
| Peel-Off Scanning to Obtain Radial Differentiation of Fractal and Complexity Features in Cell Nuclei | 54 |
| B. Nielsen, F. Albrechtsen, and S. Baheerathan (University of Oslo, Norway) | |
| Unsupervised Restoration of Brain SPECT Volumes | 55 |
| M. Mignotte and J. Meunier (Université de Montréal, Canada) | |

| | |
|--|-----------|
| Non-Recursive Paired Tracking for Vessel Extraction from Retinal Images | 61 |
| M. Lalonde, L. Gagnon (CRIM, Canada) and M.C. Boucher (Depart. D'ophtalmologie, Univ. de Montréal, Canada) | |

| | |
|--|-----------|
| Extraction automatique d'objets cellulaires en imagerie médicale microscopique - Une approche intégrant les contours actifs avec des informations contours et régions | 69 |
| S. Schüpp, A. Elmoataz, R. Clouard, P. Herlin, and D. Bloyet (Service d'Anatomie Pathologie, Centre Francois Baclesse, France) | |

| | |
|---|-----------|
| Suivi de courbes 3D - Application à la détection des sillons corticaux | 76 |
| C. Renault, M. Desvignes, and M. Revenu (GREYC-ISMRA Lab., France) | |

Invited Talk

| | |
|--|-----------|
| Graph Matching - Recent Theoretical Results, Algorithms, and Applications | 82 |
| Horst Bunke, Department of Computer Science, University of Bern, Switzerland | |

S4- Statistical Methods

| | |
|--|-----------|
| PNN Model for Parzen's PDF Estimation of Image Histograms | 89 |
| E. Aitnouri, S. Wang and D. Ziou (University of Sherbrooke, Canada) | |

| | |
|---|-----------|
| Handling Context Dependence with Dual Hidden Markov Models | 95 |
| R. Plamondon, X. Li, and C. Feng (École Polytechnique de Montréal, Canada), | |

| | |
|--|------------|
| A Maximum Likelihood Investigation into Color Indexing | 101 |
| N. Sebe and M. Lew (Leiden Insitute of Advanced Computer Science, The Netherlands) | |

| | |
|---|------------|
| Superresolution Reconstruction of Infra-red Image Sequences by Wavelet Expansion | 107 |
| J. Li, Y. Sheng (Laval Univ., Canada), L. Sévigny (Defence Research Establishment Valcartier, Canada), P. Valin (Lockheed Martin Electronic Systems Canada, Canada) | |

S5- Image Restoration and Reconstruction

| | |
|---|------------|
| Image Modeling by Hypergraph: Application to Noise Cancellation | 115 |
| M. Elhassouni, S. Rital, A. Bretto, H. Cherifi, and D. Aboutajdine (Université de Rabat, Morroco) | |

| | |
|---|------------|
| Filtrage morphologique de représentations par triangulations de Delaunay | 122 |
| N. Loménie, L. Gallo, N. Cambou, and G. Stamon (Université de Paris 5 - Sorbonne, France) | |

| | |
|--|------------|
| Calibration d'un système de vision par lumière structurée | 128 |
| Y. Voisin, F. Marzani, and A. Diou (Université de Bourgogne, France) | |

| | |
|--|-----|
| Vers un paramétrage local automatique d'opérateurs de vision précoce en imagerie aérienne oblique | 136 |
| R. Thomas, G. Stamon, M-V Serfaty-Dutron, and R. Horak (Université de Paris 5 - Sorbonne, France) | |

| | |
|---|-----|
| Calcul d'un estime de description minimale du mouvement et du relief dans une scène à partir d'une séquence d'images | 144 |
| S. Hadjres and A. Mitiche (INRS-Telecommunications, Canada) | |

S6- Applications

| | |
|---|-----|
| Differential Invariants Under Gamma Correction | 150 |
| A. Siebert (Univ. of British Columbia, Canada) | |

| | |
|--|-----|
| Artificial Vision as an Interface Between Geographical Information Systems and Remote Sensing: First Results of a Case Study on Urban Quality of Life and <i>Ambrosia artemisiifolia</i> cartography (common ragweed) | 158 |
| P. Maupin, P. Apparicio, R. Lepage, and B. Solaiman (École de technologie supérieure, Canada) | |

| | |
|---|-----|
| Automated Monitoring of Pigs from Afar | 166 |
| J. Zelek, N. Bruce, and R. Kanwar (Guelph University, Canada) | |

| | |
|---|-----|
| Discrimination de surfaces texturées 3D: Application à la caractérisation de l'usure de revêtements routiers | 174 |
| M. Khoudeir, J. Brochard, B. Augereau, and V. Legeay (Université de Poitiers, France) | |

| | |
|--|-----|
| Protein Structure Determination - Combining Inexact Graph Matching and Deformable Templates | 179 |
| K. Baxter and J. Glasgow (Queen's University, Canada) | |

S7- Motion

| | |
|---|-----|
| Real-Time Detecting and Labelling of Human Body | 187 |
| Y. Yang, C.S. Chua, and Y.K. Ho (Nanyang Technological University, Singapore) | |

| | |
|---|-----|
| Motion Analysis of Human Based on Coplanar Constraint | 195 |
| C. Pan and S. Ma (National Laboratory of Pattern Recognition, Chinese Academy of Science, P.R. China) | |

| | |
|--|-----|
| Quantitative Regularized Range Flow | 203 |
| J. Barron and H. Spies (University of Western Ontario, Canada) | |

S8- Reconstruction

- 2D Robot Localization with Image-Based Panoramic Models Using Vertical Line Features** 211
D. Cobzas and H. Zhang (University of Alberta, Canada)
- Novel View Synthesis - A Comparative Analysis Study** 217
A. Habed and B. Boufama (University of Windsor)
- Using Projective Vision to Find Camera Positions in an Image Sequence** 225
G. Roth and A. Whitehead (National Research Council of Canada, Canada)
- Physically Valid Triangulation of Sparsely Matched Images Using Texture Information -
Application to View-Synthesis** 233
J.S. Perrier, G. Agam and P. Cohen (École Polytechnique de Montréal, Canada)

Invited Talk

- Stochastic Tracking of Human Motion** 241
Michael J. Black, Xerox Palo Alto Research Center and Brown University, USA
- On Prototyping Human Image Annotation** 242
T. Caelli (University of Alberta, Canada)

S9- Image Understanding

- Robust Subpixel Edge Localization for Dimensional Measurements by Computer Vision** 247
F. Truchetet, O. Lalgant, and F. Nicolier (Université de Bourgogne, France)
- A Multiscale Method for Text and Line Extraction from Gray-Level Noisy Images** 255
T. Freche and N. Vincent (Université de Tours, France)
- ZIPf Law: A Tool for Image Characterisation** 262
M. Makris and N. Vincent (Université de Tours)
- Comparative Performance for Isolated Points Detection Operators: Application on Surface
Defects Extraction** 269
R. Seulin, G. Delcroix, and F. Merienne (Université de Bourgogne, France)
- Recognition of Characters Distorted by Camera Angle** 274
Y. Notake, K. Kato, and K. Yamamoto (Gifu University, Japan)

VI 2000 Poster Presentations

| | |
|---|-----|
| Multiple-model Based Human Tracking | 280 |
| Y. Ren, C.S. Chua, and Y.K. Ho (Nanyang Technological University, Singapore) | |
| Fast Classification of Road, Grass and Trees from Color Outdoor Scenes | 286 |
| Hiroshi Wajima, Toru Yamashita, Takahiro Sugiyama, and Keiichi ABE (Japan) | |
| Handwriting Information Extraction from Check Background Based on a Multiscale Wavelet Transform | 291 |
| H. Douzi, D. Mammass (Université de Rabat, Morocco), and F. Nouboud (Université de Trois-Rivières, Canada) | |
| Système de gestion de documents: du document papier vers le Document électronique | 297 |
| L. Bouzidi, S. Tayeb-Bey-Meziane, and Lionel Poulet (Université de Lyon, France) | |
| Multiple-Face Tracking System Using Multiple Cameras | 298 |
| M. Ohya, H. Hongo, K. Kato, and K. Yamamoto (Gifu, Japan) | |
| MRI and Neuroreceptor SPECT Brain Images Registration Based on Anisotropic Diffusion | 304 |
| S. Cormier, N. Boujema, A. Simon, and L. Pourcelot (Université de Tours, France) | |
| Face Recognition Under Varying Views | 309 |
| A. Sehad, A. Hadid, H. Hocini, M. Djeddi, and S. Ameer (Centre de Développement des Technologies Avancées, Algeria) | |
| Détection des arbres individuels dans des images de haute résolution | 311 |
| M. Bouzkraoui and J.M. Beaulieu (Université de Laval, Canada) | |
| A Novel Library System | 318 |
| J. Yamamatsu, K. Iwata, K. Yamamoto, K. Kato, and M. Ishida (Gifu, Japan) | |
| Traitement d'images dans une étude du genou au moyen d'une caractérisation du condyle | 323 |
| J.J. Rousselle, G. Verley, J. Brilhaut, N. Vincent, V. Sabard, and Luc Favard (Université de Tours, France) | |
| Hidden Markov Models for Pattern Extraction | 330 |
| L. Serradura, T. Brouard, M. Slimane, and N. Vincent (Université de Tours, France) | |
| Acceleration of Binning Nearest Neighbour Methods | 337 |
| M. Greenspan, G. Godin (University of Toronto), and J. Talbot (CNRC, Canada) | |
| Segmentation of Range Images Using Local Approximation of Scan Lines | 345 |
| I. Khalifa, M. Moussa, and M. Kamel (University of Waterloo, Canada) | |

| | |
|---|------------|
| Pavement Roughness Estimation Using Path Tortuosity and 2-D Lacunarity Measure | 350 |
| A. Lina, P. Cohen, and J.Y. Herve (École Polytechnique, Canada) | |
| Image Segmentation by Edge-Adaptive Binarization and Morphological Edges Detection | 357 |
| Aishy Amer and E. Dubois (INRS-Telecommunications, Canada) | |
| Perceptual Textural Features Corresponding to Human Visual Perception | 365 |
| N. Abbadeni, D. Ziou, and S. Wang (Université de Sherbrooke, Canada) | |
| Clam Shell Analysis Using Rational Wavelet Transform | 373 |
| F. Nicolier, M. Toubin, A. Baussard, and F. Truchetet (Université de Bourgogne, France) | |
| 3-D Scanners | 378 |
| J. Haverien, J. Röning (University of Oulu, Finland) | |
| Composing a Bird's Eye View | 382 |
| R. Laganière (University of Ottawa, Canada) | |
| Improved Segmentation and Extrapolation for Block-based Shape-Adaptive Coding | 388 |
| Y. Zhao and D. Malah (Technion - Israel Institute for Technology, Israel) | |
| Online Aspect Control of 3D Product Metallisation | 395 |
| G. Delcroix, B. Lamalle, P. Gorria, and F. Merienne (Université de Bourgogne, France) | |
| Relation Morphogenese-Ontogegese: La Preuve par l'Image | 400 |
| E. Verrecchia, A. Diou, and F. Truchetet (Université de Bourgogne, France) | |