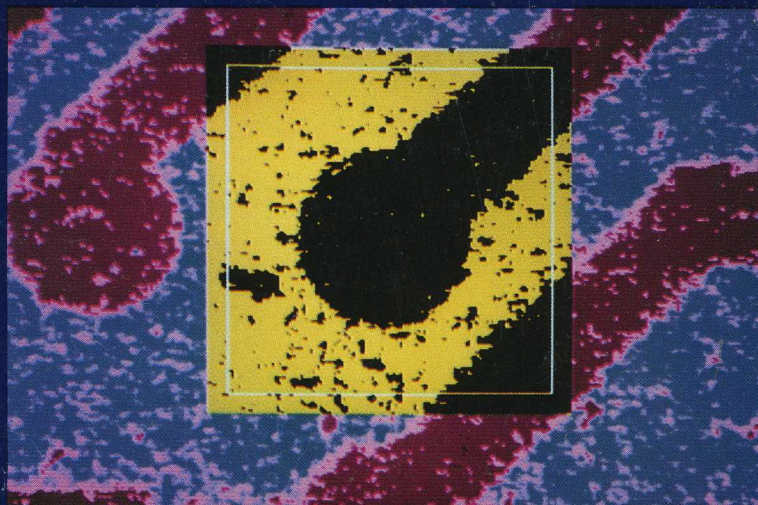


Proceedings

# Vision '88 Interface 88



Canadian Information  
Processing Society

June 6-10, 1988  
Edmonton, Alberta

Canadian Image Processing  
and Pattern Recognition Society

John Baron

# PROCEEDINGS

# Vision Interface '88

June 6-10, 1988

Edmonton Convention Centre

### Message from the General Chairman

**Vision Interface '88**, the second conference on Computer Vision in Canada, is establishing a new milestone and hopefully its most successful conference. This year a program has been put together comprising two full-days of tutorials on such topical subjects as computer vision, mobile robotics and the display of 3-D biomedical datasets. Twelve paper sessions with more than thirty five papers to be presented, follow the tutorial session. A trade show is also available for attendees to see state-of-the-art computer equipment.

Another milestone achieved this year is the concurrent conferences CSCSI '88 and Graphics Interface '88. The decision to hold the three conferences together was made chiefly because of the overlap of subject matter, but it is also intended to stimulate meaningful interaction between the groups and to cement the cooperative bonds which have long existed between the societies. It is hoped that each person finds something of interest in the sessions and these proceedings which represent the definitive version of the presented papers.

I would like to thank each of the committee members, assistants, session chairmen, reviewers, authors, presenters, and visiting speakers for making this conference a success. As well, I would like to acknowledge the visible support for Vision Interface '88 shown by the attendees.

**Wayne A. Davis,**  
General Chairman Conference '88

### Message from the Program Co-Chairs of Vision Interface '88

Welcome to Vision Interface '88, sponsored by the Canadian Image Processing and Pattern Recognition Society (CIPPRS). This is the second conference on Computer Vision in Canada with a varied and interesting program. We would like to thank the Program Committee members for their dedication and participation in reviewing the submitted papers. As Program Co-Chairs of Vision Interface '88, we would also like to thank our invited speakers and all those who submitted papers. These proceedings become the permanent record of your efforts.

**Tony Kasvand**  
NRC  
and  
**Adam Krzyzak**  
Concordia University

ORGANIZED BY: Wayne A. Davis, University of Alberta  
PROGRAM: Tony Kasvand, NRC; Adam Krzyzak, Concordia University  
SUBMITTED: J. G. Taylor, University of Alberta  
PROGRAM: J. G. Taylor, University of Alberta  
PUBLICATIONS: A. Krzyzak, Concordia University  
PUBLICITY: J. Scheffer, University of Alberta  
REGISTRATION: R. Gopal, University of Alberta; J. ARCO, University of Alberta  
PLW SHOW: M. Green, University of Alberta  
TRADE SHOW: T. Cook, University of Alberta  
LOCAL ARRANGEMENTS: T. Sandhu, Alberta Energy & Natural Resources, Edmonton  
AUDIO-VISUAL: R. Johnson

### Canadian Image Processing and Pattern Recognition Society

#### President

Dr. Chung Y. Suen  
Dept. of Computer Science  
Concordia University

100 St. Marymount Blvd. W.  
Montreal, Quebec, H3G 1M6

#### Secretary/Treasurer

Dr. Morris Gullberg  
Dept. of Electrical Eng.  
University of Ottawa  
Ottawa, Ontario, K1N 6N6

#### MCPR Organizing Event

1. Dr. Tony Kasvand  
Computer Graphics Section  
National Research Council  
Magdalen Road  
Ottawa, Ontario, K1A 0R6  
2. Dr. Chung Y. Suen

#### Executive Editor

Dr. J. G. Taylor  
Dept. of Computer Eng.  
University of Alberta  
Ottawa, Ontario, K1N 6N6

## ORGANIZING COMMITTEE

**GENERAL CHAIRMAN:** Wayne Davis, University of Alberta

**PROGRAM CO-CHAIRMAN:** T. Kasvand, National Research Council  
A. Krzyzak, Concordia University

**PROGRAM COMMITTEE:** T. Caelli, University of Alberta  
L. Devroye, McGill University  
K. Doetsch, National Research Council  
J. Domey, National Research Council  
M. Goldberg, University of Alberta  
D. Goodenough, CCRS  
R. Gordon, University of Manitoba  
T. Kasvand, National Research Council  
A. Krzyzak, Concordia University  
B. Kurz, University of New Brunswick  
M. Levine, McGill University  
A. Mackworth, University of British Columbia  
J. Middleton, Spar Aerospace Limited  
R. Plamondon, Ecole Polytechnique  
C. Suen, Concordia University  
J. Tsotsos, University of Toronto  
A. Wong, University of Waterloo

**FINANCE:** L. Gaetz, University of Alberta

**PUBLICATIONS:** A. Krzyzak, Concordia University

**PUBLICITY:** J. Schaeffer, University of Alberta

**REGISTRATION:** R. Goebel, University of Alberta  
J. Abbott, University of Alberta

**FILM SHOW:** M. Green, University of Alberta

**TRADE SHOW:** T. Caelli, University of Alberta

**LOCAL ARRANGEMENTS:** T. Barnicoat, Alberta Energy & Natural Resources, Edmonton

**AUDIO-VISUAL:** R. Johnson

### Canadian Image Processing and Pattern Recognition Society

*President*

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

*Secretary/Treasurer*

Dr. Morris Goldberg  
Dept. of Electrical Eng.  
University of Ottawa  
Ottawa, Ontario, K2N 6N5

*IAPR Governing Board  
Representatives*

1. Dr. Tony Kasvand  
Computer Graphics Section  
National Research Council  
Montréal Road  
Ottawa, Ontario, K1A 0R8  
2. Dr. Ching Y. Suen

*Newsletter Editor*

Dr. Emil Petriu  
Dept. of Electrical Eng.  
University of Ottawa  
Ottawa, Ontario, K2N 6N5

## TABLE OF CONTENTS

<b>ROBOT VISION</b>	Page
<i>Measuring the Alignment Accuracy of Surface Mount Assembly Circuit Board Masks</i> D. Gauthier et al., McGill University .....	1
<i>IRLM: An Imaging System for Object Recognition, Localization &amp; Motion Recovery</i> J.J. Wu & T.M. Caelli, University of Alberta .....	7
<i>Processing Single Range Profiles from a Wrist Mounted Laser Range Finder</i> C. Archibald, NRC Ottawa .....	13
<i>Segmentation of Range Images By Piecewise Approximation with Shape Constraints</i> J.M. Beaulieu, University Laval & P. Boulanger, NRC Ottawa .....	19
<b>BIOMEDICAL IMAGING</b>	
<i>Geometric Unwarping for Digital Subtraction Mammography</i> X. Zhou & R. Gordon, University of Manitoba .....	25
<i>Representation of Spatial Patterns in the Electrical Activity Generated by the Brain</i> Z.J. Koles et al., University of Alberta .....	31
<i>Automated Detection of Breast Tumors</i> S.M. Lai et al., University of Alberta .....	35
<b>INVITED SPEAKER</b>	
<i>Industrial Machine Vision-Reflecting on the Past Decade</i> J.L. Mundy, General Electric Company .....	41
<b>REMOTE SENSING &amp; COMPUTATIONAL VISION</b>	
<i>Data Fusion &amp; Object Recognition</i> D. Goodenough & M.A. Robson, CCRS Ottawa .....	42
<i>On the Integration of a Geographic Information System with LANDSAT-5 Data</i> D. Goodenough et al., CCRS Ottawa .....	43
<i>Symbolic Knowledge Representation for Remote Sensing</i> G. Plunkett & D. Goodenough, CCRS Ottawa .....	44
<i>Spatial Information Extraction with Pixel Swapping</i> J. Iisaka, CCRS Ottawa .....	50
<b>SHAPE</b>	
<i>Gesture Recognition by Feature Analysis</i> J. Kim, IBM Research Centre, Yorktown Heights .....	51
<i>Parametric Approximations of Contours of Digitized Characters</i> R. Legault & C.Y. Suen, Concordia University .....	56
<i>Classification of Digitized Contours Represented by Signatures</i> A. Krzyzak & H. El buaeshi, Concordia University .....	64
<i>On the Definition of Reference Skeletons for Comparing Thinning Algorithms</i> R. Plamondon & C.Y. Suen, Ecole Polytechnique & Concordia University .....	70
<b>INVITED SPEAKER</b>	
<i>The Image Processing Market Place</i> R.C. Gonzales, University of Tennessee & Perceptics Corp. ....	76

## PARALLEL PROCESSING

<i>Parallel Algorithms for Extracting Shape Features of Handwritten Characters</i> H.F. Li et al., Concordia University .....	80
<i>Improvement &amp; Systolic Implementation of Hough Transformation for Straight Line Detection</i> H.F. Li et al., Concordia University .....	86
<i>Computation of a Class of Detail Preserving Filters in Pipeline Architectures</i> A. Fong, University of Guelph .....	92

## COMPUTATIONAL METHODS IN VISION

<i>Specularity Removal for Shape from Shading</i> F. Tong & B.V. Funt, Simon Fraser University .....	98
<i>Visual Routines: Ingredients, Design, &amp; Control</i> M.H.J. Romanycia, University of British Columbia .....	104
<i>Estimating Movement Direction with a Neural Network</i> W.C. Treurniet, CRC Ottawa .....	110
<i>A Graphics Package for Simulating the Data of Range Finders</i> S.H.Y. Hung, NRC Ottawa .....	115

## INVITED SPEAKER

<i>Space Station—An Application for Computer Vision</i> K.H. Doetsch, & R.C. Hughes, NRC Ottawa .....	122
--	-----

## APPLICATIONS I

<i>Unsupervised Segmentation of Textured Images</i> A. Khotanzad & J.Y. Chen, Southern Methodist University, Dallas .....	123
<i>A Global System for Matching 3-D Range Data Objects</i> N.N. Abdelmalek, NRC Ottawa .....	129
<i>Speech Modeling by Correlation Fitting</i> J. Huang & L.B. Jackson, Northwestern Polytechnical University, Xian, PRC & University of Rhode Island .....	135
<i>Multiresolution Modeling &amp; Matching Using Salient Features</i> Z.N. Li & Q. Song, Simon Fraser University & University of Wisconsin-Milwaukee .....	139

## APPLICATIONS II

<i>Matrix Formulation and Parallel Algorithms for Relaxation Object Labelling</i> E. Leung & X. Li, University of Alberta .....	146
<i>An Application of Syntactic Pattern Recognition to Seismic Interpretation</i> L. Le & E. Nyland, University of Alberta .....	152
<i>Label Relaxation Technique for Stable Estimation of a Topographic Primal Sketch</i> P. Boulanger, NRC Ottawa .....	158
<i>Ranging Sensors for Obtaining Vision Information: Successes and Shortcomings</i> E.J. Trost & S. Onyshko, Unisys & University of Manitoba .....	163
<i>A Study on the Feasibility of a Global Description of 3-D Objects in Range Data for Recognition</i> S.H.Y. Hung, NRC Ottawa .....	168

## INVITED SPEAKER

<i>Integrating Methodologies in Image Analysis</i> T. Pavlidis & Y.T. Liow, SUNY Stony Brook .....	174
---	-----

<b>AUTHOR'S INDEX</b> .....	184
-----------------------------	-----