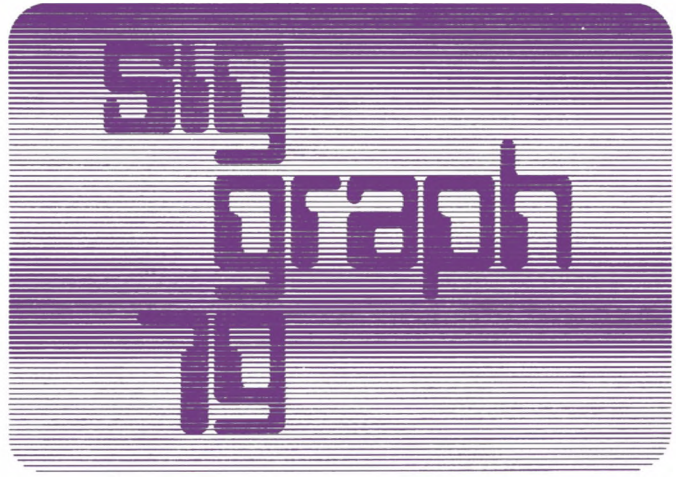
SIGGRAPH 1979

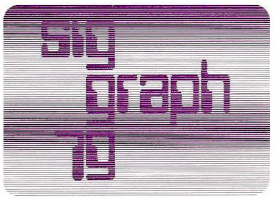
Hyatt Regency, Chicago, Illinois
August 6-8, 1979



IEEE Computer Society conference on

pattern recognition and image processing

August 6-8, 1979 Hyatt Regency Chicago O'Hare, Illinois



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Wayne Huelskoetter
Dicomed, Inc.

CHICAGO VISUALIZATION WEEK IN BRIEF

Sunday, August 5, 1979	
PRIP TUTORIAL	9:30-6:00 P.M.
Monday, August 6, 1979	
6 SIGGRAPH TUTORIALS	9:30-6:30 P.M.
TUTORIALS RECEPTION	7:00-9:00 P.M.
USER GROUPS	9:30-10:00 P.M.
PRIP SESSIONS	9:30-6:00 P.M.
PRIP COCKTAIL RECEPTION	7:00-9:00 P.M.
Tuesday, August 7, 1979	
6 SIGGRAPH TUTORIALS	9:30-6:30 P.M.
SIGGRAPH/PRIP RECEPTION	8:00-10:00 P.M.
EQUIPMENT EXPO	12:00-8:00 P.M.
VENDOR FORUM	12:00-8:00 P.M.
USER GROUPS	9:30-10:00 P.M.
PRIP SESSIONS	9:30-6:00 P.M.
Wednesday, August 8, 1979	
SIGGRAPH SESSIONS	9:30-6:00 P.M.
SCIENCE SHOW	8:00-10:00 P.M.
EQUIPMENT EXPO	10:00-6:00 P.M.
EXPO RECEPTION	6:00-8:00 P.M.
VENDOR FORUM	10:00-6:00 P.M.
FILM & VIDEO	10:00-8:00 P.M.
PRIP SESSIONS	9:30-6:00 P.M.
Thursday, August 9, 1979	
SIGGRAPH SESSIONS	9:30-6:00 P.M.
ART & ENTERTAINMENT GRAPHICS	8:00-10:00 P.M.
EQUIPMENT EXPO	10:00-6:00 P.M.
SPECIAL INTEREST DINNERS	6:00-8:00 P.M.
VENDOR FORUM	10:00-6:00 P.M.
FILM & VIDEO	10:00-8:00 P.M.
Friday, August 10, 1979	
SIGGRAPH SESSIONS	9:30-4:00 P.M.
FILM & VIDEO	10:00-2:00 P.M.

MONDAY MORNING

Tutorial Sessions 9:30 a.m.-12:00 noon

6 SIGGRAPH TUTORIALS

Tutorial Chairs:
Norman Badler, University of Pennsylvania
Lee Metrick, Tektronix, Inc.

INTRODUCTION TO COMPUTER GRAPHICS

Rosemont A
Chair: Kellogg Booth, University of Waterloo
The fundamentals of computer graphics are covered in this tutorial including: uses for computer graphics, hardware, software, raster graphics, graphics standards, commercial packages, documentation graphics and computer animation.
Instructors:
John Beatty, University of Waterloo
Lansing Hatfield, Lawrence Livermore Laboratory
Carl Machover, Machover Associates
Marceli Wein, National Research Council of Canada

INTRODUCTION TO RASTER GRAPHICS

Rosemont B
Chair: Jim Foley, George Washington University
This tutorial introduces the basic hardware, software and application concepts for raster graphics. No prior graphics knowledge is required but experience with computers is helpful. Several commercial systems, both color and black and white, will be discussed, followed by descriptions of hardcopy raster devices. Software algorithms and applications to industry and business will be presented as well.

Instructors:
John Dalton, Goddard Space Flight Center
John Godfrey, Mellon National Corporation
Stephen Levine, Lawrence Livermore Laboratory
Lee Metrick, Tektronix, Inc.
William Newman, Xerox Palo Alto Research Center
Robert Sproull, Carnegie-Mellon University

COMPUTER AIDED DESIGN
Rosemont D
Chair: Michael P. Dearing, International Harvester Company
This tutorial covers key issues in selection, design, and implementation of CAD systems. The first day focuses on getting contemporary and available technology to work for you and includes CAD economics, system design, mini-computer systems, and data-base considerations. The second day covers person-machine interaction, geometric modeling and the future of CAD.
Instructors:
Gerald W. Bayer, Kodak
Frank W. Bliss, Ford Motor Company
Charles Eastman, Carnegie-Mellon University
George Hyman, Ford Motor Company
Phil Kennecott, General Electric Company
Harvey Z. Kriloff, Boeing Commercial Airplane Company
Ralph E. Miller, Boeing Commercial Airplane Company
Ari Requicha, University of Rochester
Herb Voelcker, University of Rochester

ADVANCED RASTER GRAPHICS
Rosemont C
Chair: Jim Blinn, Jet Propulsion Laboratory
This tutorial on advanced image synthesis with raster systems is intended to bring the attendee up to date on the most recent developments in computer image synthesis. It will concentrate on the production of realistic-looking images of 3-D scenes, emphasizing mathematical modeling techniques, lighting simulation and optimal display utilization. It will serve as a useful background for understanding state-of-the-art papers on this subject in the conference. One session will be joint with the Animation tutorial.
Instructors:
Frank Crow, Ohio State University
Alvy Ray Smith, New York Institute of Technology

ANIMATION GRAPHICS
American/Braniff
Chair: Ed Catmull, New York Institute of Technology
This tutorial concentrates on computer animation techniques and covers the application of the computer to the production of images for videotape or film. Presentations will be made on two- and three-dimensional animation, assisting conventional animation, special effects, and commercial applications.
Instructors:
Gary Demos, Information International, Inc.
Tony Diment, Logica Ltd.
Lee Harrison, Computer Image Corporation
Mark Levoy, Cornell University
Alvy Ray Smith, New York Institute of Technology
Garland Stern, New York Institute of Technology
Marceli Wein, National Research Council
Lance Williams, New York Institute of Technology

GRAPHICS STANDARDS
NWO/TWA & Allegheny
Chair: R. Daniel Bergeron, University of New Hampshire
This tutorial is aimed at providing an understanding of the Graphics Standards Report and its effect on new systems. There will be two groups formed—one of managers, and one of programmers. The managers' section will concentrate on evaluation of general-purpose graphics packages and the effect standards have on management of a project. The programmers' section is for those who wish a fairly detailed exposure to the background, philosophy, and important techniques and algorithms useful in implementing a device-independent graphics package.
Instructors:
Ingrid Carlbom, Brown University
Robert Ellis, Boeing Computer Services
Bertram Herzog, University of Colorado
James Michener, Intermetrics, Inc.
Richard Puk, Megatek Corporation
James Warner, University of Colorado

MONDAY AFTERNOON
SIGGRAPH TUTORIALS LUNCHEON
Social Function 1:00-1:45 p.m.
Rosemont A, B, C, D
Tutorials 2:30-6:30 p.m.
6 SIGGRAPH TUTORIALS (continued)

MONDAY EVENING
SIGGRAPH TUTORIALS RECEPTION
Social Function 7:00-9:00 p.m.
Rosemont A, B

TUESDAY MORNING
Tutorials Session 9:30-12:00 noon
6 SIGGRAPH TUTORIALS (continued)

TUESDAY AFTERNOON
SIGGRAPH TUTORIALS LUNCHEON
Social Function 1:00-1:45 p.m.
Rosemont A, B, C, D
Tutorials Session 2:30-6:30 p.m.
6 SIGGRAPH TUTORIALS (conclusion)

TUESDAY EVENING
SIGGRAPH/PRIP CONFERENCE RECEPTION
Social Function 8:00-10:00 p.m.
Rosemont A, B, C, D

WEDNESDAY MORNING
Session WA1 9:30 a.m.-12:10 p.m.
Rosemont A, B
SIGGRAPH/PRIP SESSION
(Co-Sponsored by PRIP)
Co-Chairs:
R. Bajcsy, University of Pennsylvania
B. Pollack, University of British Columbia

0930 Raster Image File Format (RIFF): An Approach to Problems in Image Management
P. G. Selfridge and K. R. Sloan, Jr., University of Rochester

0950 An Understanding of Moire Patterns in the Reproduction of Halftone Images
A. Steinbach and K. Wong, IBM

1010 Generation of 3D Surface Descriptions from Images of Pattern-Illuminated Objects
R. Potmesil, Rensselaer Polytechnic Institute

1030 Tutorial on Compensation Tables
E. Catmull, New York Institute of Technology

1050 Break
1110 Simple Animation by Changing Color Definitions
R. Shoup, Xerox Palo Alto Research Center
1130 An Improved Illumination Model for Shaded Displays
T. Whitted, Bell Laboratories
1150 Some Raster Graphics Extensions to the Core System
J. Foley, J. Templeton and D. Dastyar,
George Washington University

Session WA2 9:30 a.m.-12:10 p.m.
Rosemont C, D

OVERVIEW SESSION

Chair: R. Puk, Megatek Corporation
0930 General-Purpose Graphics System for Computer-Aided Design
S. Uno and H. Matsuka, Tokyo Scientific Center, IBM Japan
0950 Computer Graphics for Large-Scale Two- and Three-Dimensional Analysis of Complex Geometries
B. Brown, Lawrence Livermore Laboratory
1010 Stereoscopic Computer Graphics for Simulation and Modeling
J. Roese and L. McCleary, Naval Ocean Systems Center, Dept. of the Navy
1030 T.O.P.E.S.
W. Pferd, Bell Laboratories
1050 Break
1110 Videocel
H. Towles, Computer Creations
1130 Digital Video Display Systems and Dynamic Graphics
R. Baecker, University of Toronto
1150 Evaluation and Criticism of the Core Graphics System
D. Cahn, N. Johnston and W. Johnston, Lawrence Berkeley Laboratory

WEDNESDAY AFTERNOON

WELCOME 2:00 p.m.
Rosemont A, B / United
Bruce H. McCormick, University of Illinois at Chicago Circle
KEYNOTE ADDRESS 2:10 p.m.
Rosemont A, B, / United
Edward Zimmerman, Executive Office of the President

Session WP1 2:30-3:00 p.m.
Rosemont A, B, / United

VISUAL SPECTACULAR

A Visual Overview of the Conference
Moderator: T. DeFanti, University of Illinois at Chicago Circle
Session WP2 3:00-4:30 p.m.
Rosemont A, B / United

DOCUMENTATION AND PUBLICATION GRAPHICS

Chair: J. Beatty, Lawrence Livermore Laboratory
0300 The Composition and Correction of Printed Matter
A. Pringle, University of Cambridge
0315 Typography for Raster-Scan Displays
P. Robinson, University of Cambridge
0330 Computer-Designed Letters
N. Wiseman, University of Cambridge
0345 Newswhole
R. Baecker, D. Tilbrook, and M. Tuori, University of Toronto
0400 Publications Expedited by a Creator, Compositor, Editor and Illustrator in One On-line Package
J. Beatty, J. Chin and H. Moll, Livermore Laboratory
0415 Dlisp Support: An Interactive Raster-Scan Display Facility
R. Sproull, Carnegie-Mellon University
0430 Break
Session WP3 3:00-6:00 p.m.
American/Braniff

PANEL: GRAPHICS STANDARDS PLANNING COMMITTEE

Chairmen of the GSPC Subcommittees will present the revised Core Report and other subcommittee work. A question-and-answer session will follow the presentations.
Moderators:
R. Heilman, Battelle Columbus Labs
B. Herzog, University of Colorado
Panelists:
E. Sonderegger, SIGGRAPH Director (Refinements)
V. Wallace, University of Kansas (Input)
G. Chappell, TRW Systems Group (Implementation)
A.Goodrich, University of Michigan (Partitions/Protocols)
L. Hatfield, Lawrence Livermore Labs (Extensions)

Session WP4 4:45-6:00 p.m.
Rosemont A, B

GRAPHICAL INPUT

Chair: C. Machover, Machover Associates
0445 Some Principles for Effective Display of Simulation Data
A. Morse, University of Massachusetts
0505 The Number Wheel: Interactive Three-Dimensional Positioning with a Tablet-Based Valuator
R. Thornton, Carnegie-Mellon University
0525 Graphical Human Interface to a Neutral Beam Source
V. Elischer and J. Fiddler, Lawrence Berkeley Laboratory
0545 The Semantics of Graphical Input
E. Anson, North Andover, Massachusetts

WEDNESDAY EVENING

EXHIBITOR-SPONSORED WINE & CHEESE RECEPTION

Social Function 6:00-8:00 p.m.
Rosemont C, D
Session WP5 8:00-10:00 p.m.
Rosemont A, B

THE BEST OF THE NEW SCIENCE FILMS & VIDEOTAPES

Chair: Ken Knowlton, Bell Laboratories
with the assistance of
The American Science Film Association

THURSDAY MORNING

Session ThA1 9:30-12:00 noon
Rosemont A, B, / United

PANEL: VISION

An in-depth discussion on the important parameters of human visual response to computer graphic display elements and similar phenomena.
Moderator: F. Montalvo, Lawrence Berkeley Laboratory
Introduction: S. Levine, Lawrence Livermore Laboratory
Panelists:
S. Anstis, York University, Canada
R. L. Gregory, University of Bristol
B. Julesz, Bell Laboratories

THURSDAY AFTERNOON

Session ThP1 2:00-6:00 p.m.
Rosemont A, B,

ALGORITHMS AND MODELING

Chair: H. Fuchs, University of North Carolina at Chapel Hill

0200 An Algorithm for Shading of Regions on Vector Display Devices
K. Brassel and R. Fegeas, SUNY-Buffalo

0220 An Algorithmic Approach to Controlling Search in Three-Dimensional Image Data
M. Rhodes, University of California, Los Angeles

0240 True-Perspective Terrain Models
W. Dungan, Jr., University of Guelph

0300 Haloed Line Effect for Hidden Line Elimination
A. Appel, F. Rohlf, and A. Stein, Watson Research Center, IBM

0320 Transparency for Computer Synthesized Images
D. Kay and D. Greenberg, Cornell University

0340 ATOMLLL: Atoms with Shading and Highlights
N. Max, Lawrence Livermore Laboratory

0400 Break

0420 A Fast Scan-Line Algorithm for Rendering Parametric Surfaces
J. Clark, New York Institute of Technology

0440 Predetermining Visibility Priority in 3D Scenes
H. Fuchs, Z. Kedem and B. Naylor, University of North Carolina at Chapel Hill

0500 ISOSRF – An Algorithm for Plotting Iso-Valued Surfaces of a Function of Three Variables
T. Wright and J. Humbrecht, National Center for Atmospheric Research

0520 Computer Drafting of Stones, Wood, Plants and Ground Materials
C. Yessios, Ohio State University

0540 Automatic Extraction of Irregular Network Digital Terrain Models from Dense Grid Digital Terrain Models
R. Fowler and J. Little, University of Columbia

Session ThP2 2:00-5:00 p.m.
United

PANEL: LARGE-SCALE APPLICATIONS OF COMPUTER CHARTING & MAPPING IN INDUSTRY

A discussion of the types of planning, justification, expense and results that are part of the implementation of new computer graphics applications with attention to overcoming corporate barriers to such implementations.
Moderator: A. Paller, Applied Urbanetics, Inc.
Panelists:
D. Dahl, Los Alamos Scientific Laboratory
R. Dupree, Standard Oil of Indiana
W. d'Hondt, Boeing Commercial Aircraft Company

SIGGRAPH BOARD MEETING 2:00-8:00 p.m.
Continental

THURSDAY EVENING

Social Function 6:00-8:00 p.m.
International Ballroom

SPECIAL INTEREST DINNERS:

AUTOMATION
ANIMATION
LSI CHIPS
IMAGE PROCESSING
PSYCHOPHYSICS
DIGITAL DARKROOM

Session ThP3 8:00-10:00 p.m.
Rosemont A, B / United

ART AND ENTERTAINMENT GRAPHICS

An all-film-and-videotape show designed to dazzle
Chairs D. Sandin and T. DeFanti, University of Illinois at Chicago Circle

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FRIDAY MORNING

Session FA1 9:30-11:00 a.m.
Rosemont A, B

APPLICATIONS

Chair: J. Dill, General Motors

0900 A Colour Display Unit for a 21-Channel EEG Monitor
R. Paternoster, L. Bousse and O. Steenhaut, VRIJE Universteit, Brussels

0930 Movies from Music: Visualizing Musical Compositions
J. Mitroo, N. Herman and N. Badler, University of Pennsylvania

1000 Interactive Color Map Displays of Domestic Information
J. Dalton, J. Billingsley, J. Quann and P. Bracken, NASA Goddard Space Center

1030 The Shaded Surface Display of Large Molecules
T. Porter, National Institutes of Health

Session FA2 9:30 a.m.-12:00 noon
Continental

PANEL: HUMAN INTERFACE DESIGN IN GRAPHICS SOFTWARE SYSTEMS

Moderator: T. Bruggere, Tektronix, Inc.
Panelists:
J. D. Foley, George Washington University
J. D. Grimes, Tektronix
G. Lynch, Tektronix
T. P. Moran, Xerox Research Center
P. Reisner, IBM Research Laboratories

Session FA3 11:00 a.m.-12:00 noon
Rosemont A, B

SYSTEMS

Chair: R. Sproull, Carnegie-Mellon University

1100 A Network Graphical Conferencing System
M. O'Brien, RAND Corporation

1120 A Building Block Approach to Computer Graphics
J. Flexer and G. Wiederhold, Stanford University

1140 Implementation of an Interactive Computer Graphics Environment at NASA-JSC
M. Lang, R. Cohen, K. Eschenberg, J. Ochs, F. Stoker and J. Raney, Pennsylvania State University

FRIDAY AFTERNOON

Session FP1 2:00-4:00 p.m.
Rosemont A, B

ANIMATION AND RASTER GRAPHICS

Chair: J. Blinn, Jet Propulsion Laboratory

0200 The Efficient Generation of Smooth Line Drawings on Video Displays
H. Fuchs and J. Barros, University of North Carolina at Chapel Hill

0220 Smoothly Shaded Renderings of Polyhedral Objects on Raster Displays
T. Duff, New York Institute of Technology

0240 Tint Fill
A. Smith, New York Institute of Technology

0300 Softcel: An Application of Raster-Scan Graphics to Conventional Cel Animation
G. Stern, New York Institute of Technology

0320 Toward an Interactive High Visual Complexity Animation System
C. Csuri, R. Hackathorn, R. Parent, W. Carlson and M. Howard, Ohio State University
0340 Parallel Processing Techniques for Hidden Surface Removal
M. Kaplan and D. Greenberg, Cornell University

SIGGRAPH '79 sincerely thanks Dicomed Corporation and MAGI Corporation for their assistance in preparing slides for authors' use.

We also greatly appreciate the support of General Electric Company Video Display Equipment Operation in providing the two Large Screen Light Valve Video Projectors.

CONCURRENT ACTIVITIES

GRAPHICS/IMAGE PROCESSING EQUIPMENT EXPOSITION

Exhibits will be on display in Hall A of the O'Hare Exposition Center (adjacent to the Hyatt Regency O'Hare) at the following times:

Tuesday, August 7	12:00 noon-8:00 p.m.
Wednesday, August 8	10:00 a.m.-6:00 p.m.
Thursday, August 9	10:00 a.m.-6:00 p.m.

Admission to the Graphics/Image Processing Equipment Exposition is free to SIGGRAPH '79 and PRIP '79 registrants. Admission to the Expo alone is $10.
See SIGGRAPH '79 Exhibits Guide for more details.

VENDOR FORUM

The Vendor Forum, three days of vendor presentations of new product lines, will be held in Hall E of the O'Hare Exposition Center. The Vendor Forum will run concurrently with the Graphics/Image Processing Equipment Expo—at the times above.
See SIGGRAPH '79 Exhibits Guide for more details.

FILM & VIDEOTAPE RETROSPECTIVE

Rosemont C, D
20 hours of films and videotapes highlighting the past ten years of computer graphics, each hour presented by an expert in the field at the following times:

Wednesday, August 8	12:00 noon-2:00 p.m. 3:00 p.m.-5:00 p.m.
Thursday, August 9	10:00 a.m.-8:00 p.m.
Friday, August 10	10:00 a.m.-4:00 p.m.

See SIGGRAPH '79 Film & Videotape Retrospective Guide for additional information. Tickets are available to nonregistrants at $2.00/hour.

USER GROUP MEETINGS

Adage/AGE		
Monday, August 6	8:00 a.m.-5:00 p.m.	Eastern
Dicomed		
Tuesday, August 7	6:00 p.m.-10:00 p.m.	United A
E & S		
Tuesday, August 7	1:30 p.m.-6:00 p.m.	Delta
GCS		
Tuesday, August 7	1:30 p.m.-6:00 p.m.	Delta
ISSCO/DISSPLA		
Monday, August 6	8:00 a.m.-10:00 p.m.	United B
Tuesday, August 7	8:00 a.m.-5:00 p.m.	United B
Vector General		
Monday August 6	6:00 p.m.-10:00 p.m.	Continental

SIGGRAPH '79/PRIP '79 GENERAL INFORMATION

REGISTRATION

The Conference Registration Desk is located in the Lower Lobby of the Hyatt Regency O'Hare and will be open at the following times:

Sunday, August 5	5:00 p.m.-8:00 p.m.
Monday, August 6	8:00 a.m.-6:00 p.m.
Tuesday, August 7	8:00 a.m.-8:00 p.m.
Wednesday, August 8	8:00 a.m.-6:00 p.m.
Thursday, August 9	8:00 a.m.-6:00 p.m.
Friday, August 10	8:00 a.m.-12:00 noon

Name badges, meal tickets, tutorial materials and conference proceedings should be called for on arrival at the Conference Registration Desk. A message information desk will also be open at the above times adjacent to the Conference Registration Desk. The message center telephone number is 312-696-1234. (Ask for SIGGRAPH.)

A registration desk will also be open at the entrance to the O'Hare Exposition Center for the convenience of those attending the Graphics/Image Processing Equipment Exposition.

FEES

On-site registration fee for all or any part of the SIGGRAPH '79 or PRIP '79 Conference is Member $97.50, Student $20.00 and Nonmember $130.00. Additional fees for cross-registration $32.50, tutorial $143.00 and special interest dinners $15.50 are identified on the registration form. A late registration surcharge of 30% is included in the above fees.

SIGGRAPH '79 registration entitles one to the SIGGRAPH/PRIP reception (Tuesday, August 7) and a copy of the SIGGRAPH proceedings.

PRIP '79 registration entitles one to the SIGGRAPH/PRIP reception (except student registrants) held Tuesday, August 7 and a copy of the PRIP '79 proceedings.

Cross-registration brings full privileges of SIGGRAPH '79 and PRIP '79 registration.

Special interest dinners are available to both SIGGRAPH '79 and PRIP '79 registrants upon payment of $15.50/dinner.

Registration fees must be paid by cash or check drawn on a U.S. bank in U.S. funds and made payable to SIGGRAPH '79 or PRIP '79 as appropriate. No purchase orders or checks drawn on foreign banks will be accepted under any circumstances.

CANCELLATIONS/REFUNDS

Refund of the registration fee will be granted to those persons who cancel their registration at least 24 hours prior to the start of the program. Refunds for meals (including SIGGRAPH/PRIP reception) will not be granted unless registration cancellation is received at least 72 hours prior to the start of the program.

PARKING

2000 parking spaces are adjacent to the O'Hare Exposition Center. Parking is $2/day. The Hyatt Regency O'Hare and the Holiday Inn O'Hare/Kennedy also maintain parking for their customers.

LODGING

Hyatt Regency O'Hare: headquarters hotel, River Road at Kennedy Expressway,
Box 66456, Chicago, IL 60666, (312) 696-1234.

Holiday Inn O'Hare/Kennedy: 5440 N. River Road,
Rosemont, Il 60018, (312) 671-6350.
Directly across River Road from O'Hare Exposition Center, 5 minutes walk from Hyatt Regency O'Hare.

Caravelle Inn: 5440 N. River Road, Rosemont, Il 60018, (312) 678-2525.

Windsor Inn: 6565 N. Mannheim Road, Rosemont, IL 60018, (312) 827-6121.

O'Hare 4 Horsemen Motel: 10300 W. Higgins Road, Rosemont, IL 60018, (312) 296-4471.

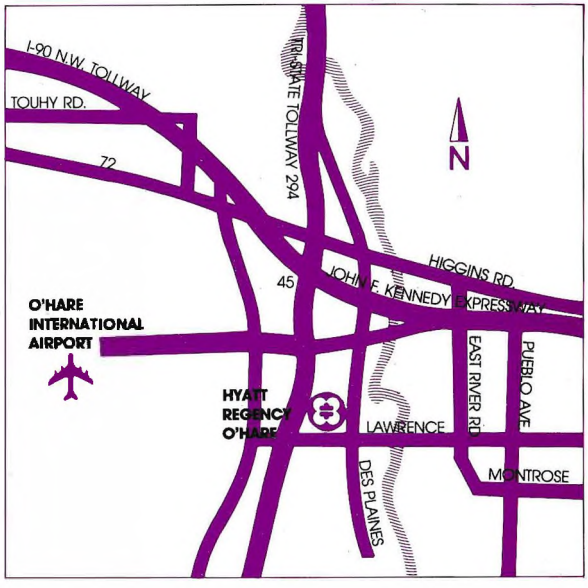
The O'Hare Inn: 6600 N. Mannheim Road, Des Plaines, IL 60018, (312) 827-5131.

Sheraton-O'Hare Motor Hotel: 6810 N. Mannheim Road, Rosemont, IL 60018, (312) 297-1234.

TRANSPORTATION

The Hyatt Regency O'Hare is just minutes from O'Hare International Airport (Chicago), with complimentary hotel bus service, and a half hour from downtown Chicago. Located just off the Kennedy Expressway (I-90); it's across the street from the O'Hare Exposition Center.

From O'Hare Airport: Hyatt Regency O'Hare provides complimentary limousine service every 15 minutes from O'Hare, just minutes away. Just call from the direct line phone located on the lower baggage claim level in each terminal building. **Downtown Chicago:** Kennedy Expressway West to O'Hare Field turnoff; exit at River Road South. **North:** Tri-State (294) south into the Kennedy Expressway Chicago turnoff. Exit at Cumberland North and pass over the expressway and re-enter Kennedy expressway to the O'Hare Field turnoff. Exit at River Road South. **South:** Tri-State north (294-I90) to O'Hare Field, exiting at Mannheim Road South. Pass over the expressway to enter Kennedy Expressway at the Chicago East sign. Exit at River Road South.



HYATT REGENCY O'HARE

River Road at Kennedy Expressway
P. O. Box 66456, Chicago, Illinois 60666
312-696-1234

IEEE Computer Society conference on

pattern recognition and image processing

August 6-8, 1979 Hyatt Regency Chicago O'Hare, Illinois

PRIP 79

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Washington, D.C.

Local Arrangements
Bruce H McCormick
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Virginia Polytechnic Institute
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K S. Fu
Purdue University

Laveen Kanal
University of Maryland

SUNDAY MORNING
Tutorial Session 9:30 a.m.-1:00 p.m.
American/Braniff

PATTERN RECOGNITION & IMAGE PROCESSING TUTORIAL
This tutorial covers the basic concepts in computer pattern recognition and digital image processing. These fields are becoming more important in a variety of application areas such as automated industrial assembly-line production, computer-aided medical evaluation and diagnosis, earth resources and remote sensing, robotics, intelligent data gathering and processing for defense, space exploration, and law enforcement.

Instructors:
Dr. Harry C. Andrews, Vice President and Director of Advanced Plans and Programs at Comtal Corporation.

Dr. King Sun Fu, Professor of Electrical Engineering at Purdue University.

Dr. Robert M. Haralick, Professor of Electrical Engineering at Virginia Polytechnic Institute and State University.

Dr. Laveen N. Kanal, Professor of Computer Science at the University of Maryland.

Course Outline:
Topics to be included are:

I. Statistical Pattern Recognition
   - Decision Rules
   - Feature Extraction

II. Structural Pattern Recognition
   - Syntactic Methods
   - State-Space Methods

III. Image Processing
   - Image Transforms
   - Image Data Compression
   - Image Enhancement and Restoration
   - Image Understanding
   - Hybrid Optical/Digital Processing

Text: "Tutorials and Selected Papers in Digital Image Processing." Participants who have brought 9-track 1600bpi tapes of 512x512 images of 8-bit brightness levels per pixel will be able to work with their images on a COMTAL Vision One/20 System.

SUNDAY AFTERNOON
Social Function 1:00-2:00 p.m.
Eastern/Delta

PRIP TUTORIAL LUNCHEON
Tutorial Session 2:00-6:00 p.m.
American/Braniff

PATTERN RECOGNITION & IMAGE PROCESSING TUTORIAL (continued)

MONDAY MORNING
Session MA1 9:30a.m.-1:00 p.m.
Philippine/Air France

IMAGE PROCESSING
Chair: T. S. Huang, Purdue University

0930 Fourier Quadratic Optimization Technique for Image Reconstruction
W. G. Wee, and A. Prakash, University of Cincinnati 1

1000 Image Enhancement by Gradient Inverse Weighted Smoothing Scheme
D. C. C. Wang, A. H. Vagnucci, and C. C. Li
Montefiore Hospital, Pittsburgh, Pennsylvania 9

1030 A Dynamic Model for Image Registration
D. J. Burr, Bell Laboratories 17

1100 Break
1130 Logarithmic Spiral Grids for Image Processing
C. Weiman, Old Dominion University, G. Chaikin, New York University Medical Center 25
1200 Adaptive Image Filtering
C. H. Chen, Southern Massachusetts University 32

Session MA2 9:30 a.m.-1:00 p.m.
Air Canada

PATTERN RECOGNITION THEORY

0930 A Combined Nonparametric Approach to Future Selection and Binary Decision Tree Design
E. M. Rounds, Technology Service Corp. 38
1000 Statistical Properties of Error Estimators in Performance Assessment of Recognition Systems
J. Kittler, and P. Devijver, Oxford University, England 44
1030 Learning with Imperfectly Labeled Patterns
C. B. Chittineni, Lockheed Corp. 52
1100 Break
1130 An Algorithm for Determining Identity of Nearest-Neighbor and Potential Function Decision Rules
S. N. Srihari, T. Snabb, and L. T. White, SUNY Buffalo 63
1200 Design of Composite Classifier Systems in Imperfectly Supervised Environments
B. V. Dasarathy, M&S Computing, Inc., B.V. Sheela, ISRO Satellite Center, India 71
1230 A Discriminant Analysis Procedure for Paired Variables
M. Cox and C. F. Lam, Medical University of South Carolina 79

Session MA3 9:30 a.m.-1:00 p.m.
Swiss Air/Olympic

INDUSTRIAL APPLICATIONS

Chair: J. Jarvis, Bell Laboratories

0900 Estimation of Internal Machine Part Clearances by Digital Processing of Industrial Radiographs Using a Profile Analysis Technique
D. L. Davies, B. J. McCartin, and P. H. Smith, Pratty & Whitney Aircraft Group 53
1000 Automatic Visual Inspection of Blind Holes in Metal Surfaces
G. B. Porter, T. M. Cipolla, and J. L. Mundy, General Electric 83
1030 Automatic Optical Identification of Faults in Bubble Memory Overlay Patterns
C. A. Klein and K. J. Breeding, Ohio State University 87
1100 Break
1130 Automatic Non-Reference Inspection of Printed Wiring Boards
W. Sterling, Xerox, Palo Aito 93
1200 A Method for Automatic IC Chip Alignment and Wire Bonding
Y. Y. Hsieh and K. S. Fu, Purdue University 101
1230 A Fast Defect Measurement Algorithm and Its Array Proessor Mechanization
O. Firschein and W. Eppler, Lockheed Research, M. A. Fischler, SRI International 109

MONDAY AFTERNOON

Session MP1 2:30-6:00 p.m.
Philippine/Air France

EDGE PROCESSING

Chair: H. Freeman, Rensselaer Polytechnic Institute

0230 Segmentation of Solid Objects Using Global and Local Edge Coincidence
J. J. Hwang, C. C. Lee and E. L. Hall, University of Tennessee 114
0255 Implementation, Interpretation, and Analysis of a Suboptimal Boundary Finding Algorithm
H. Elliott, D. B. Cooper and P. Symosek, Colorado State University 122
0320 An Iterative Generalization of the Sobel Edge Detection Operator
A. Iannino and S. D. Shapiro, Stevens Institute of Technology 130
0345 Evaluation of Edge Operators Using Relative and Absolute Grading
D. J. Bryant and D. W. Bouldin, University of Tennessee 138
0410 Break
0425 On Improving Line Detection in Noisy Images
G. S. Zabele and J. Koplowitz, Clarkson College 146
0450 Edge Extraction of Radar and Optical Images
R. Y. Wong and E. L. Hall, California State Polytechnic University 150
0515 Edge Smoothing
A. Salahi and T. S. Huang, Purdue University 154
0540 An Optimal Three-Dimensional Edge Operator
S. W. Zucker and R. A. Hummel, McGill University, Canada 162

Session MP2 2:30-6:30 p.m.
Air Canada

STRUCTURAL PATTERN RECOGNITION AND CLUSTERING

Chair: S. D. Shapiro, Stevens Institute of Technology

0230 Ln Norm Optimal Histogram Matching
S. K. Chang and Y. W. Wong, University of Illinois—Chicago Circle 169
0300 Where Do I Look Now?: Modeling and Inferring Object Locations by Constraints
D. Russell, University of Rochester 175
0330 An Effective Algorithm for String Correction Using a Generalized Distance
R. L. Kashyap and B. J. Oommen, Purdue University 184
0400 Break
0430 Self-Learning Pattern Classification Using a Sequential Clustering Technique
R. L. DeMantaras and J. Aguilar-Mattin, University of California—Berkeley 192
0500 Pattern Recognition and Problem Solving
R. B. Banerji, Temple University 202
0530 Graphics Techniques for the Evaluation of Clustering Algorithms
W. E. Wright, Southern Illinois University 206

Session MP3 2:30-6:00 p.m.
Swiss Air/Olympic

APPLIED IMAGERY PATTERN RECOGNITION

Chair: R. Nagel, National Bureau of Standards

0230 An SIMD/MIMD Multimicroprocessor System for Image Processing and Pattern Recognition
H. J. Siegel, L. J. Siegel, R. J. McMillen, P. T. Mueller, Jr. and S. D. Smith, Purdue University 214
0255 An Application of Pattern Recognition to an Astronomical Data Reduction Problem
J. F. Jarvis and J. A. Tyson, Bell Laboratories 225
0320 A Direct Two-Dimensional FFT with Applications in Image Processing
D. F. Naccarato and Y. T. Chien, University of Connecticut 233

0345 Covering and Indexing an Image Subset
S. L. Tanimoto, University of Washington 239
0410 Break
0425 Satellite Pattern Classification Using Charge Transfer Devices
W. E. Snyder, C. Husson and H. F. Benz, North Carolina State University 246
0450 The Base 8 Binary Array Processor
A. P. Reeves and R. Rindfuss, Purdue University 250
0515 Implementation of Computation-Intensive Reconstruction Algorithms for X-Ray Computed Tomography
B. Gilbert, L. D. Harris, R. D. Beistad, R. A. Robb and D. E. Atkins, Mayo Clinic, Rochester, MN 256
0540 Software Concepts Useful for Industrial Image Processing
P. Smith, B. McCartin, D. Davies, Pratt and Whitney Aircraft Group

MONDAY EVENING
Social Function 7:00-9:00 p.m.
Diplomat/Viscount
PRIP COCKTAIL RECEPTION

TUESDAY MORNING
Session TA1 9:30 a.m.-1:00 p.m.
Philippine/Air France
CURVE AND SHAPE DESCRIPTION
Chair: T. Pavlidis, Princeton University
0930 Skeletons for Sequential Boundary Data
B. A. Shapiro, J. Pisa and J. Sklansky, National Institutes of Health 265
1000 A Technique for Comparing Curves
D. J. Burr, Bell Laboratories 271
1030 Strip Trees: A Hierarchical Representation for Map Features
D. H. Ballard, University of Rochester 278
1100 Break
1130 Three-Dimensional Shape Analysis Using Local Shape Descriptors
T. P. Wallace, O. R. Mitchell and K. Fukunaga, Purdue University 292
1230 Global Shape Decomposition Using the K-Syntactic Similarity Approach
C. Bjorklund and T. Pavlidis, Princeton University

Session TA2 9:30 a.m.-1:00 p.m.
Swiss Air/Olympic
SCENE ANALYSIS
Chair: A. Guzman, Universidad Nacional Autonoma de Mexico
0930 Experiments in Dynamic Segmentation
C. G. Pieroni, University of Lausanne, Switzerland 300
1000 A Simulated Associative Memory for Storing Structural Descriptions of Pictures
P. Bonzon and T. Van Nam, University of Lausanne 308
1030 Regionization of Image Data Using Surface Approximation
S. Hsu and J. L. Mundy, General Electric 314
1100 Break
1130 Scene Labeling: An Optimization Approach
O. Faugeras and M. Berthod, Institut de Recherche, France 318
1200 Object Recognition by Three-Dimensional Moment Invariants
F. A. Sadjadi and E. L. Hall, University of Tennessee 327
1230 A New Probabilistic Relaxation Scheme
S. Peleg, University of Maryland 337

Session TA3 9:30 a.m.-1:00 p.m.
Air Canada
MEDICAL APPLICATIONS I
(Co-Sponsored by Pattern Recognition Society)
Chair: R. Ledley, Georgetown University Medical Center
0930 Object Location in Computed Tomography Images Using Global Local Segmentation
E. L. Hall and J. J. Hwang, University of Tennessee 344
1000 Problems Associated with Processing Large Numbers of Chest Radiographs
J. L. Hankinson and J. E. Stewart 353
1030 Image Processing in Computer Radiography
R. Heeschen, R. Joseph, F. DiBianca and G. Cohen, General Electric 356
1100 Break
1130 Automatic Radiographic Feature Enhancement
R. S. Ledley, C. M. Park, Y. G. Kulkarni, and R. A. Duffy, Georgetown University Medical Center 363
1200 Functional Imaging: Applications in Three Radiological Modalities
J. E. Holden, University of Wisconsin 368
1230 An Algorithm for Volume Estimation from Digitized Images
L. Cook, P. Cook, K. R. Lee, S. Batnitzky, S. Fritz, J. Ophir, S. J. Dwyer III, A. W. Templeton, University of Kansas Medical Center

TUESDAY AFTERNOON
Session TP1 2:30-6:00 p.m.
Philippine/Air France
TEXTURE AND MATHEMATICAL FOUNDATIONS
Chair: D. Fangeras, Institut de Recherche
0230 Stochastic Texture Fields Synthesis from A Priori Given Second Order Statistics
A. Gagalowicz, Institut de Recherche, France 376
0300 Towards a Set of Statistical Features Which Measure Visually Perceivable Qualities of Textures
R. W. Conners, Louisiana State University 382
0330 Multilevel Array Grammars for Generating Texture Scenes
S. N. Jayaramurthy, University of Iowa 391
0400 Break
0430 Feature Extraction for Texture Discrimination
H. Wechsler, University of Wisconsin 399
0500 Skeletons in Pattern Recognition Categories
M. Pavel, University of Paris, France 404
0530 A Group Theoretic Approach to Invariance in Pattern Recognition
T. G. Newman, Texas Tech University 407

Session TP2 2:30-6:00 p.m.
Swiss Air/Olympia
TWO-DIMENSIONAL AND THREE-DIMENSIONAL SHAPE DESCRIPTION AND MATCHING
Chair: L. Shapiro, Virginia Polytechnic Institute and State University
0230 Structural Shape Description and Matching
L. G. Shapiro, Virginia Polytechic Institute and State University 413
0300 Generalized Cylinders from Parallel Slices
B. Soroka, University of Kansas 421
0330 How to Describe Pure Form and How to Measure Differences in Shape Using Shape Numbers

E. Bribiesca and A. Guzman, Universidad Nacional Autonoma de Mexico 427
0400 Break
0430 Use of Incremental Curvature for Describing and Analyzing Two-Dimensional Shape
H. Freeman, Rensselaer Polytechnic Institute 437
0500 Global Shape Decomposition Using the K-Syntactic Similarity Approach
C. M. Bjorklund and T. Pavlidis, Princeton University 445
0530 Shape Recognition Using Hierarchical Constraint Analysis
T. Henderson & L. Davis, University of Texas at Austin

Session TP3 2:30-6:00 p.m.
Air Canada
MEDICAL APPLICATIONS II
Chair: J. Sklansky, University of California, Irvine
0230 An Approach to Computer Processing of Lung Tissue Micrographs
J. T. Tou and H. H. Liu, University of Florida 453
0300 Metaphase Finding Using Microprocessors
J. Van Daele, F. Dom, L. DeBuysscher, A. Oosterlink and H. Van Den Berghe, University of Leuven, Belgium 460
0330 An Application of Fuzzy Subset Theory to the Classification of Human Chromosomes
L. Vanderbilt, I. A. Oosterlink and H. Van Den Berghe, University of Leuven, Belgium 466
0400 Break
0430 Analysis of Images of Colonies of Tissue Culture Cells and Microorganisms
J. L. Couch, M. W. Konrad and D. Glaser, University of California, Berkeley 473
0500 A Segmentation Approach for Pap Smear Inspection
K. S. Fu and Y. K. Lin, Purdue University 479
0530 Toward Computed Detection of Nodules in Chest Radiographs
J. Skansky, P. Sankar, M. Katz, F. Towfig, D. Hassner, A. Cohen and W. Root, University of California, Irvine 484

TUESDAY EVENING
Social Function 8:00-10:00 p.m.
Rosemont Ballroom
SIGGRAPH/PRIP CONFERENCE RECEPTION

WEDNESDAY MORNING
Session WA1 9:30 a.m.-1:00 p.m.
Philippine/Air France
PANEL: TRANSPORTABLE IMAGE PROCESSING SOFTWARE
Chair: A. Rosenfeld, University of Maryland
Panelists:
B. Barnes, National Science Foundation
H. Freeman, Rensselaer Polytechnic Institute
D. Hamlet, University of Maryland
R. M. Haralick, Virginia Polytechnic Institute and State University

Session WA2 9:30 a.m.-1:00 p.m.
Swiss Air/Olympic
SCENE SEGMENTATION AND INTERPRETATION
Chair: R. M. Haralick, Virginia Polytechnic Institute and State University
0930 A Facet Model for Image Data
R. M. Haralick and L. Watson, Virginia Polytechnic Institute and State University 489
1000 A Noise Reducing Preprocessing Algorithm
K. J. Overton and T. E. Weymouth, University of Massachusetts, Amherst 498
1030 Texture Image Segmentation Using Local Extrema
O. R. Mitchell, S. P. Lutton and S-P. Su, Purdue University 508
1100 Break
1130 Segmentation
K. E. Price, University of Southern California, Los Angeles 512
1200 Segmentation, Evaluation, and Natural Scenes
P. Nagin, R. Kohler, A. Hanson and E. Riseman, University of Massachusetts, Amherst 515
1230 A Modular Computer Vision System for Picture Segmentation and Interpretation
M. D. Levine and S. I. Shaheen, McGill University 523

Session WA3 9:30 a.m.-12:10 p.m.
Rosemont A/B
SIGGRAPH/PRIP SESSION
(Co-Sponsored by SIGGRAPH)
Co-Chairs: R. Baicsy, University of Pennsylvania
B. Pollack, University of British Columbia
0930 Raster Image File Format (RIFF): An Approach to Problems in Image Management
P. G. Selfridge and K. R. Sloan, Jr., University of Rochester 540
0950 An Understanding of Moire Patterns in the Reproduction of Halftone Images
A. Steinbach and K. Wong, IBM 545
1010 Generation of 3D Surface Descriptions from Images of Pattern Illuminated Objects
R. Potmesil, Rensselaer Polytechnic Institute 553
1030 Tutorial on Compensation Tables
E. Catmull, New York Institute of Technology
1050 Break
1110 Simple Animation by Changing Color Definitions
R. Shoup, Xerox Palo Alto Research Center
1130 An Improved Illumination Model for Shaded Displays
T. Whitted, Bell Laboratories
1150 Some Raster Graphics Extensions to the Core System
J. Foley, J. Templeton and D. Dastyar, George Washington University

WEDNESDAY AFTERNOON
Session WP1 2:30-6:00 p.m.
Philippine/Air France
PANEL: IMAGE UNDERSTANDING: PRIP OR AI?
Panel Organizer: K. S. Fu, Purdue University
Moderator: L. Druffel, Defense Advanced Research Projects Agency
Panelists: R. K. Aggarwal, Honeywell
E. Barrett, National Science Foundation
R. M. Haralick, Virginia Polytechnic Institute and State University
L. N. Kanal, University of Maryland
R. Reddy, Carnegie-Mellon University
A. Rosenfeld, University of Maryland

Session WP2 2:30-6:00 p.m.
Air Canada
IMAGE CODING AND CURVE APPROXIMATION
Chair: S. Shanmugam, Bell Laboratories
0230 Motion Compensated Transform Coding
A. N. Netravali and J. Stuller, Bell Laboratories 561

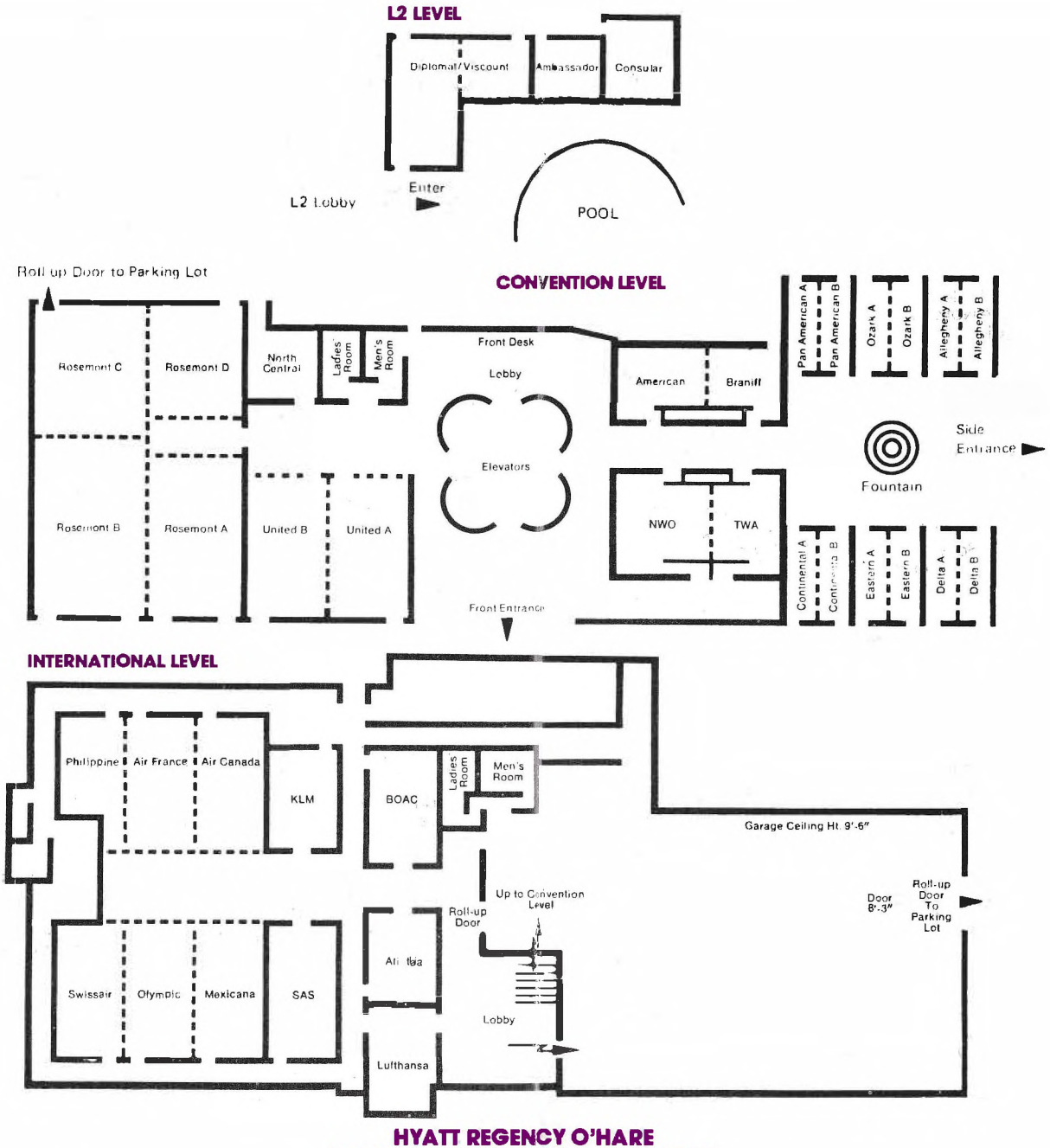
0255 DCT/DPCM Processing of NTSC Composite Video Signal
A. Polysongsang and K. R. Rao, University of Texas 568
0320 Use of the Hough Transform for Image Data Compression
S. D. Shapiro, Stevens Institute of Technology 576
0345 Adaptive Image Data Compression
O. A. Zuniga and R. M. Haralick, Virginia Polytechnic Institute and State University 583
0410 Break
0440 Finding a Good Figure that Approximately Passes Through Given Points
J. R. Slagle and J. K. Dixon, Naval Research Laboratory 591
0505 Applications of a Simple Statistical Model for Curves
T. Pavlidis and D. J. Sakrison, Princeton University 599
0530 Fast Polygonal Approximation of Digitized Curves
J. Sklansky and Gonzalez, University of California, Irvine 604

Session WP3 2:30-6:00 p.m.
Swiss Air/Olympic

REMOTE SENSING AND TIME-VARYING IMAGERY

Chair: F. Billingsley, NASA Headquarters, Washington, D.C.

0230 Map-Guided Interpretation of Remotely Sensed Imagery
J. Tanenbaum, H. G. Barrow, R. C. Bolles, M. A. Fischler, and H. C. Wolf, SRI International 610
0300 Some Recent Developments in Texture Analysis
A. Rosenfeld, University of Maryland 681
0330 Adaptive Remove Sensing Technology for Feature Recognition and Tracking
R. G. Wilson, W. E. Silverston, Jr. and G. F. Bullock, Langley Research Center 623
0400 Break
0430 A Motion Directed Picture Segmentation System to Support Network Graphics Applications
A. I. Karshmer, New Mexico State University 630
0500 A Syntactic Approach to Time-Varying Image Analysis
T. I. Fan and K. S. Fu, Purdue University 638
0530 Visual Motion Perception by Intelligent Systems
W. Scacchi, University of California, Irvine 646



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