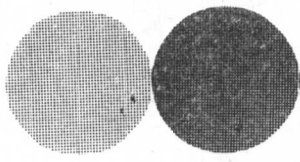


5TH INTERNATIONAL.  
CONFERENCE ON

# PATTERN RECOGNITION



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**5th**  
INTERNATIONAL  
CONFERENCE  
ON

**PATTERN  
RECOGNITION**

Ⓢ PROCEEDINGS



... FLORIDA  
DECEMBER 1-4, 1980

Co-Sponsored by IAPR and the IEEE Computer Society



Ⓢ IEEE COMPUTER SOCIETY

Ⓢ INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS

**Volume 1 of 2**

IEEE CATALOG NO. 80CH1499-3

Library of Congress No. 79-90304

1639/05

13555

Cover design by Dr. J.L. Mundy.

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IEEE Catalog No. 80CH1499-3  
Library of Congress No. 79-90304  
Long Beach Order No. 247

Order from IEEE Computer Society  
10662 Los Vaqueros Circle  
Los Alamitos, CA 90720

IEEE Service Center  
445 Hoes Lane  
Piscataway, N.J. 08854

## CONFERENCE CHAIRMAN'S MESSAGE

It is a great pleasure to offer this volume to the international community of pattern recognition workers. The size of the volume is an indication of the growth of the field and I hope that it will serve as a convenient reference for the latest research work. The publication of the Proceedings is only part of the enormous amount of work required in order to put together a major Conference. It is only appropriate to use this page to indicate my appreciation to all the organizing committee members, the IEEE Computer Society who undertook the financial responsibility for the meeting, and last, but not least the International Association for Pattern Recognition (IAPR) which is the organization that brings together researchers from all the continents.

T. Pavlidis  
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## FOREWORD

The Fifth International Conference on Pattern Recognition, with world-wide representation, is meeting to report research progress and to make plans for the direction of future research. We hope you agree that Miami Beach offers the same delightful setting for the Conference as did cities selected in the past—Washington, D.C., Copenhagen, Coronado, and Kyoto.

A committee of prominent specialists in pattern recognition has designed a technical program to meet two goals—to be rich in quality and to have as many technical areas as possible represented. In order to accomplish these goals, the committee has selected over 300 papers from those contributed. In addition, eleven leading researchers or technologists contributed invited survey papers, and nine panel sessions, focusing on a variety of timely issues, will highlight the four days of the conference. These proceedings constitute the official record of the many contributions to the conference, which I hope will prove to be of lasting value to you.

Besides the direct and visible contributions of papers, much time and effort by many dedicated volunteers and professionals was devoted to the development of the program. I am very grateful to the members of the Program Committee whose time, expertise, advice, and counsel helped shape the technical program and whose assistance made the job of Program Chairman much easier than it could have been. I am also very thankful for the able and expert assistance of the many reviewers who helped screen the papers and who provided many valuable comments, suggestions, and ideas to authors and to the Program Committee. All of these people are the unseen contributors who rightfully should share in the success of this Fifth International Conference on Pattern Recognition.

Perhaps the best way to express my gratitude to all is to cheerfully pass on the baton of the Program Committee for the Fifth to the Committee of the Sixth ICPR. To be held in 1982, the Sixth ICPR will be held in Munich, West Germany, and I sincerely hope that the journey from Miami Beach to Munich will be fruitful and exciting for everyone.

Y. T. Chien  
Program Chairman

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## MESSAGE FROM THE IAPR PRESIDENT

It is with great pleasure that, as President of the International Association for Pattern Recognition, I am able to add these few words of introduction to the Proceedings volume for the 5th International Conference on Pattern Recognition. These biannual conferences have now become universally accepted as the foremost events in the field of pattern recognition and its allied branches. Participation at the conferences has been steadily increasing since the first conference in 1973, and the Proceedings have become recognized as authoritative records of the state of the art of pattern recognition.

Pattern recognition is now a well-respected science-engineering field. It has an international association, a biannual international conference, numerous annual conferences and workshops, a newsletter, journals, books, and an ever-increasing number of academic institutions that offer formal lecture courses bearing its name. This reflects the growing acceptance of pattern recognition as a discipline of fundamental importance to modern technology, providing both new insight and new methodology for solving practical problems in such diverse fields as agriculture, aerial reconnaissance, geology, medicine, military science, communications, law, criminal justice, quality control in manufacturing, robotics, and linguistics.

IAPR is today a well-established international association. Its membership spans 13 national pattern recognition societies or groups organized for this purpose. A number of additional national societies are in the process of being formed and are expected to join IAPR within the next few years. The increasing strength and vitality of IAPR is a testimony to the contributions of the many researchers and practitioners in the field; no better evidence of this can be offered than these Proceedings.

Organization of a major international conference is a demanding task, requiring many months of preparations. For this 5th ICPR the credit for success belongs to the General Chairman, Dr. Theo Pavlidis, and to the Program Chairman, Professor Y.T. Chien, as well as to all who served on the various committees they organized to deal with the physical arrangements for the conference and with the assembly of the technical program. Without their dedicated efforts there would have been no conference. We all owe them a heartfelt vote of thanks.

Herbert Freeman  
President, IAPR

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