

BIOGRAPHICAL INFORMATION OF THEODOSIOS PAVLIDIS

Personal Information

Place of birth: Salonica, Greece

Date of birth: September 8, 1934

Citizenship: U.S.

Education

- Ph.D. in Electrical Engineering, University of California, Berkeley, 1964.
- M.S. in Electrical Engineering, University of California, Berkeley, 1962.
- Diploma in Mechanical and Electrical Engineering, National Technical University of Athens, 1957.

Employment Record:

- 2001- : Distinguished Professor Emeritus, Stony Brook University.
- 2001-2002: Symbol Technologies. Chief Computer Scientist (a VP level position).
- 1986-2001: Departments of Computer Science and Electrical Engineering, Stony Brook University. Leading Professor 1986-1995. Distinguished Professor 1995-2001.
- 1980-1986: Computer Science Research Center, AT&T Bell Laboratories, Murray Hill, NJ. Member of Technical Staff.
- 1964-1980: Department of Electrical Engineering and Computer Science, Princeton University. Promoted to Associate Professor with tenure 1968. Promoted to full Professor in 1975.
- 1978-1979: Visiting Professor of Electrical Engineering and Computer Science, Univ. of California at Berkeley.

Consulting Experience: Before 1980: RCA, Exxon, and U.S. Army Laboratories (Fort Monmouth and Frankford Arsenal). Since 1986: AT&T Bell Labs, Symbol Technologies, Datacopy, Ricoh (Japan), Neomedia Technologies, etc.

Research Interests:

Image Analysis: Computer Vision and Pattern Recognition, especially bi-level image analysis such as bar codes and optical character and graphics recognition;

Computer Graphics and Graphical User Interfaces: Current work emphasizes the use of pattern recognition techniques to facilitate human-machine interaction.

Earlier interests included Control and Systems Theory and their application to Biology.

Awards

Fellow of IEEE, Jan. 1, 1979. (For contributions to the theory and applications of pattern recognition.)

IEEE Computer Society Meritorious Service Award, Nov. 1986. (For contributions as Editor-in-Chief of IEEE Trans. on PAMI.)

Fellow of IAPR (Intern. Assoc. for Pattern Recognition), Oct. 1994, part of the first group that ever received the honor. (For contributions to computer graphics, image processing, and service to IAPR.)

IEEE Computer Society Golden Core Award, 1996.

King-Sun Fu prize for fundamental contributions to the theory and methodology of structural pattern recognition, Sept. 2000. (This is the top award of the International Association for Pattern Recognition presented to an individual every two years.)

Major Professional Activities: I. Publications

Associate Editor for Tutorials of *IEEE Proceedings*, 1990-1992. Member of Editorial Board of *IEEE Proceedings*, 1988-1997.

Member of Editorial Board of *Computer Vision and Image Understanding*, 1991-.

Guest editor (with S. Mori) of special issue of *IEEE Proceedings* on Optical Character Recognition (July 1992).

Editor-in-Chief of *IEEE Transactions on Pattern Analysis and Machine Intelligence*. 1982-1986. (Also member of Editorial Committee 1979-81 and member of Advisory Board since 1986.)

Member of IEEE Publications Board (division 5 representative) 1986-87 (two year term)

Member of IEEE Computer Society Publications Board 1982-1988, 1990, and 1992-1995. (In 1992 chaired search committee for editor-in-chief of IEEE Computer Magazine).

Chairman of IEEE Computer Society Transactions Advisory committee for 1987, 1988, and 1993-1995 (duties included search for new editors-in-chief of transactions, establishment of editorial policies, etc.). Member of same committee 1990-1992.

Former Associate Editor of *Pattern Recognition*, *Computer Vision, Graphics and Image Processing*, *Pattern Recogn. Letters*, *Information Sciences*, and *Bulletin of Mathematical Biology*.

Major Professional Activities: II. Government

Member of the Science Council for the Center of Excellence in Space Data and Information Sciences (CESDIS), University Space Research Association, 1989-91 and 1992-94. (Part of NASA)

Member of panel in preparation of hearings on supercomputing by U.S. House of Representatives, Washington, DC, Feb. 25-26, 1988.

Member of NSF Advisory council for Information, Robotics, and Intelligent Systems (IRIS) (1987-88).

Member of NSF Advisory council for Design, Manufacturing, and Computer Engineering (1985-1986).

Member of Research Briefing Panel on Computer Vision and Pattern Recognition (organized by the National Academy of Sciences), April 1985.

Member of NSF Advisory council for Electrical and Computer Engineering (1981-84).

Also member of various NSF panels for PYI and NYI awards, CER and CISE, site visits, etc. (about one panel per year until 2000 and then again since 2008).

Participant in DARPA Workshop on Document Understanding, Palo Alto, Calif. May 6-8, 1992.

Major Professional Activities: III. Conferences

General Chair IEEE Workshop on Automatic Identification Technologies, Nov. 6&7, 1997, Stony Brook, NY.

Symposium Chair, Third Annual Symposium on Document Analysis and Information Retrieval, Las Vegas, Nev., April 11-13, 1994.

Chair, SPIE Document Recognition Conference, San Jose, Calif., Feb. 6-10, 1994.

Program chairman, ICDAR'93 (Second International Conference on Document Analysis and Recognition), Tsukuba, Japan, Oct. 20-22, 1993.

Program chairman, IAPR Workshop on Structural and Syntactic Pattern Recognition, Nancy, France, Sept. 12-14, 1988.

General Chairman: IEEE Conference on Robotics and Automation, Philadelphia, April 24-29, 1988.

Scientific Committee Chairman: NATO Workshop on Syntactic and Structural Pattern Recognition, Barcelona, Spain, October 1986.

General Chairman: Fifth International Conference on Pattern Recognition, Miami Beach, December 1980.

Chairman of the Dahlem Workshop on Biomedical Pattern Recognition, Berlin (West), May 1979.

Program co-chairman of Pattern Recognition and Artificial Intelligence Workshop, Princeton, April 1978.

Chairman of Adaptive Processes Symposium, 1977.

Member of various conference and workshop committees (including chairmanships), session chairman, etc.

Major Professional Activities: IV. Societies

Member of *K. S. Fu* prize committee, IAPR, 2001-2007 . Chair 2001-2003.

Member of IEEE Computer Society Governing Board (elected by membership vote for a three year term: 1994-96).

Distinguished Visitor for IEEE Computer Society 1991-94.

Member of executive committee International Association for Pattern Recognition, 1978-1982.
Second Vice President 1984-1986.

Patents

- T. Pavlidis, J. Cai, F. Schuessler, and J. D. Chen "Method of Decoding Bar Code Symbols from Partial Scans," *U.S. Patent 5,241,164*, Aug. 31, 1993.
- D. P. Goren, T. Pavlidis, and G. Spitz "Decoding Bar Codes from Multiple Scans using Element Replacement," *U.S. Patent 5,262,626*, Nov. 16, 1993.
- T. Pavlidis and J. Cai "Decoding Bar Code Symbols by Determining the Best Alignment of Partial Scans," *U.S. Patent 5,278,398*, Jan. 11, 1994.
- T. Pavlidis and J. Zhou "Page Segmentation with Tilt Compensation," *U.S. Patent 5,285,504*, Feb. 8, 1994.
- T. Pavlidis, Y. P. Wang, and J. Swartz "High Density Two-Dimensional Bar Code Symbol," *U.S. Patent 5,304,786*, April 19, 1994.
- E. B. Joseph and T. Pavlidis "Analog Waveform Decoder utilizing Histogram of Edge Sizes," *U.S. Patent 5,311,001*, May 10, 1994.
- T. Pavlidis, Y. P. Wang, and J. Swartz "Systems Utilizing a High Density Two Dimensional Bar Code Symbol," *U.S. Patent 5,399,846*, March 21, 1995.
- E. B. Joseph and T. Pavlidis "Analog Waveform Decoder using Peak Locations," *U.S. Patent 5,504,318*, Apr. 2, 1996.
- C-C. J. Li, T. Pavlidis, and J. Katz "Method and System for Bar Code Acquisition" *U.S. Patent 5,504,319*, April 2, 1996.
- T. Pavlidis, Y. P. Wang, and J. Swartz "High Density Two Dimensional Bar Code Symbology" *U.S. Patent 5,504,322*, April 2, 1996.
- T. Pavlidis "Segmenting a page of a document into areas which are text and which are halftone" *U.S. Patent 5,566,255*, Oct. 15, 1996.
- T. Pavlidis, Y. P. Wang, and J. Swartz "Microfilm Reader for High Density Two-Dimensional Bar Code Symbology," *U.S. Patent 5,796,090*, August 18, 1998.
- J. Swartz, ... , T. Pavlidis, (total of 8 names) "Statistical Sampling Security Methodology for self-scanning System," *U.S. Patent 6,092,725*, July 25, 2000.
- J. Swartz, ... , T. Pavlidis, (total of 8 names) "Statistical Sampling Security Methodology for self-scanning System," *U.S. Patent 6,672,506*, January 6, 2004.

Publications

Five Books

Biological Oscillators: Their Mathematical Analysis, Academic Press, 1973 (224 pp).

Structural Pattern Recognition, Springer-Verlag, 1977 (302 pp). (Second printing, 1980.)
Translated into Chinese, 1981.

Algorithms for Graphics and Image Processing, Computer Science Press, 1982 (430 pp).

Translated into: Russian, 1986, Polish, 1987, Chinese 1988, German 1990. Included in Dr. Dobb's CD of Graphics Programming, 1995.

Main selection for May 1983 of *Electrical and Electronics Engineering Book Club*.

Selected as an outstanding academic book of 1982-83 by *Choice*.

Review Extracts:

"After the interdependency of image processing, pattern recognition, and computer graphics has been ignored for so long, this excellent book will set a standard that will influence the three fields for years to come." *ACM Computing Review*.

"This book is a remarkable 'how to' of graphics and imaging Highly recommended."
Computer Graphics World.

Interactive Computer Graphics in X, PWS Publishing Company, Boston, 1996 (555 pp).

Fundamentals of X Programming, Kluwer Academic/Plenum Publishing, April 1999 (374 pp)

Three edited books

- Biomedical Pattern Recognition and Image Processing, Dahlem Konferenzen, Verlag Chemie, 1979 (440pp). (With K. S. Fu.)
- Syntactic and Structural Pattern Recognition, NATO ASI Series, Series F, vol. 45, 1988, Springer-Verlag, (467 pp.) (With G. Ferrate, A. Sanfeliu, and H. Bunke.)
- Structural Pattern Analysis, Series in Computer Science - vol. 19, World Scientific, 1990 (260 pp.) (With R. Mohr and A. Sanfeliu.)

Journal and Conference Papers

Over 100 papers in refereed journals or invited contributions to books. Other publications include conference papers , technical reports, book reviews, contributions to ACM Computing reviews, etc. See [attached list](#) for journal and selected conference papers.

Activities at SUNY, Stony Brook

Since retirement (2001-)

Two advanced graduate special topics courses.

Member of the Emeriti faculty association steering committee.

Before retirement (1986-2001)

Organization of a Laboratory for Image Analysis and Graphics with members of both Computer Science and Electrical Engineering Departments. Research support since 1987 includes the following grants: various NSF grants from the Div. of Information, Robotics, and Intel. Systems and from the Div. of Design and Manufacturing, United States Postal Service, Lockheed Palo Research Laboratory, Grumman Data Systems, Symbol Technologies, Bell Atlantic, Ricoh R&D, and Sony.

Funded projects during the last year before retirement.

- Fundamentals of Two-Dimensional Symbolologies (Sponsored by Symbol Technologies).
- System for Verifying and Editing Technical Drawings (Sponsored by Bell Atlantic).
- Exploratory Research on Context Inference (Sponsored by NSF).

Earlier sponsored projects include research on Regularization Techniques for Image Analysis (NSF), Aerial Image Interpretation (Lockheed), Page Segmentation (Ricoh R&D), Recognition of Poorly Printed Text (U.S. Postal Service and NSF), Computer-assisted Cartography (Grumman Data Systems)

Completed supervision of eleven Ph.D. theses (see list below).

Introduction of a new graduate course in Image Analysis.

Introduction of a new graduate course on Window Systems and Event Driven Programming.

Taught undergraduate courses in graphics, Unix and C, and software engineering.

Member of various departmental committees (incl. executive committee).

Member of administrative review committee of University Senate (1992), including representing that committee on the search committee for vice-president for research and graduate studies.

Activities at Symbol Technologies

As Chief Computer Scientist (2001-2002)

Several projects involving a hand held CCD camera as well as projects in data mining.

Left the company in June 2002 because of disagreements with the upper management on technology issues. (Within a year all the upper management, including the board of directors, had been replaced and the company encountered several legal problems.)

As a Consultant (1987-2000)

Co-inventor of the high-density bar code PDF417.

Evaluated software production tools for Portable System Division and then directed design and implementation of tool SymCase, currently in use by the European Division of the company (1990-91 while on partial leave from the University).

Development of various algorithms for enhancing bar code decoding and acquisition.

Depositions and report preparation on behalf of the company in connection to various patent litigations.

(Activities conducted at SUNY under Symbol funding are listed elsewhere.)

Activities at AT&T Bell Laboratories (1980-1986)

A major research effort has been toward the development of an integrated optical character and graphics recognition system (OCGR). Part of it was in collaboration with Teletype Corporation, a subsidiary of AT&T.

Research on aids for creating technical illustrations and integrating them into phototypeset text. This includes the following: (a) Development of a `distributed' drawing editor that has one part running on a bitmap terminal and another on the host computer. (b) A *troff* preprocessor so that its files can be integrated into text. (c) Algorithms for automatic "beautification" of drawings. These tools are used widely within AT&T Bell Labs and AT&T-IS (command *ped* running under UNIX) for illustrations of technical papers and training manuals.

Other research topics include scan conversion, conic splines, font scaling, and problems on segmentation, enhancement, sampling, and quantization of images.

Activities at Princeton University (1964-1980)

Taught courses on Systems Theory, Pattern Recognition, Discrete Systems (including Graph Theory) and Graphics and Picture Processing.

Director of Graduate Studies in the Department of Electrical Engineering (1969-1972).

Chairman of the Engineering School Committee on Engineering and the Life Sciences (1968-1973). Member of same 1967-1980. [Duties involved, among others, faculty recruitment for Bioengineering Program].

Developed laboratory for digital picture processing and interactive graphics. The main component was a Ramtek RM9300 system.

Supervision of seven Ph.D. theses (see list below) and a number of Master's and senior projects. Three of the senior students who completed such projects have received the departmental prize for outstanding undergraduate research.

Continuous support from NSF for research on Linguistic and Structural Pattern Recognition (Principal Investigator) from 1968 until departure from Princeton.

Support at various time from NIH (for research on Circadian Rhythms), and U. S. Army agencies (for Pattern Recognition). Recipient of an NSF Initiation Grant in 1967-68.

Equipment grants both individually (from NSF) and jointly with other faculty (from NSF and the Mellon Foundation.)

Seminars and Talks (since about 1975)

Universities: Univ. of Aizu (Japan) Technical Univ. of Berlin, Germany, Brown Univ., Univ. of California (Berkeley, Davis, Irvine, UCLA, and Santa Barbara), Cambridge Univ., England, Columbia Univ., Univ. of Connecticut, Concordia Univ. (Montreal), Univ. of Hamburg, Germany, Harvard SEAS, Harvard Medical School, Univ. of Illinois, M. I. T. (AI Lab), Michigan State Univ., Univ. of Minnesota, Univ. of Pennsylvania, Rensselaer Polyt. Instit., Rice Univ., Stanford Univ., Stevens Instit. of Technology, SUNY at Buffalo, SUNY at Stony Brook, Univ. of Texas (Austin), Univ. of Tennessee, Tokyo Institute of Technology, Univ. of Toronto, Tubingen Univ., Germany, Univ. of Virginia, Univ. of Washington, Seattle, Yale University, etc.

Industrial Laboratories: Bell Laboratories (Holmdel and Murray Hill), Electrotechnical Laboratory, Tokyo, Japan, IBM Research (Yorktown Heights, San Jose, and Almaden), Lockheed Palo Alto, NASA-Ames, Nippon-Schlumberger (Tokyo), Xerox PARC, etc.

Invited Conference talks: AAAS Annual Meeting, Boston, 1976, Intern. An. Meeting of Soc. of Exploration Geophysicists, New Orleans., 1979, NATO Advanced Study Institute on Pattern Recognition, St Anne's College, Oxford, England, 1981, Canadian Man - Computer Communications Society Conference, 1981, Waterloo, Ontario, British Pattern Recognition Association, London, 1982, Joint Nat. Acad. of Sciences - Chinese Acad. of Sciences Workshop on text processing by Computer, Palo Alto, 1985, Fourth Scandinavian Conf. on Image Analysis, Trondheim, 1985, NSF/IEEE Workshop on Intelligent Controls, 1988, Intern. Workshop on Visual Form, Capri, 1991, etc.

During October and November 1985 gave a series of lectures at Fudan University (Shanghai), Chinghua University (Beijing), and other Universities in China. Also consulted on curriculum

development. The visit was sponsored by the Chinese University Development Project under the Nat. Academy of Sciences.

Banquet Speaker at the Fourth IEEE Intern. Symp. on Intelligent Control, Albany, September 25, 1989.

Ph. D. Dissertations at Princeton Univ. supervised by T. Pavlidis

(Current or latest known position of former student in parentheses)

- Mylopoulos, John , "On the Recognition and Definition of Patterns in Discrete Spaces", 1970. (Prof. of Computer Science, Univ. of Toronto.)
- Fang, G. S. , "Statistical Techniques for Waveform Analysis and Discrimination", 1971. (AT&T Bell Labs, Holmdel.)
- Feng, Franklin H. Y. , "Description and Recognition of Scenes and Object Shapes from Gray Level Inputs, 1974. (AT&T Bell Labs, Holmdel.)
- Tanimoto, Steven L. , "Hierarchical Approaches to Picture Processing", 1975. (Prof. of Computer Science, Univ. of Washington.)
- Chang, Robin L. P. , "Application of Fuzzy Decision Techniques to Structural Pattern Recognition and Curve Fitting, 1976.
- Bjorklund, Carolyn M. , "Global Shape Analysis by k-Syntactic Similarity", 1979. (Lockheed Research, Palo Alto.)
- Chen, Patrick C. C. , "Image Segmentation by Texture using Estimation Techniques", 1980. (Exxon Production Research, Houston.)

Ph. D. Dissertations at Stony Brook Univ. supervised by T. Pavlidis

(Current or last known position of former student in parentheses)

- Liow, Y. T. , "Integrating Region Growing and Edge Detection", 1989. (AT&T Bell Labs, Holmdel.)
- Wang, Y. P. , "Spatial Information and Coding Theory", 1990. (vice president of advanced technology development at HHP Inc., Hand Held Products)
- Chen, M-H , "Processing of Blurred Bilevel Images", 1992. (Dainippon Screen, Los Angeles, CA.)
- Joseph, E. , "The Recognition and Restoration of Bilevel Waveforms", 1992. (Symbol Technologies, Bohemia, NY.)
- Hu, J. , "Feature Extraction and Indexing Techniques for Pictorial Database Retrieval, 1993. (IBM Research, NY)
- Rocha, J. , "Character Shape Analysis for Word Recognition", 1993. (Univ. of the Balearic Islands, Spain)
- Scarlatos, L. , "Spatial Data Representations For Rapid Visualization and Analysis, 1993. (Associate Prof. Brooklyn College)
- Zhou, J. , "A Document Analysis System", 1993. (Dir. of R&D, Summus Ltd, South Carolina)
- Wang, L. , "Gray Scale Feature Extraction for Character Recognition, 1993. (Citicorp, New York)
- Hunter, K. D. , "Polygon Reconstruction Using a Laser Scanning Model, " 1998. (Chief Scientist, NeoMedia technologies, Fort Myers, Fla)
- Shi, H-W , "A Text Recognition System Based on Graph Embedding Matching", 1998. (Infinity Corp. New York)