

## Anil K. Jain

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### EDUCATION

Ohio State University  
Ph.D. Electrical Engineering 1973  
M.S. Electrical Engineering 1970  
  
Indian Institute of Technology, Kanpur  
B. Tech. Electrical Engineering 1969

### EMPLOYMENT

1992 -  
University Distinguished Professor, Michigan State University  
1995 - 1999  
Chair, Department of Computer Science & Engineering, Michigan State University  
1974 - 1982  
Professor, Associate Professor, and Assistant Professor,  
Department of Computer Science, Michigan State University  
1980 - 1981  
Program Director, Intelligent Systems Program, National Science Foundation  
1972 - 1974  
Assistant Professor, Department of Computer Science, Wayne State University

### Visiting Professor

IIT-Hyderabad; Korea University; Tsinghua University; Hong Kong Polytechnic University; ETH, Zurich; University of Bonn; Technical University of Lisbon; University of Oslo; IBM T.J. Watson Research Center; Hong Kong University of Science and Technology; Osaka University; Norwegian Computing Center; Tata Research Development and Design Center, India; Delft Technical University.

### AWARDS AND RECOGNITION

- Fellow, The World Academy of Science (TWAS), 2019
- *Doctor Honoris Causa*, Universidad Autnoma de Madrid (UAM), 2018
- ISI Highly Cited researcher, 2017; h-index 179, [https://scholar.google.com/citations?user=g-\\_ZXGsAAAAJ](https://scholar.google.com/citations?user=g-_ZXGsAAAAJ)
- Distinguished Alumni Award, IIT Kanpur, 2017
- Member, National Academy of Engineering, 2016
- Foreign Fellow, Indian National Academy of Engineering, 2016
- Member, AAAS Latent fingerprint Study Group, 2015-2017
- Fellow, National Academy of Inventors, 2015
- IAPR Senior Biometric Investigator Award, 2014
- Member, NIST Forensic Science Standards Board, 2014-2016
- Withrow Teaching Excellence Award, Michigan State University, 2014
- Member, IDIAP Scientific Advisory Committee 2013-

- Member, National Academies Panel on Information Technology, 2010-2012; Improvised Explosive Devices, 2005-2007; Biometrics, 2005-2009
- Member, Research Grants Council (Engineering), Hong Kong, 2008-2018
- Member, Defense Science Board, 2008-2010
- IEEE ICDM Research Contributions Award, 2008
- King-Sun Fu Prize, Int'l Association of Pattern Recognition, 2008
- IEEE W. Wallace McDowell Award, 2007; Comp. Society Technical Achievement Award, 2003
- Member, Biometrics Defense Support Team, 2007-2008
- Fellow, SPIE 2005; AAAS 2005; ACM 2003; IAPR 1996; IEEE 1991
- PSP Award from the Association of American Publishers for *Handbook of Fingerprint Recognition*, Springer, 2003
- Pierre Devijver Award, Int'l Association of Pattern Recognition, 2002
- John Simon Guggenheim Fellow 2001; Alexander von Humboldt Research Award 2002; Fulbright Research Scholar 1998
- ACM National Lecturer, 1997-98; IEEE Computer Society Lecturer, 1988-1990
- Ohio State University, College of Engineering Distinguished Alumnus Award, 1997
- Member, IEEE Publications Board, 1989-90
- Michigan State University Distinguished Faculty Award, 1989
- National Merit Scholar, Government of India, 1963

#### PAPER AWARDS

- Best Conf. Paper awards: IEEE BIOSIG, Darmstadt, Germany, 2016; IEEE BTAS, Washington DC, 2013, 2012, 2010, 2009; IEEE ICB, New Delhi India, 2012; IEEE IJCB, Washington DC, 2011; IEEE SIBGRAPI, Brazil, 2010; IEEE ICPR, Istanbul, Turkey 2010; IEEE ICB, Alghero, Italy, 2009; IEEE ICPR, Tampa, 2008; BYSM, Tampa, 2008; PCM, Hong Kong, 2007; IEEE ICPR, Hong Kong, 2006; IEEE ICB, Hong Kong, 2006; IEEE AVBPA, Rye Brook, NY, 2005; IEEE SDM, Orlando, 2004; IEEE ICIP, Kobe, 1999; ICDAR, Montreal, 1995
- Most Cited Paper Award, for "Data Clustering: 50 years beyond K-means", Vol. 31, issue 8, Pattern Recognition Letters, 2013
- Pattern Recognition Journal, Best Paper Award for 2005, 1991, 1987
- IEEE Transactions on Neural Networks, Outstanding Paper Award, June 1996

#### CONFERENCE ORGANIZATION

- *Organizing Committee Member*: Program on Statistics and Applied Mathematics in Forensic Science, SAMSI, Research Triangle Park, NC, 2015-16
- *General Chair*: Int'l Conf. on Pattern Recognition, Beijing, 2018, Int'l Conf. on Biometrics, New Delhi, 2012, Seoul, 2007, and Hong Kong, 2006, 2004; 7<sup>th</sup> Int'l Workshop on Pattern Recognition in Information Systems, Funchal, 2007; Int'l Workshop on Multimedia Content Representation, Classification and Security, Istanbul, 2006; IEEE Computer Vision and Pattern Recognition Conf., Santa Barbara, 1998; Int'l Conf. on Pattern Recognition, Istanbul, 2010, Brisbane, 1998, The Hague, 1992; NSF Workshop on Research Agenda in Biometrics, Morgantown, 2003; Energy Minimization Methods in Computer Vision and Pattern Recognition, Sophia-Antipolis, France, 2001; IEEE Southwest Symposium on Image Analysis and Interpretation, Dallas, 1994; NSF Workshop on Challenges of Computer Vision, Maui, 1991; NSF Workshop on Theory and Applications of MRF, San Diego, 1989; IEEE Workshop on Interpretation of 3D Scenes, Austin, 1989; NSF Indo-US Workshop on Computer Research Collaboration, Hyderabad, 1988; NSF Workshop on Range Image Understanding, East Lansing, 1988; NATO Advanced Research Workshop on Real-Time Object Tracking and Classification, Maratea, Italy, 1987

- *Program Chair*: Audio Video Based Person Authentication, New York, 2005; SPIE Conf. on Biometric Technology for Human Identification, Orlando, 2004, 2005; Int'l Conf. on Pattern Recognition, Cambridge, 2004, Barcelona, 2000

#### EDITORIAL BOARDS

- *Editor in Chief*: IEEE Trans. Pattern Analysis and Machine Intelligence, 1991-1994
- *Associate Editor*, ACM Trans. Knowledge Discovery in Data, 2006-2010; IEEE Trans. Information Forensics and Security, 2005-2010; Pattern Recognition Journal, 1989; IEEE Trans. Pattern Analysis and Machine Intelligence, 1986-1990; IEEE Trans. Neural Networks, 1994-1999; Applied Intelligence, 1980-1990; Journal of Mathematical Imaging and Vision, 1990-1999; Pattern Recognition Letters, 1974-1984
- *Guest Editor*: Pattern Recognition Journal, 2003, 2002, and 1997; IEEE Computer, 2000; IEEE Trans. Neural Networks, 1997

#### KEYNOTE SPEAKER

- Global Congress on Biometric Identification, Shenzhen, Oct 19, 2018
- 13<sup>th</sup> Chinese Conference on Biometric Recognition, Urumqi, Aug 11-12, 2018
- 11<sup>th</sup> Int'l Conf. on Biometrics, Gold Coast, Australia, Feb 20-23, 2018
- 13<sup>th</sup> Int'l Conf. on Signal Image Tech. & Internet Based Systems, Jaipur, India, Dec 4-7, 2017
- 4<sup>th</sup> ID4Africa Conf., Windhoek, Namibia, Apr 26-28, 2017
- 103<sup>rd</sup> Indian Science Congress, Jan 4, 2016
- Federal Reserve Bank, Atlanta, Workshop on Banking on Biometrics, Nov 17, 2015
- NIST Center for Excellence on Forensic Science, Ames, Iowa, Oct 27, 2015
- The Royal Soc. Symp. on the Paradigm Shift for UK Forensic Science, London, Feb 2-3, 2015
- Microsoft 21st Century Computing Conf., Beijing, Oct 29, 2014
- Workshop de Visao Computacional, Uberlandia, Minas Gerais, Brazil, Oct 6-8, 2014
- Int'l Joint Conf. on Biometrics, Tampa, Sept 29-Oct 2, 2014
- EU COST Workshop on BiForD, Opatija, Croatia, May 28-29, 2014
- National Conf. on Computer Vision, Pattern Recognition, Image Processing and Graphics, Jodhpur, India, Dec 18-21, 2013
- Fall National Conf. of Korean Institute of Info. Scientist & Engineers, Jeju, Nov 15-16, 2013
- Int'l Carnahan Conf. on Security Technology, Medellin, Colombia, Oct 2013
- Int'l Conf. on Advanced Computer Science and Information Systems, Bali, Sept 2013
- Int'l Conf. of the Biometrics Special Interest Group, Darmstadt, Sept 2013
- Int'l Conf. on Biometrics, Madrid, June 4-8, 2013
- 10th Biometric Summer School, Alghero, June 11-15, 2013
- Int'l Workshop on Biometrics and Forensics, Lisbon, Apr 4-5, 2013
- Asia Pacific Signal and Information Processing Association Conf., Hollywood, CA, Dec 2012
- IEEE Int'l Conf. on Systems, Man, and Cybernetics, Seoul, Oct, 2012
- Asian Conf. on Biometrics, Beijing, Dec 2011
- IEEE Conf. on Industrial Electronics & Applications, Beijing, June 2011
- EU TURBINE Workshop, Brussels, Jan 2011
- SIAM SDM 2010 Workshop, Columbus, Ohio, May 2010
- Biometric ID Management and Multimodal Communication, Madrid, Sept 2009
- European Conf. Machine Learning, Antwerp, Sept 2008

- Int'l Symposium on Data, Information & Knowledge Spectrum, Amritapuri, India, Dec 2007
- 12th Ibero-American Congress on Pattern Recognition, Valparaiso, Chile, Nov 2007
- 4th Int'l Conf. on Image and Graphics, Chengdu, China, Aug. 2007
- 5th Int'l Conf. on Machine Learning and Data Mining, Leipzig, July 2007
- 2nd Workshop on Computer Vision, Sao Carlos, Brazil, Oct 2006
- 19th Brazilian Sym. on Comp. Graphics, Image Proc. and Comp. Vis., Manaus, Oct 2006
- 18th Int'l Conf. Pattern Recognition, Hong Kong, Aug 2006
- Int'l Conf. on Enterprise Information Systems, Paphos, Cyprus, May 2006
- Symposium on Cryptography and Information Security, Hiroshima, Japan, Jan 2006
- 1st Int'l Conf. Pattern Recognition & Machine Intelligence, Kolkata, India, Dec 2005
- 13th Int'l Conf. Image Analysis and Processing, Cagliari, Italy, Sept 2005
- 14th Scandinavian Conf. Image Analysis, Joensuu, Finland, June 2005
- Korea Computer Vision and Pattern Recognition Society Meeting, Seoul, Dec 2004
- NATO Workshop on Information Security, Ottawa, Oct. 2004
- MIT Technology Review, Emerging Technology Conf., Sept. 2004
- 17th Int'l Conf. Pattern Recognition, Cambridge, England, Aug. 2004
- IEEE Signal Processing and Applications Conf., Kusadasi, Turkey, Apr 2004
- European Union COTS Workshop on Biometrics, Vigo, Spain, Mar 2004
- Sino Biometrics Conf., Beijing, Dec. 2003, Xian, Aug. 2002
- Fifth Int'l Conf. On Advances in Pattern Recognition, Calcutta, Dec. 2003
- Fifth Int'l Conf. On Multimodal Interfaces, Vancouver, Nov. 2003
- German Pattern Recognition Society Conf., Magdeburg, Germany, Sept. 2003
- Austrian Pattern Recognition Society Conf., Vienna, June 2003
- 1st Int'l Conf. on Diagnostic Imaging and Analysis, Shanghai, Aug. 2002
- IAPR Workshop on Statistical & Structural Pattern Recognition, Windsor, Aug. 2002
- MITAC Annual Meeting, Vancouver, May 2002
- Dow Lecture, Saginaw Valley State University, Saginaw, Feb. 2002
- 3rd Audio- Video-Based Person Authentication Conf., Halmstad, Sweden, June 2001
- Workshop on Texture, Oulu, Finland, June 1999
- Int'l Symposium on Multispectral Image Analysis, Wuhan, Oct. 1998
- Computer Vision Graphics and Image Proc. Conf., Taipei, Aug. 1998
- Irish Machine Vision and AI Conf., Derry, N. Ireland, Sept. 1997
- Energy Minimization Methods in Computer Vision & Pattern Recog., Venice, May 1997
- 2nd Asian Conf. on Computer Vision, Singapore, Dec. 1995
- 8th Int'l Conf. Image Analysis and Processing, San Remo, Sept. 1995
- IEEE World Congress on Computational Intelligence, Orlando, July 1994
- 8th Scandinavian Conf. on Image Analysis, Tromso, May 1993
- Digital Image Computing Techniques & Applications, Melbourne, Dec. 1991
- American Association of Physicists in Medicine, San Francisco, July 1991

INVITED TALKS

IIIT-Hyderabad, Hyderabad, Oct 2018; Hong Kong Baptist University, Hong Kong, Oct 2018; Universidad Autonoma de Madrid, Madrid, Sept 2018; Sichuan University, Chengdu, Aug 2018; Xidian University, Xi'an, Aug 2018; Bill & Melinda Gates Foundation, Seattle, Mar 2018; World Food Program, Nairobi, Jan 2018; University of the West Indies, Port of Spain, Jan 2018; Norwegian University of Science and Technology, Gjøvik, Jan 2018; Sandia National Lab, Nov 2017; Yonsei University, Seoul, Korea, June 2017; MNIT, Jaipur, Jan 2016; Hong Kong Baptist University, Dec 2015; Sichuan University, Chengdu, Dec 2015; University of North Texas, Denton, Oct 2015; MIT Workshop on "A Turing++ Question: Who is there?", Sept, 2015; SAMSI Program on Forensics, Research Triangle Park, Aug 2015; Rowan University, July 2015; Hong Kong Baptist University, Apr 2015; Dayalbagh University, Agra, Mar 2015; Noblis, Falls Church, VA, Nov 2014; University of Zagreb, May 2014; Wayne State University, Apr 2014; Dept. of Math, Michigan State University, Apr 2014; University of South Florida, Feb 2014; Boston University, Jan 2014; NSF/DARPA/FBI Workshop on Frontiers of Image Analysis, Jan 2014; Indian Institute of Technology, Bombay, Dec 2013; Sogang University, Nov 2013; Yonsei University, Oct 2013; Institute of Information Science, Academia Sinica, Taipei, Oct 2013; University of Indonesia, Jakarta, Sept 2013; IDIAP, Martigny, Sept 2013; Qualcomm, San Diego, May 2013; University Autonoma, Madrid, June 2013; Yonsei University, Seoul, June 2013; MorphoTrust, Boston, Mar 2013; IIIT, New Delhi, Feb 2013; Dayalbagh University, Agra, Feb 2013; 3M Cogent systems, Dec 2012; University of Texas, Austin, Dec 2012; University of Notre Dame, Nov 2012; 2012 Michigan Biometrics Conf., Grand Rapids, Oct 2012; Postech, Pohang, Oct 2012; Sogang University, Seoul, Sept 2012; Korea University, Seoul, Sept 2012; Life Technologies, Foster City, July 2012; City University of Hong Kong, June 2012; National Laboratory for Pattern Recognition, Beijing, June 2012; King Mankut University of Technology, Bangkok, Mar 2012; Sichuan University, Chengdu, June 2011; University of Miami, Apr 2011; Fujitsu Labs, Tokyo, Dec 2010; Suprema, Seoul, Dec 2010; Hong Kong University Science & Technology, Dec 2010; Korea University, Sept 2010; Beijing Behang University, June 2010; Institute for Infocomm Research, Singapore, June 2010; Universiti Sains Malaysia, Penang, June 2010; Multimedia University, Malacca, June 2010; University of Louisville, Apr 2010; Samsung R&D, Dallas, Apr 2010; University of Florida, Feb 2010; Chosun University, Dec 2009; Yonsei University, Nov 2009; University of Maryland, Oct 2009; Korea University, Oct 2009; Pusan National University, Oct 2009; Tsinghua University, June 2009; Inter American Development Bank, May 2009; University of North Texas, Apr 2009; University of Florida, Oct 2008; Chulalongkorn University, Nov 2008; TCS, Nov 2008; Istanbul Technical University, Sept. 2008; Cogent, Aug. 2008; KMUT, Bangkok, May 2008; Chiang Mai University, Chiang Mai, May 2008; Kentucky Science and Technology Foundation, Apr 2008; University of Minnesota, Apr 2008; University of Virginia, Mar 2008; University of Missouri, Columbia, Jan 2008; CMC Ltd., Hyderabad, Dec 2007; Ford Motor Company, Dearborn, Nov 2007; Information Trust Institute, University of Illinois, Urbana-Champaign, Oct. 2007; Istanbul Technical University, Sept. 2007; Tsinghua University, Beijing, Aug. 2007; Nanyang Technological University, Singapore, Mar 2007; Institute of Infocomm Research, Singapore, Mar 2007; Wayne State University, Detroit, Mar 2007; General Motors Technical Center, Feb. 2007; Yonsei University, Seoul, Jan. 2007; Hong Kong Baptist University, Jan. 2007; Department of Electrical & Computer Engineering, Ohio State University, Nov. 2006; School of Computer Science, University of Central Florida, Nov. 2006; UNESP, Baurau, Brazil, Oct 2006; Federal University of Parana, Curitiba, Brazil, Oct 2006; Sichuan University, Chengdu, China, Aug 2006; Institute of Automation, Beijing, Aug 2006; Lumidigm, Albuquerque, July 2006; SAGEM, Paris, June 2006; Department of Informatics, ETH, Zurich, May 2006; University of Athens, May 2006; Aristotle University of Thessaloniki, May 2006; Kyoto University, Jan 2006; Indian Institute of Technology, Kanpur, Dec 2005; Indian Institute of Science, Bangalore, Dec 2005; Institut National Telecommunications (INT-Evry), Nov 2005; National Academy of Science Sackler Forensic Science Colloquium, Nov 2005; Dept. of Computer Science, SUNY, Buffalo, Oct 2005; Department of Electrical Engineering, Istanbul Technical University, Sept., 2005; NEC Research Labs, Princeton, July 2005; Institute of Automation, Chinese Academy of Sciences, Beijing, June 2005; Siemens Corporate Research, Princeton, Feb 2005; Symbol Technologies, Long Island, Feb 2005; Biometric Research Center, Yonsei University, Seoul, Dec 2004; Indian Institute of Technology, Mumbai, Dec 2004; CMC Research and Development Center, Hyderabad, Dec 2004; ATR Int'l, Kyoto, Nov 2004; Department of Electrical & Computer Engi-

neering, Carnegie Mellon University, Nov. 2004; Department of Statistics, University of Goettingen, Germany, June 2004; Department of Informatics, University of Freiburg, Germany, June 2004; Department of Computer Science, ETH, June 2004; Beckman Institute, University of Illinois, Urbana, Mar 2004; Department of Computer Science, Indian Institute of Technology, Kanpur, Dec. 2003; Department of Computer Science, Hong Kong Polytechnic University, Dec. 2003; Department of Computer Science, Hong Kong University of Science & Technology, Dec. 2003; ECE Dept. Tulane University, New Orleans, Oct. 2003; CSEE Department, West Virginia University, Morgantown, Oct. 2003; "Science at the Edge" Seminar Series, Michigan State University, Sept. 2003; Philips Research Lab, Eindhoven, Sept. 2003; Department of Informatics III, University of Bonn, July 2003; Department of Computer Science, Technical University of Vienna, June 2003; Biometrics Summer School, Sardinia, June 2003; ECE Department, North Carolina State University, Mar 2003; Statistics Department, Florida State University, Feb. 2003; Computer Science Department, University Notre Dame, Jan. 2003; Dept. of Computer Science, Hong Kong Polytechnic University, Hong Kong Dec. 2002; Computer Science Dept., IUPUI, Indianapolis, Nov. 2002; Financial Sector Technical Committee (NIST), Alexandria, VA, Oct. 2002; Biometric Consortium (BC 2002), Crystal City, VA, Sept. 2002; Department of Computer Science, Sichuan University, Chengdu, Aug. 2002; Pierre Devijver Lecturer, Workshop on Structural & Statistical Patter Recognition, Windsor, Aug. 2002; National Institute of Standards & Technology (NIST), June 2002; CITER, West Virginia University, Apr 2002; GAO Panel on Biometrics, Washington D.C., Apr 2002; Department of Computing, University of Alberta, Mar 2002; NSF Workshop on Pattern Recognition, Ann Arbor, Mar 2002; Department of Electrical Engineering, University of Texas, Austin, Feb. 2002; Department of Computer Science, University of Bonn, Germany, Jan. 2002; Department of Computer Science, Western Michigan University, Nov. 2001; Department of Computer Science, Oakland University, Nov. 2001; Department of Electrical & Computer Engineering, MSU Sept. 2001; Department of Statistics, University of Michigan, Sept. 2001; Department of Computer Science, Hong Kong University Science & Technology, Aug. 2001; Department of Computer Science, Chulankongkorn University, Bangkok, Aug. 2001; Software Park, Bangkok, Aug. 2001; Department of Computer Science, King Mangkot University, Aug. 2001; Department of Statistics, Ohio State University, May 2001; Department of Electrical & Computer Engineering, University of Miami, Coral Gables, Mar 2001; National Center for Software Technology, Bombay, Dec. 4, 2000; Department of Computer Science, Indian Institute of Technology, Delhi, Dec. 1, 2000; Department of Electronic Engineering, Nanyang Technical University, Singapore, Nov. 25, 2000; National Laboratory of Pattern Recognition, Beijing, Nov. 23, 2000; Microsoft Research Laboratory, Beijing, Nov. 20-22, 2000; Eaton Corporation, Rochester Hills, Nov. 15, 2000; Department of Electrical Engineering, Istanbul Technical University, Oct. 24, 2000; Marmara Research Center, Istanbul, Oct. 23, 2000; Siemens PSE Division, Graz, Oct. 19, 2000; Siemens ICM Division, Munich, Oct. 18, 2000; Campus Interdisciplinary Seminar, MSU, Oct. 4, 2000; Lawrence Technological University, Southfield, Sept. 27, 2000; Eaton Corporation, Milwaukee, Aug. 28, 2000; West Virginia EPSCOR Workshop, Charleston, WV, Feb. 1999; University of Surrey, Guildford, England, Jan. 1999; Instituto Superior Tecnico, Lisbon, Portugal, Nov. 1998; West Virginia Science & Technology Council, Morgantown, Nov. 1998; National Laboratory for Pattern Recognition, Beijing, Oct. 1998; Academica Sinica, Taipei, Aug. 1998; National Taiwan University, Taipei, Aug. 1998; Department of Computer Science, University of Auckland, New Zealand, Aug. 1998; Department of Computer Science, New York University, Mar 1998; University of West Virginia, Morgantown, Jan. 1998; Department of Systems Design, University of Waterloo, Sept. 1997; LG Electronic Research Center, Princeton, Aug. 1997; School of Automation, Indian Institute of Science, Bangalore, July 1997; Bell Labs, Lucent Technologies, Naperville, July 1997; National Centre for Software Technology, Bombay, July 1997; Department of Computer Science, Sichuan Union University, Chengdu, June 1997; Department of Computer Science, Hong Kong University Science & Technology, June 1997; University of Cagliari, Italy, May 1997; Department of Computer Science, Ohio State University, May 1997; University of Indonesia, Jakarta, May 1997; NEC Research Laboratory, Princeton, Feb. 1997

## PATENTS

1. A. K. Jain, U. Park and H. C. Choi, "Apparatus and method for monitoring", Korean Patent

- No. 10-1170269, July 25, 2012.
2. A. K. Jain, U. Park and H. C. Choi, "Apparatus and method for monitoring using beam splitter", Korean Patent No. 10-1150563, May 21, 2012.
  3. A. K. Jain, L. Hong, R. Bolle and S. Pankanti, "System and Method for Deriving a string-based representation of a fingerprint image", U.S. Patent No. 6,487,306, Nov. 26, 2002.
  4. A. K. Jain, L. Hong, R. Bolle and S. Pankanti, "Determining A Point Correspondence Between Two Points in Two Respective (Fingerprint) Images", U.S. Patent No. 6, 049,621, Apr 11, 2000.
  5. A. K. Jain, L. Hong, R. Bolle and S. Pankanti, "System and Method for Matching (Fingerprint) Images Using an Aligned String-Based Representation", U.S. Patent No. 6,185,318, Feb. 6, 2001.
  6. A. K. Jain, L. Hong, R. Bolle and S. Pankanti, "System and Method For Identifying Foreground And Background Portions Of Digitized Images", U.S. Patent No. 6,263,091, July 17, 2001.
  7. A. K. Jain, L. Hong, R. Bolle and S. Pankanti, "System and Method for Determining Block Direction in Fingerprint Images", U.S. Patent No. 6,289112 Sept. 11, 2001.
  8. A. K. Jain, L. Hong, R. Bolle and S. Pankanti, "Determining An Alignment Estimation Between Two (Fingerprint) Images", U.S. Patent No. 6,314,197, Nov. 6, 2001.

## PUBLICATIONS

### BOOKS

1. S. Z. Li and A. K. Jain (eds.), *Encyclopedia of Biometrics*, Second Edition, Springer, 2015.
2. S. Z. Li and A. K. Jain (eds.), *Handbook of Face Recognition*, Second Edition, Springer, 2011.
3. A. K. Jain, A. Ross and K. Nandakumar, *Introduction to Biometrics*, Springer, 2011.
4. A. K. Jain, A. Ross and P. J. Flynn (eds.), *Handbook of Biometrics*, Springer, 2007.
5. A. Ross, K. Nandakumar and A. K. Jain, *Handbook of Multibiometrics*, Springer, 2006.
6. S. Z. Li and A. K. Jain (eds.), *Handbook of Face Recognition*, Springer, 2005.
7. J. L. Wayman, A. K. Jain, D. Maltoni and D. Maio (eds.), *Biometric Systems: Technology, Design and Performance Evaluation*, Springer, 2005.
8. D. Maltoni, D. Maio, A. K. Jain and S. Prabhakar, *Handbook of Fingerprint Recognition*, Springer-Verlag, 2003; Second edition, 2009.
9. A. K. Jain, S. Pankanti and R. Bolle (eds.), *BIOMETRICS: Personal Identification in Networked Society*, Kluwer, 1999.
10. A. K. Jain and P. J. Flynn (eds.), *3D Object Recognition Systems*, Elsevier, 1993.
11. R. Chellappa and A. K. Jain (eds.), *Markov Random Fields: Theory and Applications*, Academic Press, 1993.
12. I. Sethi and A. K. Jain (eds.), *Neural Networks and Statistical Pattern Recognition*, North Holland, 1991.
13. R. Jain and A. K. Jain (eds.), *Analysis and Interpretation of Range Images*, Springer Verlag, 1990.
14. A. K. Jain and R. C. Dubes, *Algorithms for Clustering Data*, Prentice Hall, 1988.

## JOURNAL ARTICLES

1. J. Engelsma, K. Cao and A. K. Jain, “RaspiReader: An Open Source Fingerprint Reader”, *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2018.
2. G. Mai, K. Cao, Pong C. Yuen and A. K. Jain, “On The Reconstruction Of Face Images From Deep Face Templates”, *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2018.
3. T. Chugh, K. Cao, and Anil K. Jain, “Fingerprint Spoof Buster: Use of Minutiae-centered Patches”, *IEEE Transactions on Information Forensics and Security*, 2018.
4. K. Cao and A. K. Jain, “Automated Latent Fingerprint Recognition”, *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2018.
5. L. Best-Rowden and A. K. Jain, “Automatic Face Image Quality Prediction”, *IEEE Transactions on Information Forensics and Security*, 2018.
6. Y. Shi, C. Otto and A. K. Jain, “Face Clustering: Representation and Pairwise Constraints”, *IEEE Transactions on Information Forensics and Security*, 2018.
7. J. Engelsma, S. S. Arora, A. K. Jain and N. Paulter, “Universal 3D Wearable Fingerprint Targets: Advancing Fingerprint Reader Evaluations”, *IEEE Transactions on Information Forensics and Security*, 2018.
8. T. Chugh, K. Cao, J. Zhou, E. Tabassi and A. K. Jain, “Latent Fingerprint Value Prediction: Crowd-based Learning”, *IEEE Transactions on Information Forensics and Security*, Vol. 13, No. 1, pp. 20-34, Jan 2018.
9. H. Han, A. K. Jain, F. Wang, S. Shan, and X. Chen, “Heterogeneous Face Attribute Estimation: A Deep Multi-Task Learning Approach”, *IEEE Trans. Pattern Analysis & Machine Intelligence*, 2017.
10. S. S. Arora, A. K. Jain and N. G. Paulter, “Gold Fingers: 3D Targets for Evaluating Capacitive Readers”, *IEEE Transactions on Information Forensics and Security*, Vol. 12, No. 9, pp. 2067-2077, Sep 2017.
11. A. K. Jain, S. S. Arora, K. Cao, L. Best-Rowden and A. Bhatnagar, “Fingerprint Recognition of Young Children”, *IEEE Transactions on Information Forensics and Security*, Vol. 12, No. 7, pp. 1501-1514, July 2017.
12. D. Crouse, R. Jacobs, S. Klum, Z. Richardson, A. K. Jain, A. Baden and S. Tecot, “Lemur-FaceID: A Face Recognition System to facilitate Individual Identification of Lemurs”, *BMC Zoology*, 2017.
13. C. Otto, D. Wang and A. K. Jain, “Clustering Millions of Faces by Identity”, *IEEE Trans. Pattern Analysis & Machine Intelligence*, 2017.
14. L. Best-Rowden and A. K. Jain, “Longitudinal Study of Automatic Face Recognition”, *IEEE Trans. Pattern Analysis & Machine Intelligence*, 2017.
15. F. Wei, S. Bucak, J. Vollner, T. Fenton, A. K. Jain and R. C. Haut, “Classification of Porcine Cranial Fracture Patterns Using a Fracture Printing Interface”, *Journal of Forensic Sciences*, 2016
16. P. S. Sudhish, A. K. Jain and K. Cao, “Adaptive Fusion of Biometric and Biographic Information for Identity De-duplication”, *Pattern Recognition Letters*, 2016.
17. I. M. Baytas, K. Lin, F. Wang, A. K. Jain and J. Zhou, “PHENOTREE: Interactive Visual Analytics for Hierarchical Phenotyping from Large-Scale Electronic Health Records”, *IEEE Transaction on Multimedia*, 2016.
18. I. M. Baytas, K. Lin, F. Wang, A. K. Jain and J. Zhou, “Stochastic convex sparse principal component analysis”, *EURASIP Journal on Bioinformatics and Systems Biology*, 2016.

19. D. Wang, C. Otto and A. K. Jain, "Face Search at Scale", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, June 2016.
20. S. S. Arora, K. Cao, A. K. Jain and N. G. Paulter Jr., "Design and Fabrication of 3D Fingerprint Targets", *IEEE Transactions on Information Forensics and Security*, Vol. 11, No. 10, pp. 2284-2297, Oct 2016.
21. A. K. Jain, K. Nandakumar, A. Ross, "50 years of Biometric Research: Accomplishments, Challenges, and Opportunities", *Pattern Recognition Letters*, Vol. 79, Pages 80-105, Aug 2016.
22. K. Patel, H. Han and A. K. Jain, "Secure Face Unlock: Spoof Detection on Smartphones", *IEEE Transactions on Information Forensics and Security*, Vol. 11, No. 10, pp. 2268-2283, Oct 2016.
23. S. Liao, A. K. Jain and S. Z. Li, "A Fast and Accurate Unconstrained Face Detector", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 38, No. 2, pp. 211-223, Feb 2016.
24. S. Yoon and A. K. Jain, "Longitudinal Study of Fingerprint Recognition", *Proc. National Academy of Sciences*, Vol. 112, No. 28, pp. 8555-8560, July 2015.
25. A. K. Jain and A. Ross, "Bridging the Gap: From Biometrics to Forensics", *Philosophical Transactions of The Royal Society B*, Vol. 370, No. 1674, Aug 2015.
26. K. Nandakumar and A. K. Jain, "Biometric Template Protection Schemes: Bridging the Performance Gap Between Theory and Practice", *IEEE Signal Processing Magazine*, Vol. 32, No. 5, pp. 88-100, Sept 2015.
27. D. Wen, H. Han and A. K. Jain, "Face Spoof Detection with Image Distortion Analysis", *IEEE Transactions on Information Forensics and Security*, Vol. 10, No. 4, pp. 746-761, Apr 2015.
28. K. Cao and A. K. Jain, "Learning Fingerprint Reconstruction: From Minutiae to Image", *IEEE Transactions on Information Forensics and Security*, Vol. 10, No. 1, pp. 104-117, Jan 2015.
29. H. Han, C. Otto, X. Liu and A. K. Jain, "Demographic Estimation from Face Images: Human vs. Machine Performance", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2015.
30. S. Klum, H. Han, B. Klare and A. K. Jain, "The FaceSketchID System: Matching Facial Composites to Mugshots", *IEEE Transactions on Information Forensics and Security*, Vol. 9, No. 12, pp. 2248-2263, 2014.
31. L. Best-Rowden, H. Han, C. Otto, B. Klare and A. K. Jain, "Unconstrained Face Recognition: Identifying a Person of Interest from a Media Collection", *IEEE Transactions on Information Forensics and Security*, Vol. 9, No. 12, pp. 2144-2157, 2014.
32. K. Nguyen, A. Sarkar, and A. K. Jain, "Prostate Cancer Grading: Use of Graph Cut and Spatial Arrangement of Nuclei", *IEEE Transactions on Medical Imaging*, Vol. 33, No. 12, pp. 2254-2270, 2014.
33. D. Kang, H. Han, A. K. Jain, and S. W. Lee, "Nighttime Face Recognition at Large Standoff: Cross-Distance and Cross-Spectral Matching", *Pattern Recognition*, Vol. 47, No. 12, pp. 3750-3766, 2014.
34. U. Park, J. Park and A. K. Jain, "Robust Keypoint Detection Using Higher-Order Scale Space Derivatives: Application to Image Retrieval", *IEEE Signal Processing Letters*, Vol. 21, No. 8, pp. 962-965, Aug 2014.
35. S. S. Arora, E. Liu, K. Cao and A. K. Jain, "Latent Fingerprint Matching: Performance Gain via Feedback from Exemplar Prints", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 36, No. 12, pp. 2452-2465, 2014.

36. K. Cao, E. Liu and A. K. Jain, "Segmentation and Enhancement of Latent Fingerprints: A Coarse to Fine Ridge Structure Dictionary", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 36, No. 9, pp. 1847-1859, Sept 2014.
37. S. Bucak, R. Jin, and A. K. Jain, "Multiple Kernel Learning for Visual Object Recognition: A Review", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 36, No. 7, pp. 1354-1369, July 2014.
38. U. Park, H. Choi, A. K. Jain and S. Lee, "Face Tracking and Recognition at a Distance: A Coaxial and Concentric PTZ Camera System", *IEEE Transactions on Information Forensics and Security*, Vol. 8, No. 10, pp. 1665-1677, 2013
39. E. Liu, A. K. Jain, and J. Tien, "A Coarse to Fine Minutiae-Based Latent Palmprint Matching", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 35, No. 10, pp. 2307-2322, 2013.
40. J. C. Klontz and A. K. Jain, "A Case Study of Automated Face Recognition: The Boston Marathon Bombing Suspects", *IEEE Computer*, Nov, 2013.
41. L. Wu, R. Jin and A. K. Jain, "Tag Completion for Image Retrieval", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 35, No. 3, pp. 716-727, Mar 2013.
42. H. Han, B. Klare, K. Bonnen, and A. K. Jain, "Matching Composite Sketches to Face Photos: A Component-Based Approach", *IEEE Transactions on Information Forensics and Security*, Vol. 8, No. 1, pp. 191-204, Jan 2013.
43. K. Bonnen, B. Klare, and A. K. Jain, "Component-Based Representation in Automated Face Recognition", *IEEE Transactions on Information Forensics and Security*, Vol. 8, No. 1, pp. 239-253, Jan 2013.
44. A. A. Paulino, J. Feng, and A. K. Jain, "Latent Fingerprint Matching Using Descriptor-Based Hough Transform", *IEEE Transactions on Information Forensics and Security*, Vol. 8, No. 1, pp. 31-45, Jan 2013.
45. B. Klare and A. K. Jain, "Heterogeneous Face Recognition using Kernel Prototype Similarities", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 35, No. 6, pp. 1410-1422, 2012.
46. S. Liao, A. K. Jain, and S. Z. Li, "Partial Face Recognition: Alignment-Free Approach", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 35, No. 5, pp. 1193-1205, 2012.
47. J. Feng, J. Zhou, and A. K. Jain, "Orientation Field Estimation for Latent Fingerprint Enhancement", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 35, No. 4, pp. 925-940, 2012.
48. A. Nagar, H. S. Choi, and A. K. Jain, "Evidential Value of Automated Latent Fingerprint Comparison: An Empirical Approach", *IEEE Transactions on Information Forensics and Security*, Vol. 7, No. 6, pp. 1752-1765, Dec 2012.
49. B. F. Klare, M. Burge, J. Klontz, R. W. Vorder Bruegge, and A. K. Jain, "Face Recognition Performance: Role of Demographic Information", *IEEE Transactions on Information Forensics and Security*, Vol. 7, No. 6, pp. 1789-1801, Dec 2012 .
50. Z. Lei, S. Liao, A. K. Jain, and S. Z. Li, "Coupled Discriminant Analysis for Heterogeneous Face Recognition", *IEEE Transactions on Information Forensics and Security*, Vol. 7, No. 6, pp. 1701-1716, Dec 2012.
51. Q. Zhao and A. K. Jain, "Model-Based Separation of Overlapping Latent Fingerprints", *IEEE Transactions on Information Forensics and Security*, Vol. 7, No. 3, pp. 904-918, June 2012.
52. A. Nagar, K. Nandakumar, and A. K. Jain, "Multibiometric Cryptosystems based on Feature Level Fusion", *IEEE Transactions on Information Forensics and Security*, Vol. 7, No. 1, pp. 255-268, Feb 2012.

53. A. K. Jain and K. Nandakumar, "Biometric Authentication: System Security and User Privacy", *IEEE Computer*, Nov, 2012.
54. A. K. Jain, R. Jin, and J.-E. Lee, "Tattoo Image Matching and Retrieval", *IEEE Computer*, Vol. 45, No. 5, pp. 93-96, May, 2012.
55. A. K. Jain and S. Yoon, "Automatic Detection of Altered Fingerprints", *IEEE Computer*, Vol. 45, No. 1, pp. 79-82, Jan, 2012.
56. J.-E. Lee, W. Tong, R. Jin, and A. K. Jain, "Image Retrieval in Forensics: Tattoo Image Database Application", *IEEE Multimedia*, Vol. 19, No. 1, pp. 40-49, 2012.
57. A. K. Jain, B. Klare, and U. Park, "Face Matching and Retrieval in Forensics Applications", *IEEE Multimedia*, Vol. 19, No. 1, pp. 20-28, 2012.
58. Y.-B. Lee, U. Park, and A. K. Jain, "PILL-ID Matching and Retrieval of Drug Pill Images", *Pattern Recognition Letters*, Vol. 33, No. 7, pp. 904-910, May 2012.
59. K. Nguyen, B. Sabata, and A. K. Jain, "Prostate Cancer Grading: Gland Segmentation and Structural Features", *Pattern Recognition Letters*, Vol. 33, No. 7, pp. 951-961, May 2012.
60. S. Yoon, J. Feng, and A. K. Jain, "Altered Fingerprints: Analysis and Detection", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 34, No. 3, pp. 451-464, Mar 2012.
61. K. Nguyen, A. K. Jain, and B. Sabata, "Prostate Cancer Detection: Fusion of Cytological and Textural Features", *Journal of Pathology Informatics*, Vol. 2, No. 2, p. 3, 2011.
62. S. Prabhakar, A. Ivanisov, and A. K. Jain, "Biometric Recognition: Sensor Characteristics and Image Quality", *IEEE Instrumentation & Measurement Society Magazine*, Vol. 14, No. 3, pp. 10-16, June 2011.
63. A. K. Jain, and B. Klare, "Matching Forensic Sketches and Mug Shots to Apprehend Criminals", *IEEE Computer*, Vol.44, No. 5, pp. 94-96, May 2011.
64. Z. Li, U. Park, and Anil K. Jain, "A Discriminative Model for Age Invariant Face Recognition," *IEEE Transactions on Information Forensics and Security*, Vol. 6, No. 3, pp. 1028-1037, Sept 2011.
65. H-I. Suk, A. K. Jain, and S-W. Lee, "A Network of Dynamic Probabilistic Models for Human Interaction Analysis", *IEEE Transactions on Circuits and Systems for Video Technology*, Vol. 21, No. 7, pp. 932-945, July 2011.
66. F. Chen, J. Feng, A. K. Jain, J. Zhou, and J. Zhang, "Separating Overlapped Fingerprints", *IEEE Transactions on Information Forensics and Security*, Vol. 6, No. 2, pp. 346-359, June 2011.
67. T. Bourlai, A. Ross, and A. K. Jain, "Restoring Degraded Face Images: A Case Study in Matching Faxed, Printed and Scanned Photos", *IEEE Transactions on Information Forensics and Security*, Vol. 6, No. 2, pp. 371-384, June 2011.
68. U. Park, R. Jillela, A. Ross and A. K. Jain, "Periocular Biometrics in the Visible Spectrum", *IEEE Transactions on Information Forensics and Security*, Vol. 6. No. 1, pp. 96-106, Mar 2011.
69. B. Klare, Z. Li, and A. K. Jain, "Matching Forensic Sketches to Mugshot Photos", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 33, No. 3, pp. 639-646, Mar 2011.
70. J. Feng and A. K. Jain, "Fingerprint Reconstruction: From Minutiae to Phase", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 33, No. 2, pp. 209-223, Feb 2011.
71. A. K. Jain and J. Feng, "Latent Fingerprint Matching", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 33, No. 1, pp. 88-100, Jan 2011.

72. K. Niinuma, U. Park, and A. K. Jain, "Soft Biometric Traits For Continuous User Authentication", *IEEE Transactions on Information Forensics and Security*, Vol. 5, No. 4, pp. 771-780, Dec 2010.
73. U. Park and A. K. Jain, "Face Matching and Retrieval Using Soft Biometrics", *IEEE Transactions on Information Forensics and Security*, Vol. 5, No. 3, pp. 406-415, Sept 2010.
74. A. K. Jain, "Data Clustering: 50 Years Beyond K-Means", *Pattern Recognition Letters*, Vol. 31, No. 8, pp. 651-666, June 2010.
75. A. Nagar, K. Nandakumar, and A. K. Jain, "A hybrid biometric cryptosystem for securing fingerprint minutiae templates", *Pattern Recognition Letters*, Vol. 31, No. 8, pp. 733-741, June 2010.
76. U. Park, Y. Tong and A. K. Jain, "Age-invariant Face Recognition", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 32, No. 5, pp. 947-954, May 2010.
77. Y. C. Feng, P. C. Yuen and A. K. Jain, "A Hybrid Approach for Generating Secure and Discriminating Face Template", *IEEE Transactions on Information Forensics & security*, Vol. 5, No. 1, pp. 103-117, Mar 2010.
78. A. K. Jain, J. Feng and K. Nandakumar, "Fingerprint Matching", *IEEE Computer*, pp. 36-44, Feb 2010.
79. P. K. Mallapragada, R. Jin, A. K. Jain and Y. Liu, "SemiBoost: Boosting for Semi-supervised Learning", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 31, No. 11, pp. 2000-2014, Nov 2009.
80. A. K. Jain and J. Feng, "Latent Palmprint Matching", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 31, No. 6, pp. 1032-1047, June 2009.
81. X. Lu and A. K. Jain, "Deformation Modeling for Robust 3D Face Matching", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 30, No. 8, pp. 1346-1357, Aug. 2008.
82. K. Nandakumar, Y. Chen, S. C. Dass and A. K. Jain, "Likelihood Ratio Based Biometric Score Fusion", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 30, No. 2, pp. 342-347, Feb. 2008.
83. A. K. Jain, K. Nandakumar and A. Nagar, "Biometric Template Security", *EURASIP Journal on Advances in Signal Processing*, Vol. 2008, ArticleID 579416, Jan. 2008.
84. K. Nandakumar, A. K. Jain and S. Pankanti, "Fingerprint-based Fuzzy Vault: Implementation and Performance", *IEEE Transactions on Information Forensics and Security*, Vol. 2, No. 4, pp. 744-757, Dec 2007.
85. A. K. Jain, "Biometric Recognition: Q & A", *Nature*, Vol. 449, pp. 38-40, Sept. 2007.
86. S. C. Dass, Y. Zhu and A. K. Jain, "Statistical Models for Assessing the Individuality of Fingerprints", *IEEE Transactions on Information Forensics and Security*, Vol. 2, No. 3, pp. 391-401, Sept. 2007.
87. A. Ross, J. Shah and A. K. Jain, "From Templates to Images: Regenerating Fingerprints From Minutiae Points", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 29, No. 4, pp. 544-560, Apr 2007.
88. M. Farmer and A. K. Jain, "Smart Automotive Airbags: Occupant Classification and Tracking", *IEEE Transactions on Vehicular Technology*, Vol. 52, No. 1, pp. 60-80, Jan. 2007.
89. A. K. Jain, Y. Chen and M. Demirkus, "Pores and Ridges: Fingerprint Matching Using Level 3 Features", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 29, No. 1, pp. 15-27, Jan. 2007.
90. S. C. Dass, Y. Zhu and A. K. Jain, "Validating a Biometric Authentication System: Sample Size Requirements", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 28, No. 12, pp. 1902-1913, Dec. 2006.

91. A. K. Jain, A. Ross and S. Pankanti, "Biometrics: A Tool for Information Security", *IEEE Transactions on Information Forensics and Security*, Vol. 1, No. 2, pp. 125-143, June 2006.
92. M. H. Law and A. K. Jain, "Incremental Nonlinear Dimensionality Reduction by Manifold Learning", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 28, No. 3, pp. 377-391, Mar. 2006.
93. M. Farmer and A. K. Jain, "Wrapper-Based Approach to Image Segmentation And Classification", *IEEE Transactions on Image Processing*, Vol.14, No. 12, pp. 2060-2072, Dec. 2005
94. Xiaoguang Lu, Anil K. Jain, and Dirk Colbry, "Matching 2.5D Face Scans to 3D Models," *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol.28, No. 1, pp. 31-43, Jan. 2006.
95. A. Ross, S. Dass and A. K. Jain, "Fingerprint Warping Using Ridge Curve Correspondences", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 28, No.1, pp. 19-30, Jan. 2006.
96. R. Cappelli, D. Maio, D. Maltoni, J.L. Wayman and A. K. Jain, "Performance Evaluation of Fingerprint Verification Systems", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 28, No. 1, pp. 3-18, Jan. 2006.
97. A. Topchy, A. K. Jain, W. Punch, "Clustering Ensembles: Models of Consensus and Weak Partitions", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol, 27, No. 12, pp. 1866-1881, Dec 2005.
98. A. K. Jain, K. Nandakumar and A. Ross, "Score Normalization in Multimodal Biometric Systems", *Pattern Recognition*, Vol. 38, No. 12, pp. 2270-2285, Dec 2005.
99. H. Chen and A. K. Jain, "Dental Biometrics: Alignment and Matching of Dental Radiographs", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 27, No. 8, pp. 1319-1326, Aug 2005.
100. A. Fred and A. K. Jain, "Combining Multiple Clusterings Using Evidence Accumulation", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 27, No. 8, pp. 835-850, June 2005.
101. R. Snelick, U. Uludag, A. Mink, M. Indovina and A. K. Jain, "Large Scale Evaluation of Multimodal Biometric Authentication Using State-of-the-Art Systems", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 27, No. 3, pp. 450-455, Mar 2005.
102. A. Ross, S. Dass and A. K. Jain, "A Deformable Model for Fingerprint Matching", *Pattern Recognition*, Vol. 38, No. 1, pp. 95-103, Jan. 2005.
103. M.H. Law, M.A.T. Figueiredo, and A. K. Jain, "Simultaneous Feature Selection and Clustering Using Mixture Models", *IEEE Transactions Pattern Analysis and Machine Intelligence*, vol. 26, no. 9, pp. 1154-1166, Sept. 2004.
104. U. Uludag, A. Ross and A. K. Jain, "Biometric Template Selection and Update: A Case Study in Fingerprints", *Pattern Recognition*, Vol. 37, No. 7, pp. 1533-1542, July 2004.
105. A. K. Jain and Chen Hong, "Matching of Dental X-ray Images for Human Identification", *Pattern Recognition*, Vol. 37, No. 7, pp. 1519-1532, July 2004.
106. U. Uludag, S. Pankanti, S. Prabhakar and A. K. Jain, "Biometric Cryptosystems: Issues and Challenges", *Proc. IEEE*, Vol. 92, No. 6, pp. 948-960, June 2004.
107. K. Jung, K. Kim and A. K. Jain, "Text Information Extraction in Images and Video: A Survey", *Pattern Recognition*, Vol. 37, No. 5, pp. 977-997, May 2004.
108. A. K. Jain, A. Ross and S. Prabhakar, "An Introduction to Biometric Recognition", *IEEE Transactions on Circuits and Systems for Video Technology*, Vol. 14, No. 1, pp. 4-20, Jan. 2004.
109. A. K. Jain and A. Ross, "Multibiometric Systems", *Comm. ACM*, Vol. 47, No. 1, pp. 34-40, Jan. 2004.

110. A. Namboodiri and A. K. Jain, "On-Line Handwritten Script Recognition", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 26, No. 1, pp. 124-130, Jan. 2004.
111. R.L. Hsu and A. K. Jain, "Generating Discriminating Cartoon Faces Using Interacting Snakes", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 25, No. 11, pp. 1388-1398, Nov. 2003.
112. A. K. Jain and U. Uludag, "Hiding Biometric Data", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 25, No. 11, pp. 1494-1498, Nov. 2003.
113. S. Prabhakar, A. K. Jain and S. Pankanti, "Learning Fingerprint Minutiae Location and Type", *Pattern Recognition*, Vol. 36, No. 8, pp. 1847-1857, 2003.
114. A. Ross and Anil Jain, "Information Fusion in Biometrics", *Pattern Recognition Letters*, Vol. 24, Issue 13, pp. 2115-2125, Sept. 2003.
115. S. Prabhakar, S. Pankanti, and A. K. Jain, "Biometric Recognition: Security & Privacy Concerns", *IEEE Security & Privacy Magazine*, vol. 1, no. 2, pp. 33-42, Mar-Apr 2003.
116. A. K. Jain and S. Prabhakar "Biometrics Authentication", *INSIGHT*, Vol. 2, pp. 29-52, Jan 2003.
117. A. Ross, A. K. Jain, and J. Reisman, "A Hybrid Fingerprint Matcher", *Pattern Recognition*, Vol. 36, No. 7, pp. 1661-1673, 2003.
118. N. Duta, A. K. Jain and K.V. Mardia, "Matching of Palmprints", *Pattern Recognition Letters*, Vol. 23, pp. 477-485, 2002.
119. S. Pankanti, S. Prabhakar and A. K. Jain, "On the Individuality of Fingerprints", *Fingerprint World*, Vol. 28, No. 109, July 2002.
120. G.D. Guo, A. K. Jain, W.-Y. Ma and H.-J. Zhang, "Learning Similarity Measure for Natural Image Retrieval with Relevance Feedback", *IEEE Transactions on Neural Networks*, Vol. 13, pp. 811-820, July 2002.
121. R.L. Hsu, M. Adbel-Mottaleb and A. K. Jain, "Face Detection in Color Images", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 24, pp. 696-707, May 2002.
122. A. Vailaya, H.J. Zhang, C. J. Yang, F.I. Liu, and A. K. Jain, "Automatic Image Orientation Detection", *IEEE Transactions on Image Processing*, Vol. 11, pp. 746-755, July 2002.
123. S. Pankanti, S. Prabhakar and A. K. Jain, "On the Individuality of Fingerprints," *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 24, pp. 1010-1025, Aug. 2002.
124. A. K. Jain, Friedericke D. Griess and Scott D. Connell, "On-line Signature Verification," *Pattern Recognition*, Vol. 35, pp. 2963-2972, Dec. 2002.
125. A. K. Jain, S. Prabhakar and S. Pankanti, "On the Similarity of Identical Twin Fingerprints," *Pattern Recognition*, vol. 35, pp. 2653-2663, Nov. 2002.
126. D. Maio, D. Maltoni, R. Cappelli, J. Wayman and A. K. Jain, "FVC2000: Fingerprint Verification Competition," *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 24, No. 3, pp. 402-412, Mar 2002.
127. A. K. Jain, S. Prabhakar and S. Pankanti, "Matching and Classification: A case study in fingerprint domain", *Proc. Indian National Science Academy, Vol. 67(A), No. 2*, pp. 223-241, Mar 2001.
128. M.A.T. Figueiredo and A. K. Jain, "Unsupervised Learning of Finite Mixture Models", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 24, No. 3, pp. 381-396, Mar 2002.
129. S.D. Connell and A. K. Jain, "Writer Adaptation for Online Handwriting Recognition", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 24, No. 3, pp. 329-346, Mar 2002.

130. J. Liu, F.B. Dazzo, O. Glagoleva, B. Yu and A. K. Jain, "CMEIAS: A Computer Aided System for the Image Analysis of Bacterial Morphotypes in Microbial Communities", *Microbial Ecology*, Vol. 41, pp. 173-194, 2001.
131. A. K. Jain and S. Pankanti, "Biometric Systems: Anatomy of Performance", *IEICE Transactions on Fundamentals*, Vol. E84-D, No. 7, pp. 788-799, July 2001.
132. S. Prabhakar and A. K. Jain, "Decision Level Fusion in Fingerprint Verification", *Pattern Recognition*, Vol. 35, No. 4, pp. 861-874, Apr 2002.
133. B. Kamgar-Parsi, B. Kamgar-Parsi, A. K. Jain and J. Dayhoff, "Aircraft Detection: A Case Study in Using Human Similarity Measure", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol.23, pp. 1404-1414, Dec. 2001.
134. N. Duta, A. K. Jain and M.-P. Dubuisson-Jolly, "Automatic Construction of 2D Shape Models", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2001, Vol. 23, pp. 433-446, May 2001.
135. A. Vailaya, M. Figueiredo, A. K. Jain and H.J. Zhang, "Bayesian Framework for Hierarchical Semantic Classification of Vacation Images", *IEEE Transactions on Image Processing*, Vol. 10, No. 1, pp. 157-172, Jan. 2001.
136. S. Connell and A. K. Jain, "Template-based On-Line Character Recognition", *Pattern Recognition*, Vol. 34, No. 1, pp. 1-14, Jan. 2001.
137. M. Raymer, W. Punch, E. Goodman, L. Kuhn and A. K. Jain, "Dimensionality Reduction Using Genetic Algorithms", *IEEE Transactions on Evolutionary Computation*, Vol. 4, No. 2, July 2000.
138. Y. Zhong, A. K. Jain and M.P. Dubuisson-Jolly, "Object Tracking Using Deformable Templates", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 22, pp. 544-549, May 2000.
139. A. K. Jain and C. Dorai, "3D Object Recognition: Representation and Matching", *Statistics and Computing*, Vol. 10, No. 2, pp. 167-182, 2000.
140. M.T. Figueiredo, J. Leitao and A. K. Jain, "Unsupervised Contour Representation and Estimation Using B-Splines and a Minimum Description Length Criterion", *IEEE Transactions on Image Processing*, Vol. 9, No. 6, pp. 1075-1087, June 2000.
141. A. K. Jain, S. Prabhakar, L. Hong and S. Pankanti, "Filterbank-based Fingerprint Matching", *IEEE Transactions on Image Processing*, Vol. 9, No. 5, pp. 846-859, May 2000.
142. Y. Zhong, H.J. Zhang and A. K. Jain, "Automatic Caption Localization in Compressed Video", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 22, No. 4, pp. 385-393, Apr 2000.
143. Y. Zhong and A. K. Jain, "Object Localization Using Color, Texture and Shape", *Pattern Recognition*, Vol. 33, No. 4, pp. 671-684, Apr 2000.
144. S. Pankanti, R. Bolle and A. K. Jain, "Biometrics: The Future of Identification (Guest Editor's Introduction)", *IEEE Computer*, pp. 2-5, Feb. 2000.
145. A. K. Jain, L. Hong and S. Pankanti, "Biometric Identification", *Comm. ACM*, Vol. 43, pp. 90-98, Feb. 2000.
146. A. K. Jain, R. Duin and J. Mao, "Statistical Pattern Recognition: A Review", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 22, pp. 4-37, Jan. 2000.
147. J. Liu and A. K. Jain, "Image-based Form Document Retrieval", *Pattern Recognition*, Vol. 33, No. 3, pp. 503-513, 2000.
148. A.R. Jimenez, A. K. Jain, R. Ceres and J.L. Pons, "Automatic Fruit Recognition: A Survey and New Results Using Range/Attenuation Images", *Pattern Recognition*, Vol. 32, pp. 1719-1736, 1999.

149. A. K. Jain, S. Prabhakar and S. Chen, "Combining Multiple Matchers for High Security Fingerprint Verification System", *Pattern Recognition Letters*, Vol. 20, pp. 1371-1379, 1999.
150. A. K. Jain, M. Narasimha Murty and P.J. Flynn, "Data Clustering: A Review", *ACM Computing Surveys*, Vol. 31, No. 3, pp. 264-323, Sept. 1999.
151. J. Strand, T. Taxt and A. K. Jain, "Two-Dimensional Phase Unwrapping Using a Block Least Squares Method", *IEEE Transactions on Image Processing*, Vol. 8, No. 3, pp. 375-386, 1999.
152. A. K. Jain, S. Prabhakar and L. Hong, "A Multichannel Approach to Fingerprint Classification", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 21, No. 4, pp. 348-359, 1999.
153. A. K. Jain, A. Vailaya and W. Xiong, "Query by Video Clip", *Multimedia Systems*, Vol. 7, No. 5, pp. 369-384, 1999.
154. N. Ratha and A. K. Jain, "Computer Vision Algorithms on Reconfigurable Logic Arrays", *IEEE Transactions on Parallel and Distributed Systems*, Vol. 10, No. 1, pp. 29-43, 1999.
155. Y.H. Li and A. K. Jain, "Classification of Text Documents", *Computer Journal*, Vol. 41, No. 8, 1998.
156. A. K. Jain, Y. Zhong and M.-P. Jolly, "Deformable Templates: A Review", *Signal Processing*, Vol. 71, pp. 109-129, 1998.
157. L. Hong and A. K. Jain, "Integrating Faces and Fingerprints", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 20, No. 12, pp. 1295-1307, Dec. 1998.
158. S.W. Chen, S.T. Tung, C.Y. Fang, S. Cherng and A. K. Jain, "Extended Attributed String Matching for Shape Recognition", *Computer Vision and Image Understanding*, Vol. 70, No. 1, pp. 36-50, 1998.
159. L. Hong Y. Wan and A. K. Jain, "Fingerprint Image Enhancement: Algorithm and Performance Evaluation", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 20, No. 8, pp. 777-789, 1998.
160. D. Judd, P. McKinley and A. K. Jain, "Large-Scale Parallel Data Clustering", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 20, No. 8, pp. 871-876, 1998.
161. A. Vailaya, A. K. Jain and H.J. Zhang, "On Image Classification: City Images vs. Landscapes", *Pattern Recognition*, Vol. 31, No. 12, pp. 1921-1935, 1998.
162. A. K. Jain and B. Yu, "Automatic Text Location in Images and Video Frames", *Pattern Recognition*, Vol. 31, No. 12, pp. 2055-2076, 1998.
163. A. K. Jain and A. Vailaya, "Shape-Based Retrieval: A Case Study with Trademark Image Databases", *Pattern Recognition*, Vol. 31, No. 9, pp. 1369-1390, 1998.
164. A. K. Jain and B. Yu, "Document Representation and its Application to Page Decomposition", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 20, No. 3, pp. 294-308, 1998.
165. A. K. Jain, L. Hong, S. Pankanti and R. Bolle, "An Identity Authentication System Using Fingerprints", *Proc. IEEE*, Vol. 85, No. 9, pp. 1365-1388, 1997.
166. A. K. Jain and D. Zongker, "Representation and Recognition of Handwritten Digits Using Deformable Templates", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 19, No. 12, pp. 1386-1391, 1997.
167. C. Dorai, G. Wang, A. K. Jain and C. Mercer, "From Images to Models: Automatic 3D Object Model Construction from Multiple Views", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 20, No. 1, pp. 82-89, 1998.
168. C. Dorai and A. K. Jain, "COSMOS: A Representation scheme for 3D Free-Form Objects", *IEEE Trans Pattern Analysis and Machine Intelligence*, Vol. 19, No. 10, pp. 1115-1130, 1997.

169. C. Dorai, J. Weng and A. K. Jain, "Optimal Registration of Multiple Object Views", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 19, No. 10, pp. 1131-1138, 1997.
170. C. Dorai and A. K. Jain, "Shape Spectrum-Based View Grouping and matching of 3D Free-Form Objects", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 19, No. 10, pp. 1139-1145, 1997.
171. O. Trier, T. Taxt and A. K. Jain, "Recognition of Digits in Hydrographic Maps: Binary Versus Topographic Analysis", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 19, No. 4, pp. 399-404, 1997.
172. A. K. Jain, L. Hong and R. Bolle, "On Line Fingerprint Verification", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 19, No. 4, pp. 302-314, 1997.
173. A. K. Jain and D. Zongker, "Feature Selection: Evaluation, Application, and Small Sample Performance", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 19, No. 2, pp. 153-158, 1997.
174. M. Gokmen and A. K. Jain, "-Space Representation of Images and Generalized Edge Detector", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 19, No. 6, pp. 545-563, 1997.
175. H. Dulimarta and A. K. Jain, "Mobile Robot Localization in Indoor Environment", *Pattern Recognition*, Vol. 30, No. 1, pp. 99-111, 1997.
176. A. K. Jain, N. Ratha and S. Lakshmanan, "Object Detection Using Gabor Filters", *Pattern Recognition*, Vol. 30, No. 2, pp. 295-309, 1997.
177. A. K. Jain and C. Dorai, "Practicing Vision: Integration, Evaluation and Applications", *Pattern Recognition*, Vol. 30, No. 2, pp. 193-196, 1997.
178. A. Schistad Solberg and A. K. Jain, "Texture Fusion and Feature Selection Applied to SAR Imagery", *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 35, No. 2, pp. 475-479, Mar 1997.
179. J. Kuo, J. Deller, and A. K. Jain, "Pre/post-filter for performance improvement of transform coding", *Signal Processing: Image Communication*, 8, pp. 229-239, 1996.
180. B. Yu and A. K. Jain, "A Generic System for Form Dropout", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 18, No. 11, pp. 1127-1134, 1996.
181. N. Ratha, S. Chen, K. Karu and A. K. Jain, "A Real-time Matching System for Large Fingerprint Databases", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 18, No. 8, pp. 799-813, 1996.
182. G. Gimel'farb and A. K. Jain, "On Retrieving Textured Images from an Image Database", *Pattern Recognition*, Vol. 29, No. 9, pp. 1461-1484, Sept. 1996.
183. K. Karu, A. K. Jain and R. Bolle, "Is there Texture in the Image?", *Pattern Recognition*, Vol. 29, No. 9, pp. 1437-1446, Sept. 1996.
184. A. K. Jain, J. Mao, and M. Mohiuddin "Neural Networks: A Tutorial", *IEEE Computer*, Vol. 29, No. 3, pp. 31-44, Mar 1996.
185. B. Yu and A. K. Jain, "A Robust and Fast Skew Detection Algorithm for Generic Documents", *Pattern Recognition*, Vol. 29, No. 10, pp. 1599-1630, Oct. 1996.
186. A. K. Jain and A. Vailaya, "Image Retrieval Using Color and Shape", *Pattern Recognition*, Vol. 29, No. 8, pp. 1233-1244, 1996.
187. H. Dulimarta and A. K. Jain, "A Client/Server Control Architecture for Robot Navigation", *Pattern Recognition*, Vol. 29, No. 8, pp. 1259-1284, 1996.
188. O. Trier, A. K. Jain and T. Taxt, "Feature Extraction Methods for Character Recognition-A Survey", *Pattern Recognition*, Vol. 29, No. 3, pp. 641-662, Apr 1996.

189. S. Nadabar and A. K. Jain, "Parameter Estimation in Markov Random Field Line Process Models", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 18, No. 3, pp. 326-329, Mar 1996.
190. A. K. Jain, Y. Zhong and S. Lakshmanan "Object Matching Using Deformable Templates", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 18, No. 3, pp. 267-278, Mar 1996.
191. M.P. Dubuisson, S. Lakshmanan and A. K. Jain, "Vehicle Segmentation Using Deformable Templates", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 18, No. 3, pp. 293-308, Mar 1996.
192. A. K. Jain and Y. Zhong, "Page Segmentation Using Texture Analysis", *Pattern Recognition*, Vol. 29, No. 5, pp. 743-770, May 1996.
193. K. Karu and A. K. Jain, "Fingerprint Classification", *Pattern Recognition*, Vol. 29, No. 3, pp. 389-404, 1996.
194. A. Schistad Solberg, A. K. Jain and T. Taxt, "A Markov Random Field Model for Classification of Multisource Satellite Imagery", *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 34, No. 1, pp. 100-113, Jan. 1996.
195. J. Mao and A. K. Jain, "A Self-Organizing Network for Hyper-Ellipsoidal Clustering (HEC)", *IEEE Transactions on Neural Networks*, Vol. 7, 1, pp. 16-29, Jan. 1996.
196. B. Günsel, A. K. Jain and E. Panayirci, "Reconstruction and Boundary Estimation of Range and Intensity Images Using Multiscale MRF Representations", *CVGIP: Image Understanding*, Vol. 63, 2, pp. 353-366, Mar 1995.
197. N. Ratha, S. Chen and A. K. Jain, "Adaptive Flow Orientation Based Feature Extraction in Fingerprint Images", *Pattern Recognition*, Vol. 28, pp. 1657-1672, Nov. 1995.
198. Y. Zhong, K. Karu and A. K. Jain, "Locating Text in Complex Color Images", *Pattern Recognition*, Vol. 28, 10, pp. 1523-1536, Oct. 1995.
199. S. Pankanti and A. K. Jain, "Integrating Vision Modules: Stereo, Shading, Grouping, and Line Labeling", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 17, pp. 831-842, Sept. 1995.
200. T. Newman and A. K. Jain, "A System for 3D CAD-Based Inspection Using Range Images", *Pattern Recognition*, Vol. 28, pp. 1555-1574, Oct. 1995.
201. M. Narasimha Murty and A. K. Jain, "Knowledge-Based Clustering Scheme for Collection Management and Retrieval of Library Books", *Pattern Recognition*, pp. 949-964, 1995.
202. A. K. Jain and K. Karu, "Learning Texture Discrimination Masks", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 18, 2, pp. 195-205, Feb. 1996.
203. O. Trier and A. K. Jain, "Goal-Directed Evaluation of Binarization Methods", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 17, pp. 1191-1201, Dec. 1995.
204. M. Kraaijveld, J. Mao and A. K. Jain, "A Non-Linear Projection Method Based on Kohonen's Topology Preserving Maps", *IEEE Transactions on Neural Networks*, Vol. 6, pp. 548-559, May 1995.
205. M.-P. Dubuisson, A. K. Jain and W.C. Taylor, "Segmentation and Matching of Vehicles in Road Images", *Transportation Research Record*, No. 1412, pp. 57-63, 1993.
206. A. Schistad Solberg, A. K. Jain and T. Taxt, "Multisource Classification of Remotely Sensed Data: Fusion of Landsat TM and SAR Images", *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 32, pp. 768-778, July 1994.
207. T. Newman and A. K. Jain, "A Survey of Automated Visual Inspection", *CVGIP: Image Understanding*, Vol. 61, pp. 231-262, Mar 1995.

208. J. Mao, P. Flynn and A. K. Jain, "Integration of Multiple Feature Groups and Multiple Views into a 3D Object Recognition System", *CVGIP: Image Understanding*, Vol. 62, pp. 309-329, Nov. 1995.
209. M.-P. Dubuisson and A. K. Jain, "Contour Extraction of Moving Objects in Complex Outdoor Scenes", *Int'l Journal of Computer Vision*, Vol. 14, pp. 83-105, 1995.
210. J. Mao and A. K. Jain, "Neural Networks for Feature Extraction and Multivariate Data Projection", *IEEE Transactions on Neural Networks*, Vol. 6, pp. 296-317, Mar 1995.
211. M.P. Dubuisson, A. K. Jain and M.K. Jain "Segmentation and Classification of Bacterial Culture Images", *Journal of Microbiological Methods*, Vol. 19, pp. 279-295, 1994.
212. Y. Chen and A. K. Jain, "Address Block Location Using Color and Texture Analysis", *CVGIP: Image Understanding*, Vol. 60, 2, pp. 179-190, 1994.
213. S. Nadabar and A. K. Jain, "Bayesian Approach to Sensor Fusion: Implementation on a Connection Machine (CM-2)", *Pattern Recognition*, Vol. 28, No. 1, pp. 11-26, 1995.
214. N.S. Raja and A. K. Jain, "Obtaining Generic Parts from Range Images using a Multi-View Representation", *CVGIP: Image Understanding*, Vol. 60, 1, pp. 44-64, July 1994.
215. P. Flynn, T. Newman and A. K. Jain, "Model-Based Classification of Quadric Surfaces", *CVGIP: Image Understanding*, Vol. 58, No. 2, pp. 235-249, Sept. 1993.
216. S. Raudys and A. K. Jain, "On Training Sample Size and Complexity of Artificial Neural Net Classifier", *INFORMATICA*, 3, 3, 1992, pp. 301-337.
217. A. K. Jain and S. Bhattacharjee, "Text Segmentation for Automatic Document Processing", *Machine Vision and Applications*, 5, 3, pp. 169-184, 1992.
218. A. K. Jain and S. Bhattacharjee, "Address Block Location on Envelopes Using Gabor Filters", *Pattern Recognition*, 25, 12, pp. 1459-1477, 1992.
219. N.S. Raja and A. K. Jain, "Recognizing Geons from Superquadrics Fitted to Range Data", *Image and Vision Computing*, 10, 3, pp. 179-190, 1992.
220. S.W. Chen and A. K. Jain, "Multi View and Multiple Matching Techniques for 3D Object Recognition", *Computer Vision, Graphics and Image Processing: Image Understanding*, pp. 121-130, 1993.
221. P. Flynn and A. K. Jain, "3D Object Recognition Using Invariant Feature Indexing of Interpretation Tables", *Computer Vision, Graphic and Image Processing*, 55, 2, pp. 119-129, Mar 1992.
222. A. K. Jain and M.D. Ramaswami, "Rule Based 3D Object Recognition from Range Images", *JIETE*, 1992.
223. T. Newman and A. K. Jain, "Range Intensity Histogram for Segmenting LADAR Images", *Pattern Recognition Letters*, 13, 1, pp. 41-56, Jan. 1992.
224. P. Flynn and A. K. Jain, "BONSAI: 3D Object Recognition Using Constrained Search", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 13,10, pp. 1066 1075, 1991.
225. J. Mao and A. K. Jain, "Texture Classification and Segmentation Using Multiresolution Simultaneous Autoregressive Models", *Pattern Recognition*, 25, 2, pp. 173-188, 1992.
226. A. K. Jain and M.-P. Dubuisson, "Segmentation of X ray and C scan Images of Fiber Reinforced Composite Materials", *Pattern Recognition*, Vol. 25, No. 3, pp. 257-270, 1992.
227. A. K. Jain and F. Farrokhnia, "Unsupervised Texture Segmentation Using Gabor Filters", *Pattern Recognition*, 24,12, pp. 1167 1186, 1991.
228. S.W. Chen and A. K. Jain, "Object Extraction from Laser Radar Imagery", *Pattern Recognition*, 24, 6, pp. 587 600, 1991.
229. J. Ton, J. Sticklen and A. K. Jain, "Knowledge based Segmentation of Landsat Images", *IEEE Transactions on Geoscience and Remote Sensing*, 29, 2, pp. 222 232, 1991.

230. S. Raudys and A. K. Jain, "Small Sample Size Effects in Statistical Pattern Recognition: Recommendations for Practitioners", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 13, 3, pp. 252-264, 1991.
231. P. Flynn and A. K. Jain, "CAD Based Computer Vision: From CAD Models to Relational Graphs", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 13, 2, pp. 114-132, 1991.
232. M. Tuceryan and A. K. Jain, "Texture Segmentation with Voronoi Polygons", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 12, 2, pp. 211-216, 1990.
233. P.J. Flynn, T. Taxt and A. K. Jain, "Segmentation of Document Images", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 11,12, pp. 1322-1329, 1989.
234. J. Ton and A. K. Jain, "Registering Landsat Images Using Point Pattern Matching", *IEEE Transactions on Geoscience and Remote Sensing*, 27, 5, pp. 642-651, 1989.
235. R. Dubes and A. K. Jain, "Random Field Models in Image Analysis", *Journal of Applied Statistics*, 6, 2, pp. 131-164, 1989.
236. R. Jain and A. K. Jain, "Report on Range Image Understanding Workshop", *Machine Vision and Applications*, pp. 45-60, 1989.
237. A. K. Jain and R. Hoffman, "Evidence based Recognition of 3D objects", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 10, 6, pp. 783-802, Nov. 1988.
238. S. Smith and A. K. Jain, "A Test to Determine the Multivariate Normality of a Data Set", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 10, 5, pp.757-761, Sept. 1988.
239. J. Ton, W.R. Enslin, W.D. Hudson and A. K. Jain, "Automatic Road Identification and Labeling in LANDSAT 4 TM Images", *Photogrammetria*, 4, 3, 257-276, 1989.
240. A. K. Jain, C.C. Chen and R.C. Dubes, "Bootstrap Techniques for Error Estimation", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 9, 5, pp. 628-633, 1987.
241. A. K. Jain and J.V. Moreau, "Bootstrap Technique in Cluster Analysis", *Pattern Recognition*, 20, 5, pp. 547-568, 1987.
242. R. Hoffman and A. K. Jain, "Segmentation and Classification of Range Images", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 9, 5, pp. 608-620, 1987.
243. R. Hoffman and A. K. Jain, "Sparse Decompositions for Exploratory Pattern Analysis", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 9, 4, pp. 551-560, 1987.
244. J. Coggins and A. K. Jain, "A Spatial Filtering Approach to Texture Analysis", *Pattern Recognition Letters*, 3, pp. 195-203, 1985.
245. Z. You and A. K. Jain, "Performance Evaluation of Shape Matching via Chord Length Distribution", *Computer Vision, Graphics and Image Processing* 28, pp. 185-198, 1984.
246. L. Ni and A. K. Jain, "A VLSI Systolic Architecture for Pattern Clustering", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 7, 1, pp. 80-89, 1985.
247. S. Smith and A. K. Jain, "Testing for Uniformity in Multidimensional Data", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 6, 1, pp. 73-81, 1984.
248. R. Hoffman and A. K. Jain, "A Test of Randomness Based on Minimal Spanning Tree", *Pattern Recognition Letters*, 1, pp. 175-180, 1983.
249. S. Smith and A. K. Jain, "Chord Distributions for Shape Matching", *Computer Graphics and Image Processing*, 20, pp. 259-271, 1982.
250. G. Cross and A. K. Jain, "Markov Random Field Texture Models", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 5, pp. 25-39, 1982.
251. L. Johnson and A. K. Jain, "An Efficient 2 Dim FFT Algorithm", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 3, pp. 698-701, 1981.

252. G. Biswas, R. Dubes and A. K. Jain, "Evaluation of Projection Algorithms", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 3, pp. 702-708, 1981.
253. E. Backer and A. K. Jain, "A Clustering Performance Measure Based on Fuzzy Set Decomposition", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 3, pp. 66-75, 1981.
254. A. K. Jain, S. Smith and E. Backer, "Segmentation of Muscle Cell Pictures", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2, pp. 232-242, 1980.
255. A. K. Jain and B. Chandrasekaran, "On Balancing Decision Functions", *Journal of Cybernetics and Information Science*, 2, pp. 12-15, 1979.
256. R. Dubes and A. K. Jain, "Validity Studies in Clustering Methodologies", *Pattern Recognition*, 11, pp. 235-254, 1979.
257. K. Pettis, T. Bailey, A. K. Jain and R.C. Dubes, "An Intrinsic Dimensionality Estimator from Near Neighbor Information", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 1, pp. 25-37, 1979.
258. S. Shaffer, R.C. Dubes and A. K. Jain, "Single Link Characteristics of a Mode Seeking Clustering Algorithm", *Pattern Recognition*, 11, pp. 65-70, 1978.
259. A. K. Jain and W. Waller, "On the Monotonicity of the Performance of Bayesian Classifiers", *IEEE Transactions on Information Theory*, IT 24, pp. 392-394, 1978.
260. A. K. Jain and W. Waller, "On the Optimal Number of Features in the Classification of Multivariate Gaussian Data", *Pattern Recognition*, 10, pp. 365-374, 1978.
261. T. Bailey and A. K. Jain, "A Note on Distance Weighted k Nearest Neighbor Rules", *IEEE Transactions on Systems, Man, and Cybernetics*, SMC 8, pp. 311-313, 1978.
262. A. K. Jain and R.C. Dubes, "Feature Definition in Pattern Recognition with Small Sample Size", *Pattern Recognition*, 10, pp. 84-97, 1978.
263. R. Dubes and A. K. Jain, "Clustering Techniques: The User's Dilemma", *Pattern Recognition*, 8, pp. 247-260, 1976.
264. A. K. Jain, "On an Estimate of the Bhattacharyya Distance", *IEEE Transactions on Systems, Man, and Cybernetics*, SMC 6, pp. 763-766, 1976.
265. B. Chandrasekaran and A. K. Jain, "Independence, Measurement Complexity and Classification Performance", *IEEE Transactions on Systems, Man, and Cybernetics*, SMC 5, pp. 240-244, 1975.
266. B. Chandrasekaran and A. K. Jain, "Quantization Complexity and Independent Measurements", *IEEE Transactions on Computers*, C 23, pp. 102-106, 1974.
267. R.B. McGhee and A. K. Jain, "Some Properties of Regularly Realizable Gait Matrices", *Mathematical Biosciences*, 13, pp. 179-193, 1972.

PH.D. STUDENTS

1. Lacey Best-Rowden, "Face Recognition: Role of Aging and Quality Covariates", 2017 (Visa)
2. Sunpreet S. Arora, "Fingerprint Recognition: Contributions to Latent Matching and 3D Fingerprint Target Generation", 2016 (Visa)
3. Charles Otto, "Face Search and Clustering at Scale", 2016 (Nobilis)
4. Radha Chitta, "Kernel-Based Clustering of Big Data", 2015 (Xerox Parc)
5. Serhat S. Bucak, "Multiple Kernel and Multi-label Learning for Image Categorization", 2014 (Apple)
6. Soweon Yoon, "Fingerprint Recognition: Models and Applications", 2014 (NIST)
7. Alessandra A. Paulino, "Contributions to Biometric Recognition: Matching Identical Twins and Latent Fingerprints", 2013 (Rio de Janeiro State University)

8. Kien Nguyen, “Contributions to Computer-aided Diagnosis of Prostate Cancer in Histopathology”, 2013 (Ventana Medical Systems)
9. Brendan Klare, “Heterogeneous Face Recognition”, 2012 (Rank One Computing)
10. Abhishek Nagar, “Biometric Template Security”, 2012 (Samsung)
11. Pavan Kumar Mallapragada, “Some Contributions to Semi-supervised Learning”, 2010 (Microsoft)
12. Unsang Park, “Face Recognition: Face in Video, Age Invariance, and Facial Marks”, 2009 (Sogang University)
13. Yi Chen, “Extended Feature set and Touchless Imaging for Fingerprint Matching”, 2009 (DeltaID)
14. Karthik Nandakumar, “Multibiometric Systems: Fusion Strategies and Template Security”, 2008 (IBM, Singapore)
15. Hong Chen, “Dental Biometrics”, 2007 (Coupang)
16. Xiaoguang Lu, “3D Face Recognition”, 2006 (Siemens)
17. Martin Law, “Clustering and Dimensionality Reduction”, 2006 (Google)
18. Umut Uludag, “Secure Biometric Systems”, 2006 (NRIEC, Istanbul)
19. Anoop Namboodiri, “On-line Handwritten Document Understanding”, 2004 (IIIT, Hyderabad)
20. Michael Farmer, “Segmentation, Classification, and Tracking of Humans for Smart Airbag Applications”, 2004 (University of Michigan, Flint)
21. Arun Ross, “Information Fusion in Fingerprint Authentication”, 2003 (Michigan State University)
22. Rein-Lien Hsu, “Face Detection, Recognition and Tracking”, 2002 (MorphoTrust)
23. Salil Prabhakar, “Fingerprint Matching and Classification Using a Filterbank”, 2001 (DeltaID)
24. Aditya Vailaya, “Semantic Classification of Images”, 2000 (Barnes & Noble)
25. Scott Connell, “On-line Cursive Handwriting Recognition”, 2000 (General Dynamics)
26. Nicolae Duta, “Learning-based Detection, Segmentation and Matching of Objects”, 2000 (Microsoft)
27. Lin Hong, “Fingerprint Matching”, 1998 (Abbott)
28. Yu Zhong, “Deformable Models for Object Matching”, 1997 (STR)
29. Nalini Ratha, “Computer Vision Algorithms on Reconfigurable Logic Arrays”, 1996 (IBM)
30. Chitra Dorai, “Representation and Recognition of 3-D Objects with Free-Form Surfaces”, 1996 (IBM)
31. Sharathchandra Pankanti, “Integration of Vision Modules”, 1995 (IBM)
32. Marie-Pierre Dubuisson, “Segmentation and Matching of Vehicles from Complex Color Outdoor Scenes”, 1995 (retired from Siemens)
33. Jianchang Mao, “Design and Analysis of Neural Networks for Pattern Recognition”, 1994 (Microsoft)
34. Hans Dulimarta, “Client Server Control Architecture for Robot Navigation”, 1994 (Grand Valley State University)
35. Timothy S. Newman, “Experiments in CAD-Based Inspection”, 1993 (University of Alabama, Huntsville)
36. Sateesha G. Nadabar, “Markov Random Field Models in Computer Vision”, 1992 (Cognex)
37. Narayan S. Raja, “Parts Based 3D Object Recognition”, 1992 (University of Hawaii)

38. Farshid Farrokhnia, "Multi Channel Filtering Techniques for Texture Segmentation and Surface Quality Inspection", 1990 (GE Medical Systems)
39. Patrick Flynn, "CAD Based Computer Vision: Modeling and Recognition Strategies", 1990 (University of Notre Dame)
40. Jezching Ton, "A Knowledge Based Approach to Landsat Image Interpretation", 1989 (deceased)
41. Richard Hoffman, "Object Recognition From Range Images", 1986 (Northrop Grumman)
42. James Coggins, "A Framework for Texture Analysis Based on Spatial Filtering", 1982 (ViaSat)
43. Stephen Smith, "Structure of Multidimensional Patterns", 1982 (retired from Intel)
44. George Cross, "Markov Models of Texture", 1980 (retired from GTE)