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March 2009

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PERSONAL

Israeli + US citizen; Married +2.

EDUCATION

B.S. (Cum Laude), Electrical and Computer Engineering October 1983 - June 1986
Technion - Israel Institute of Technology
One year of undergraduate studies (prior to military service)
Univ. of Illinois at Urbana Champaign (1980-1981)

M.S., Electrical Engineering October 1987 - June 1989
Technion - Israel Institute of Technology
Major: Computer Vision and Neural Networks
Title of Master's thesis:
Image Analysis in the Combined Spatial Orientational Space
Names of Supervisors: Prof. Zeevi and Dr. M. Porat

Ph.D., Electrical Engineering September 1989 - June 1994
California Institute of Technology - Pasadena, CA
Major: Image Processing, Information Theory and Neural Networks
Title of Doctoral dissertation:
Multiresolution Image Processing and Learning for Texture Recognition and Image Enhancement
Advisor: Prof. Rodney M. Goodman

ACADEMIC AND PROFESSIONAL EXPERIENCE

TECHNICAL STAFF MEMBER - Jet Propulsion Laboratory, Pasadena, CA

Academic Part time at the Image Processing section. Application of the Ph.D. research to NASA image analysis tasks; Coinventor of a patent on image enhancement. 1990 - 1992

Academic Part Time at the Communications System Research section. Combining image-enhancement and automated image analysis with advanced image-compression schemes. 1992 - 1993

RESEARCH FELLOW

Electrical Engineering, California Institute of Technology 1994 - 1997
Rotation and Scale invariant texture recognition; Application of texture work in medical imagery analysis. Image enhancement; Image coding and transmission.

Computer Science Dept., University of California, Berkeley 1995 - 1997
Image understanding in Digital Libraries (NSF site for Digital Libraries research).

Eshkol PostDoctorate, Tel-Aviv University 1997 - 1999
Signal and Image processing in medical imagery analysis. Combination of image modules for content-based indexing and retrieval in large medical-image databases.

CONSULTANT - MATE, Media Access Technologies, Tel-Aviv 1997 - 1999
Video indexing and search; face detection and recognition, video object segmentation

Visiting lecturer Tel-Aviv University
Department of Biomedical Engineering, Faculty of Engineering 1999 - 2002

Lecturer (Assistant Professor) Tel-Aviv University
Department of Biomedical Engineering, Faculty of Engineering 2002 - 2006

Tenured Senior Lecturer (Associate Professor) Tel-Aviv University
Department of Biomedical Engineering, Faculty of Engineering 2006 - Current

Visiting Professor Stanford University
Department of Radiology, Faculty of Medicine Current

Visiting Researcher IBM Almaden Research Center
Multi-modal Mining for Healthcare Current

RESEARCH

- **Research Areas:** Medical image processing and analysis; Statistical image modeling and segmentation; Content-based image and video indexing and retrieval.
- **Current Research Focuses:** Medical image retrieval from large archives (PACS); MRI Brain Image Analysis; Multiple-Sclerosis; Uterine-cervix image analysis and indexing for cancer screening; Doppler echocardiography for cardiac assessment; Micro-biological Imaging.
- **Selected Research Collaborations:** (1) Image Content-Based Indexing of Uterine Cervix Images: Collaboration with National Library of Medicine (NLM) group at NIH and the NCI Hormonal and Reproductive Epidemiology Branch.
(2) Statistical models for segmentation and tracking of MS lesions in MRI images of the brain: Contacts with the Radiology Dept and Multiple-Sclerosis Unit, at Sheba Medical Center, Tel-Hashomer
(3) Content-based medical image indexing and retrieval: Contacts with the Aachen Medical Informatics Center, CLEF competition
(4) Augmenting resolution in MRI: Joint work with Dr. Sharon Peled, GE Medical

Systems, Israel (currently at Harvard), and Prof. Nahum Kiryati, Dept. of Electrical Engineering - Systems, TAU.

(5) Doppler echocardiography for assessment of cardiac disorders: Collaboration with Dr. Scheinowitz, Biomedical Engineering Dept, TAU, and Dr. Feinberg, Director of Non-Invasive Cardiology, Sheba Medical Center, Tel Hashomer

TEACHING EXPERIENCE

- **Technion**

Taught undergraduate and graduate level Electrical Engineering courses in Computer Networking and Control Theory. 1986-1989

- **California Institute of Technology** Organizer of a research group on pattern recognition and image analysis projects. 1995-1997

- **Graduate Courses, Tel-Aviv University**

“Image analysis in Digital Libraries and Medical Archives”, 1998-2001, 2004-2005, 2006-2007

“Computer Vision in Medical Applications” 2000-2003, 2007-2008

“Image Management in Medical Image Archives” 2000-2002

“Advanced Topics in Medical Image Analysis” 2001-2008

- **Undergrad Courses, Tel-Aviv University**

“Medical Image Processing and Analysis” 2003-2008

“Fundamentals of Medical Image Processing ” 2004-2008

INVITED LECTURES

- “Image Management in Medical Informatics”
Invited lecture in Computers in Medicine course, TAU May 2000
Invited lecture in Computers in Medicine course, Technion April 2002

- Invited speaker for Rozenberg Lecture, TAU May 2001

- Invited speaker for Shiluvim forum, TAU March 2005

- Invited speaker at a symposium entitled “Pattern Recognition in the Brain and in Computational Sciences” at Haifa University, March 2005

- Guest speaker at a symposium entitled “Image, Vision, and Neural Computation” at Washington University, St. Louis, USA May 2005
- Invited talk at Applied Materials January 2006
- Invited talk at IBM Almaden, CA, USA February 2008
- Invited talk at Siemens Corporate Research, NJ, USA April 2008
- Invited talk at the Radiology Dept, Stanford March 2009
- Invited talk at the IEEE International Symposium on Biomedical Imaging (IEEE-ISBI), June 2009

PROFESSIONAL ACTIVITIES

ASSOCIATE EDITOR - IEEE Transactions on Medical Imaging (TMI)

ASSOCIATE EDITOR - Journal of Pattern Analysis and Applications, BertelsmanSpringer

Workshop organizer and Chair - in Advances in Neural Information Processing Systems 6 (NIPS). December 1993

Program Committee member - in the 13th Israeli Symposium on Artificial Intelligence, Computer Vision and Neural Networks. February 1997

Program Committee member - workshop at MICCAI’2001
Medical Image Computing and Computer-Assisted Intervention: Workshop on Visual Information Retrieval and Exploration in Large Medical Image Collections,
Utrecht, The Netherlands, October 2001

Program Committee member - ICPR’2002
International Conference on Pattern Recognition, Biomedical Processing
Quebec, Canada, August 2002

Program Committee member - Advances in Neural Information Processing Systems (NIPS), 2004, 2005

Co-Organizer and Program Committee member- Workshop on Advanced Computer Aided Surgery and Biomedical Image processing, Israeli-Italian Cooperative project, Tel-Aviv University, June 2005

Chair -Medical Image Processing session; Program Committee member -
ISRACAS

Israeli Symposium on Computer-Aided Surgery, Medical Robotics, and Medical Imaging, Tel-Aviv, 2001-2006

Chair - Image Segmentation, Retrieval and Analysis session IEEE International Symposium on Biomedical Imaging (IEEE-ISBI), Washington DC, April 2006.

Co-Organizer and Program Committee member- Israel-France Meeting on Medical Imaging Technology, Hadassah University Hospital, March 2006

Co-Organizer and Chair- Israel Society for Medical and Biological Engineering - Annual meeting, Technion, May 2006

Workshop Organizer- MICCAI 07 workshop: Content-based Image Retrieval for Biomedical Image Archives: Achievements, Problems, and Prospects, Brisbane, Australia, October 2007

Invited Panelist- SPIE 08 special session: Medical Image Indexing and Retrieval, San-Diego, USA February 2008

Guest Editorial- Content-Based Image Retrieval: Major Challenges for Biomedical Applications Thomas M. Deserno, RWTH Aachen University, Germany L. Rodney Long, National Library of Medicine, NIH, USA Hayit Greenspan, Tel Aviv University, Israel

Program Committee member - MICCAI09 workshop on Medical Content-based Retrieval for Clinical Decision Support, London, Sept. 2009

RESEARCH GRANTS

ARPA grant - “A Hybrid Neural Vision System for Image Classification and Recognition”, Prof. R. Goodman and P. Perona from Caltech, J. Altspector from Bell Core. Grant No. N00014-93-1-0990. Based on Ph.D. work at Caltech. Active participation in the proposal preparation , 1994-1996

Intel Foundation Research Grant (personal grant), 1994-1996

Eshkol Foundation Grant, A national award, 1997-1999

Grant from the **Elizabeth and Nicholas Slezak Super-Center for Cardiac Research and Medical Engineering**, 1998-1999

Grant from the **Adams SuperCenter for Brain Studies**, for research in the field of:
“Superresolution in MRI images of the brain” 1999-2000

Grant from the **Kodesh Institute** for Medical Engineering and Physical Sciences,
1999-2000, 2001-2002

co-P.I. (4 groups): **Ministry of Science Grant** for Strategic Research directions
(Mechkar Tashtiti), 3 year grant, 200K\$ per year;
1999-2002

Grant from the **Adams SuperCenter for Brain Studies**, for research in the field
of: “Statistical modeling techniques for MSlesions segmentation and tracking in MRI
images of the brain”, 1 year grant, 9K\$; 2003-2004

co-P.I. (2 groups): Grant from **Mafat** on “An Efficient Probabilistic Method for Content-
based Image Retrieval”, 3 year grant, 45K\$ per year; 2005-2008

co-P.I. (3 groups): **Ministry of Science Grant** for Strategic Research directions
(Mechkar Tashtiti), for research in the field of: “Development of Innovative Comput-
erized Tools for Brain MRI Segmentation and Image Analysis in Multiple Sclerosis”,
Collaboration with the MS unit at Tel-Hashomer. 3 year grant, 97K\$ per year;
2005-2008

AWARDS AND COMPETITIONS

NASA Space Act Award: For the creative development of a technological contri-
bution which has been determined to be of significant value in the advancement of
the space and aeronautical activities of NASA. Entitled: “Image Enhancement by Non-
Linear Extrapolation in Frequency Space”. May 2003

ImageCLEF competition: First place in International competition on Medical image
retrieval from large image archives; 2008

ACTIVE PARTICIPATION IN SCIENTIFIC MEETINGS

- Conference on Neural Information Processing Systems (NIPS) Denver, Colorado, 1992,1993,1994
- IEEE Conference on Computer Vision and Pattern Recognition Seattle, Washington, June 1994
- International Conference on Pattern Recognition Israel, October 1994
- Machines that Learn Conference Snowbird, Utah, 1995
- IEEE International Conference on Image Processing Switzerland, September 1996
- IEEE Workshop on Content-based Access of Image and Video Libraries Puerto-Rico, June 1997
- IEEE Workshop on Document Image Analysis Puerto-Rico, June 1997
- IEEE International Conference on Computer Vision India, January 1998
- First joint meeting of BMES and EMBS Atlanta, GA, October 1999
- IEEE Computer Vision and Pattern Recognition, CVPR 2000, 2007
- DAGM03 - Pattern Recognition conference, Zurich, 2003
- ICCV - IEEE International Conference on Computer Vision 2003, 2007
- ECCV - European Conference on Computer Vision 2004
- IEEE Workshop on Mathematical Methods in Biomedical Image Analysis (MMBIA), CVPR, 2006,2007,2008
- ISRACAS - Israeli Symposium on Medical Image Processing and Computer Assisted Surgery Tel-Aviv, 2001-2008
- Ministry of Science - Annual meeting of Computer Vision Research Tel-Aviv, Israel, 1999-2006
- ISMBE Annual meeting of the Israel Society on Medical and Biological Engineering 2000-2008
- SPIE - Medical Imaging conference, San-Diego 2003-2008
- MICCAI- Medical Image Computing and Computer-Assisted Intervention 2001,2005,2007,2008
- ISBI - IEEE International Symposium on Biomedical Imaging 2002,2004,2006,2007,2008

REVIEWER

Journals

- IEEE Trans. on Medical Imaging (IEEE-TMI)
- International Journal of Biomedical Imaging (IJBI)
- Medical & Biological Engineering & Computing (MBEC)
- IEEE Journal on Pattern Analysis and Machine Intelligence (IEEE-PAMI)
- IEEE Trans. on Image Processing (IEEE-IP)
- IEEE Trans. on Multimedia (IEEE-MM)
- Journal of Computer Vision, Graphics and Image Processing (CVGIP)
- International Journal of Computer Vision (IJCV)
- Journal of Electronic Imaging (JEI)

Conferences

- IEEE Conference on Computer Vision and Pattern Recognition (CVPR)
- European Conference on Computer Vision (ECCV)
- International Conference on Image Processing (ICIP)
- International Conference on Pattern Recognition (ICPR)
- Neural Information Processing Systems (NIPS)
- Medical Image Computing and Computer-Assisted Intervention (MICCAI)
- Workshop on Mathematical Methods in Biomedical Image Analysis (MMBIA)

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Member of the IEEE Society

Member of the MICCAI Society

Member of the Israeli Society for Medical and Biological Engineering

M.Sc. STUDENTS SUPERVISED

- “Performance Evaluation of Quantitative Coronary Angiography Algorithms (project),” Moshe Laifengfeld, Department of Electrical Engineering, Faculty of Engineering, Tel-Aviv University
1999, Graduated
- “Content-Based Retrieval in Medical Archives: Multispectral Blood-Cell Analysis (project),” Yuval Nisan, Department of Electrical Engineering, Faculty of Engineering, Tel-Aviv University
1999, Graduated
- “Coronary Modelling (project),” Michael Kardosh, Department of Biomedical Engineering, Faculty of Engineering, Tel-Aviv University
2000, Graduated
- “Face Color Modelling,” Itay Eshet (joint with Prof. G. Langholtz), Department of Electrical Engineering-Systems, Faculty of Engineering, Tel-Aviv University
2001, Graduated
- “Coronary Analysis (project),” Dror Shtaubert, Department of Interdisciplinary Studies, Faculty of Engineering, Tel-Aviv University
2001, Graduated
- “MRI Inter-Slice Reconstruction using Super-Resolution,” Gal Oz (joint with Prof. N. Kiryati), Department of Biomedical Engineering, Faculty of Engineering, Tel-Aviv University
2001, Graduated
- “Automatic Identification of Bacteria Subspecies using Statistical Imaging Methods,” Sigal Trattner (joint with Prof. S. Abboud), Department of Biomedical Engineering, Faculty of Engineering, Tel-Aviv University
2002, Graduated
- “Context Dependent Image Segmentation and Image Matching via EMD Flow,” Guy Dvir, Department of Electrical Engineering-Systems, Faculty of Engineering, Tel-Aviv University
2002, Graduated
- “A Probabilistic Framework for Spatio-Temporal Video Representation and Indexing,” Arnaldo Mayer (joint with Prof. S. Abboud), Department of Biomedical Engineering, Faculty of Engineering, Tel-Aviv University
2002, Graduated
- “Unsupervised Image Clustering using Probabilistic Continuous Models and Information theoretic Principles,” Shiri Gordon (joint with Dr. D. Ron), Department of Electrical Engineering-Systems, Faculty of Engineering, Tel-Aviv University
2003, Graduated
- “Adaptive Face-Color Modelling in Dynamic Scenes (project),” Guy Blumstein-Koren, Department of Electrical Engineering-Systems, Faculty of Engineering, Tel-Aviv University
2003, Graduated
- “Super-resolution in MRA (project),” Ofir Glazer, Department of Biomedical Engineering, Faculty of Engineering, Tel-Aviv University
2003, Graduated

- “Super-resolution in CT (project),” Shai Menachem, Department of Biomedical Engineering, Faculty of Engineering, Tel-Aviv University
2003, Graduated
- “Registration in Medical Imagery (project),” Gal Maister, Department of Electrical Engineering - Physical Electronics, Faculty of Engineering, Tel-Aviv University
2003, Graduated
- “Probabilistic space-time modeling scheme for detection and tracking of MS lesions in MR images of the brain,” Allon Shahar, Department of Biomedical Engineering, Faculty of Engineering, Tel-Aviv University
2004, Graduated
- “Doppler velocity-profile analysis,” Oron Shechner (joint with Dr. Scheinowitz), Department of Biomedical Engineering, Faculty of Engineering, Tel-Aviv University
2004, Graduated
- “Image retrieval from medical archives,” Adi Pinchas, Department of InterDisciplinary studies, Faculty of Engineering, Tel-Aviv University
2005, Graduated
- “MRI brain image segmentation,” Amit Ruf, Department of Electrical Engineering, Faculty of Engineering, Tel-Aviv University
2005, Graduated
- “Color segmentation and indexing of uterine cervix images,” Gali Zimmerman, Department of Biomedical Engineering, Faculty of Engineering, Tel-Aviv University
2006, Graduated
- “Utilizing FF modality for CSF extraction in MRI brain imaging,” Yullian Wolff, Department of Biomedical Engineering, Faculty of Engineering, Tel-Aviv University
2007, Graduated
- “Intensity homogeneity and bias correction in uterine cervix images,” Hila Dvir. Department of Biomedical Engineering, Faculty of Engineering, Tel-Aviv University
2007, Graduated
- “Automated Doppler analysis and parameter extraction,” Yoad Bar-Shean (joint with Dr. Scheinowitz), Department of Biomedical Engineering, Faculty of Engineering, Tel-Aviv University
2007, Graduated
- “Combining segmentation and registration for MRI brain images,” Oren Friefeld, Department of Biomedical Engineering, Faculty of Engineering, Tel-Aviv University
2007, Graduated
- “Uterine Cervix image analysis,” Sheli Lotenberg, Department of Biomedical Engineering, Faculty of Engineering, Tel-Aviv University
2007, Graduated
- “White-Matter Fiber Tract Registration,” Orly Zvitia, Department of Biomedical Engineering, Faculty of Engineering, Tel-Aviv University
2008, Graduated

PRESENT M.Sc. STUDENTS

“Medical Archive Categorization,” Uri Avni, Department of Biomedical Engineering, Faculty of Engineering, Tel-Aviv University

“Edge detection in Uterine cervix Images,” Amir Alush, Department of Biomedical Engineering, Faculty of Engineering, Tel-Aviv University

PhD STUDENTS - Graduated

“Unsupervised Image Clustering and Categorization for Large Medical Archives,” Shiri Gordon, Department of Biomedical Engineering, Faculty of Engineering, Tel-Aviv University

PRESENT PhD STUDENTS

“MRI brain image analysis,” Arnaldo Mayer, Department of Biomedical Engineering, Faculty of Engineering, Tel-Aviv University

“ Three-dimensional modeling of human embryos for IVF evaluation using DIC microscope images,” Sigal Trattner (joint with Dr. Nir Sochen) Department of Biomedical Engineering, Faculty of Engineering, Tel-Aviv University

“MRI brain and lesion segmentation,” Gali Zimmerman, Department of Biomedical Engineering, Faculty of Engineering, Tel-Aviv University

JOURNAL PUBLICATION LIST

1. H. Greenspan, M. Porat and Y. Y. Zeevi, "Projection-Based Approach to Image Analysis: the Position-Orientation Space," In the *IEEE Transactions on Pattern Analysis and Machine Intelligence (IEEE-PAMI)*, Vol. 14, No. 11, pp. 1105-1110, 1992.
2. H. Greenspan, R. Goodman, R. Chellappa and C. Anderson, "Learning Texture Discrimination Rules in a Multiresolution System," In the special issue on "Learning in Computer Vision" of the *IEEE Transactions on Pattern Analysis and Machine Intelligence (IEEE-PAMI)*, Vol. 16, No. 9, pp. 894-901, 1994.
3. H. Greenspan, C. Anderson and S. Akber, "Image Enhancement by Non-Linear Extrapolation in Frequency Space," *IEEE Transactions on Image Processing (IEEE-IP)*, Vol. 9, No. 6, pp. 1035-1048, June 2000.
4. H. Greenspan, M. Laifenfeld, S. Einav and O. Barnea, "Center-line Extraction in Quantitative Coronary Angiography as a Function of the Coronary Geometrical Complexity," *IEEE Transactions on Medical Imaging (IEEE-TMI)*, Vol. 20, No. 9, pp. 928-941, Sept. 2001.
5. H. Greenspan, J. Goldberger and Itai Eshet, "Mixture Model for Face Color Modeling and Segmentation", *Pattern Recognition Letters*, Vol. 22, pp. 1525-1536, Sept. 2001.
6. H. Greenspan, J. Goldberger and Lenny Ridel, "A Continuous Probabilistic Framework for Image Matching," *Journal of Computer Vision and Image Understanding*, Vol. 84, No. 3, pp. 384-406, Dec. 2001.
7. H. Greenspan, C. Rothmann, T. Cycowitz, Y. Nissan, A. Cohen and Z. Malik, "Classification of Lymphoproliferative Disorders by Spectral Imaging of the Nucleus", *Journal of Histology and Histopathology*, Vol. 17, No. 3, pp. 767-773, 2002.
8. C. Carson, S. Belongie, H. Greenspan and J. Malik, "Blobworld: Image Segmentation using Expectation-Maximization and its Application to Image Querying", *IEEE Transactions on Pattern Analysis and Machine Intelligence (IEEE-PAMI)*, Vol. 24, No. 8, pp. 1026-1038, August 2002.
9. H. Greenspan, G. Oz, N. Kiryati and S. Peled, "MRI inter-slice reconstruction using super-resolution", *Magnetic Resonance Imaging*, Vol. 20, No. 5, pp. 437-446, June 2002.
10. H. Greenspan, G. Dvir, Y. Rubner, "Context Dependent Segmentation and Matching in Image Databases," *Journal of Computer Vision and Image Understanding (CVIU)*, online publication: October 2003; printed version: Vol 93, pp. 86-109, January 2004.
11. H. Greenspan, J. Goldberger and A. Mayer, "Probabilistic Space-Time Video Modeling via Piecewise GMM", *IEEE Pattern Analysis and Machine Intelligence (IEEE-PAMI)*, Vol. 26, No. 3, pp. 384-396, March 2004.
12. S. Trattner, H. Greenspan, G. Tepper and S. Abboud, "Automatic Identification of Bacterial Types using Statistical Imaging Methods," *IEEE Trans on Medical Imaging (IEEE-TMI)*, Vol 23, No. 7, pp. 807-820, July 2004.

13. H. Greenspan, O. Shechner, M. Scheinowitz and MS. Feinberg, "Doppler echocardiography flow-velocity image analysis for patients with atrial fibrillation," *Ultrasound in Medicine and Biology* 31(8): 1031-1040, August 2005.
14. J. Goldberger, S. Gordon and H. Greenspan, "Unsupervised Image-Set Clustering Using an Information Theoretic Framework," *IEEE Trans on Image Processing (IEEE-IP)*, Vol. 15, No. 2, pp.449-458, February 2006.
15. J. Goldberger and H. Greenspan. "Context-based Segmentation of Image Sequences," *IEEE Trans on Pattern Analysis and Machine Intelligence (IEEE-PAMI)*, Vol. 28, No. 3, pp. 463-468, March 2006.
16. H. Greenspan, A. Ruf and J. Goldberger, "Constrained Gaussian Mixture Model Framework for Automatic Segmentation of MR Brain Images," *IEEE Trans on Medical Imaging (IEEE-TMI)*, Vol. 25, No. 9, pp. 1233 - 1245, September 2006.
17. H. Greenspan and A. Pinhas, "Medical Image Categorization and Retrieval for PACS using the GMM-KL framework," *IEEE Transactions on Information Technology in BioMedicine*, Vol. 11, Issue 2, pp. 190-2002, March 2007.
18. J. Goldberger, H. Greenspan and J. Dreyfuss, "Simplifying Mixture Models using the Unscented Transform," *IEEE Trans on Pattern Analysis and Machine Intelligence (IEEE-PAMI)*, Vol. 30, No. 8, pp. 1496 - 1502, Aug. 2008
19. H. Greenspan, "Super Resolution in Medical Imaging," Special issue on "Super-Resolution in Imaging and Video" in the *Computer Journal* (<http://comjnl.oxfordjournals.org/>). Rafael Molina and Aggelos Katsaggelos guest editors. Online Feb. 19, 2008, Printed version: Vol. 52, No. 1, pp. 43-63, 2009.
20. S. Lotenberg , S. Gordon and H. Greenspan, "Shape Priors for Segmentation of the Cervix Region within Uterine Cervix Images," *Journal of Digital Imaging (JDI)*, August 2008.
21. H. Greenspan, "Revisiting the feature and content gap for landmark-based and image-to-image retrieval in medical CBIR," *International Journal of Healthcare Information Systems and Informatics (IJHISI)*, Vol. 4, No. 1, pp. 68-87, 2009.
22. H. Greenspan, S. Gordon, G. Zimmerman, J. Jeronimo, S. Antani and R. Long, "Automatic detection of anatomical landmarks in uterine cervix images", *IEEE Trans on Medical Imaging (IEEE-TMI)*, Vol. 28, No. 3, pp. 454-468, March 2009.
23. S. Gordon, S. Lotenberg, R. Long, S. Antani, J. Jeronimo and H. Greenspan, "Evaluation of uterine cervix segmentations using ground truth from multiple experts", *Journal of Computerized medical imaging and graphics*, Vol. 33, No. 3, pp. 205-216, April 2009.
24. S. Trattner, M. Feigin, H. Greenspan and N. Sochen, "A validity criterion for the Born approximation convergence in (DIC) microscopy imaging", to be published in *Journal of the Optical Society of America A*, 2009.
25. A. Mayer and H. Greenspan, "An adaptive mean-shift framework for MRI brain segmentation, to be published in *Trans on Medical Imaging (IEEE-TMI)*, 2009.
26. O. Zvitia, A. Mayer and H. Greenspan, Co-registration of White Matter Tractographies by Adaptive-Mean-Shift and Gaussian Mixture Modeling, *Trans on Medical Imaging (IEEE-TMI)*, in revision.

27. S. Gordon and H. Greenspan, An agglomerative segmentation framework for non-convex regions within uterine cervix images, *Journal of Image and Vision Computing*, in revision.
28. O. Freifeld, H. Greenspan and J Goldberger, "Multiple Sclerosis Lesion Detection Using Constrained GMM and Curve Evolution, submitted to *International journal on biomedical imaging*, Nov. 2008.

Invited Book Chapters

1. H. Greenspan, "Non-parametric Texture Learning," Published in "*Early Visual Learning*", Shree Nayar and Tommy Poggio eds., Oxford University Press, pp. 299-328, 1996.
2. H. Greenspan, Chapter in Book entitled Recent Advances in Biomedical Image Processing and Analysis, to be published by Springer-Verlag, Berlin, 2010.

Book Chapters

1. H. Greenspan, R. Goodman and R. Chellappa, "Combined Neural Network and Rule-Based Framework for Probabilistic Pattern Recognition and Discovery," In J. E. Moody, S. J. Hanson, and R. P. Lippman (eds.), *Advances in Neural Information Processing Systems 4*, 444-452, San Mateo, CA: Morgan Kaufmann Publishers, 1992.
2. H. Greenspan and R. Goodman, "Remote Sensing Image Analysis via a Texture Classification Neural Network," in C. L. Giles, S. J. Hanson, and J. D. Cowan (eds.), *Advances in Neural Information Processing Systems 5*, 425-432, San Mateo, CA: Morgan Kaufmann Publishers, 1993.

Patents

1. US5717789: "Image enhancement by non-linear extrapolation in frequency space,"
C. Anderson and H. Greenspan, Filed Sept. 1995; Issued February 1998.
2. US5956427: "DFT encoding of oriented filter responses for rotation invariance and orientation estimation in digitized images,"
H. Greenspan and S. Belongie, Filed June 1995; Issued September 1999.
3. US6005983: "Image enhancement by non-linear extrapolation in frequency space,"
C. Anderson and H. Greenspan, Filed Sept. 1997; Issued December 1999.
4. US7184100: "Method of Selecting Key-Frames from a Video Sequence,"
I. Wilf, O. Menadova and H. Greenspan, Filed March 1999; Issued February 2007.

Full-Length Refereed Conference Papers

1. H. Greenspan, R. Goodman and R. Chellappa, "Texture Analysis via Unsupervised and Supervised Learning," *Proceedings of the 1991 International Joint Conference on Neural Networks (IJCNN'91)*, 639-644, 1991.
2. (*) H. Greenspan, S. Belongie, P. Perona, R. Goodman, S. Rakshit and C. Anderson, "Overcomplete Steerable Pyramid Filters and Rotation Invariance," *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR'94)*, Seattle, Washington, pp. 222-228, June 1994.
3. (*) H. Greenspan, S. Belongie, P. Perona and R. Goodman, "Rotation Invariant Texture Recognition Using a Steerable Pyramid," *Proceedings of the 12th IEEE International Conference on Pattern Recognition (ICPR'94)*, Jerusalem, Israel, pp. 162-167, October 1994.
4. H. Greenspan and C. H. Anderson, "Image enhancement via non linear extrapolation in frequency space," *SPIE*, Vol. 2182, pp. 2-13, 1994.
5. H. Greenspan and S. Akber, "Nonlinear Edge Enhancement," *Proceedings of the IEEE International Conference on Image Processing (ICIP'95)*, pp. 179-182, October 1995.
6. (*) D. Forsyth, J. Malik, M. Fleck, H. Greenspan, T. Leung, S. Belongie, C. Carson and C. Bregler, "Finding Pictures of Objects in Large Collections of Images," *Proceedings of International workshop on object representation for computer vision (ECCV'96)*, pp. 335-360, April 1996.
7. J. Malik, D. Forsyth, M. Fleck, H. Greenspan, T. Leung, C. Carson, S. Belongie, and C. Bregler, "Finding objects in image databases by grouping," *Proceedings of the 1996 IEEE International Conference on Image Processing (ICIP'96)*, pp. 761-764, October 1996.
8. (*) C. Carson, S. Belongie, H. Greenspan and J. Malik, "Region-based Image Querying," *Proceedings of the IEEE Workshop on Content-based Access of Image and Video Libraries (CVPR'97)*, pp. 42-49, Puerto-Rico, June 1997.
9. P. Keaton, H. Greenspan and R. Goodman, "Keyword Spotting for Cursive Document Retrieval," *Proceedings of the IEEE Workshop on Document Image Analysis (CVPR'97)*, pp. 74-81, Puerto-Rico, June 1997.
10. (*) S. Belongie, C. Carson, H. Greenspan and J. Malik, "Color and Texture-based image segmentation using EM and its application to content-based image retrieval," *Proceedings of the Sixth IEEE International Conference on Computer Vision, (ICCV'98)*, pp. 675-682, January 1998.
11. M. Laifenfeld, H. Greenspan and O. Barnea, "Lumen Centerline Estimation as a function of Coronary Geometric Complexity," *Proceedings of the First joint meeting of BMES and EMBS*, Atlanta, GA, October 1999.
12. M. Laifenfeld, H. Greenspan and O. Barnea, "Lumen Centerline Detection in Coronary Angiograms," *ISMBE Annual meeting of the Israel Society on Medical and Biological Engineering* Technion, Israel, February 2000.

13. H. Greenspan, G. Dvir and Y. Rubner, "Region Correspondence for Image Matching via EMD Flow," Oral presentation in *IEEE workshop on Content-based Access of Image and Video Libraries*, June 2000.
14. (*) H. Greenspan, G. Oz, N. Kiryati and S. Peled, "MRI Inter-Slice Reconstruction using Super-resolution," *Medical Image Computing and Computer-Assisted Intervention (MICCAI)*, October 2001.
15. (*) H. Greenspan, J. Goldberger and A. Mayer, "A Probabilistic Framework for Spatio-Temporal Video Representation & Indexing," *IEEE European Conference on Computer Vision (ECCV'02)*, Vol. IV, pp. 461-475, 2002.
16. H. Greenspan, G. Oz, N. Kiryati and S. Peled, "Superresolution in MRI," *IEEE International Symposium on Biomedical Imaging (IEEE-ISBI)*, Washington D.C., July 2002.
17. H. Greenspan, S. Gordon and J. Goldberger, "Probabilistic models for generating, modelling and matching image categories," *International Conference on Pattern Recognition (ICPR'02)*, Quebec, August 2002.
18. G. Dvir, H. Greenspan, and Y. Rubner, "Context-Based Image Modelling," *International Conference on Pattern Recognition (ICPR'02)*, Quebec, August 2002.
19. J. Goldberger, H. Greenspan, S. Gordon, "Unsupervised Image Clustering using the Information Bottleneck Method," *The annual symposium for Pattern Recognition of the DAGM02*, Zurich, September 2002.
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CITATIONS : Over 200 journal citations of publications (journals and conferences). 43 Journal citations of Ph.D. work; Over 40 Journal citations of Postdoc work at Berkeley (via ISI); 4 references of Patents.

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