

Table of Contents – Part II

Robotics, Image-Guided Surgery and Interventions

Sensor Guided Ablation Procedure of Left Atrial Endocardium <i>Hua Zhong, Takeo Kanade, David Schwartzman</i>	1
A Method to Evaluate Human Spatial Coordination Interfaces for Computer-Assisted Surgery <i>M.A. Cardin, J.X. Wang, D.B. Plewes</i>	9
3D TRUS Guided Robot Assisted Prostate Brachytherapy <i>Zhouping Wei, Mingyue Ding, Donal Downey, Aaron Fenster</i>	17
Invisible Shadow for Navigation and Planning in Minimal Invasive Surgery <i>Marios Nicolaou, Adam James, Benny P.L. Lo, Ara Darzi, Guang-Zhong Yang</i>	25
A Navigation System for Minimally Invasive CT-Guided Interventions <i>Markus Nagel, Gerd Schmidt, Ralf Petzold, Willi A. Kalender</i>	33
Passive Markers for Ultrasound Tracking of Surgical Instruments <i>Jeffrey Stoll, Pierre Dupont</i>	41
Optimal Trajectories Computation Within Regions of Interest for Hepatic RFA Planning <i>Caroline Villard, Claire Baegert, Pascal Schreck, Luc Soler, Afshin Gangi</i>	49
Effects of Latency on Telesurgery: An Experimental Study <i>Reiza Rayman, Serguei Primak, Rajni Patel, Merhdad Moallem, Roya Morady, Mahdi Tavakoli, Vanja Subotic, Natalie Galbraith, Aimee van Wijnsberghe, Kris Croome</i>	57
A Novel Phantom-Less Spatial and Temporal Ultrasound Calibration Method <i>Ali Khamene, Frank Sauer</i>	65
Electromagnetic Tracker Measurement Error Simulation and Tool Design <i>Gregory S. Fischer, Russell H. Taylor</i>	73

Compact Forceps Manipulator Using Friction Wheel Mechanism and Gimbal Mechanism for Laparoscopic Surgery <i>Takashi Suzuki, Youichi Katayama, Etsuko Kobayashi, Ichiro Sakuma</i>	81
Spatial Motion Constraints for Robot Assisted Suturing Using Virtual Fixtures <i>Ankur Kapoor, Ming Li, Russell H. Taylor</i>	89
Contact Force Measurement of Instruments for Force-Feedback on a Surgical Robot: Acceleration Force Cancellations Based on Acceleration Sensor Readings <i>Shigeyuki Shimachi, Fumie Kameyama, Yoshihide Hakozaki, Yasunori Fujiwara</i>	97
Development of the Needle Insertion Robot for Percutaneous Vertebraloplasty <i>S. Onogi, K. Morimoto, I. Sakuma, Y. Nakajima, T. Koyama, N. Sugano, Y. Tamura, S. Yonenobu, Y. Momoi</i>	105
Laparoscope Self-calibration for Robotic Assisted Minimally Invasive Surgery <i>Danail Stoyanov, Ara Darzi, Guang Zhong Yang</i>	114
A Hand-Eye Robotic Model for Total Knee Replacement Surgery <i>Fanhua Shi, Jing Zhang, Yuncai Liu, Zijian Zhao</i>	122
Robot-Assisted Image-Guided Targeting for Minimally Invasive Neurosurgery: Planning, Registration, and In-vitro Experiment <i>R. Shamir, M. Freiman, L. Joskowicz, M. Shoham, E. Zehavi, Y. Shoshan</i>	131
Soft-Tissue Motion Tracking and Structure Estimation for Robotic Assisted MIS Procedures <i>Danail Stoyanov, George P. Mylonas, Fani Deligianni, Ara Darzi, Guang-Zhong Yang</i>	139
Image Registration II	
Mass Preserving Registration for Heart MR Images <i>Lei Zhu, Steven Haker, Allen Tannenbaum</i>	147
Liver Registration for the Follow-Up of Hepatic Tumors <i>Arnaud Charnoz, Vincent Agnus, Grégoire Malandain, Clément Forest, Mohamed Tajine, Luc Soler</i>	155

Maximum a Posteriori Local Histogram Estimation for Image Registration <i>Matthew Toews, D. Louis Collins, Tal Arbel</i>	163
Dynamic 3D Ultrasound and MR Image Registration of the Beating Heart <i>Xishi Huang, Nicholas A. Hill, Jing Ren, Gerard Guiraudon, Derek Boughner, Terry M. Peters</i>	171
Learning Best Features for Deformable Registration of MR Brains <i>Guorong Wu, Feihu Qi, Dinggang Shen</i>	179
Stochastic Inverse Consistency in Medical Image Registration <i>Sai Kit Yeung, Pengcheng Shi</i>	188
A Novel Incremental Technique for Ultrasound to CT Bone Surface Registration Using Unscented Kalman Filtering <i>Mehdi Hedjazi Moghari, Purang Abolmaesumi</i>	197
Automatic 4-D Registration in Dynamic MR Renography Based on Over-Complete Dyadic Wavelet and Fourier Transforms <i>Ting Song, Vivian S. Lee, Henry Rusinek, Manmeen Kaur, Andrew F. Laine</i>	205
Model of a Vascular C-Arm for 3D Augmented Fluoroscopy in Interventional Radiology <i>S. Gorges, E. Kerrien, M-O. Berger, Y. Troussel, J. Pescatore, R. Anzionnat, L. Picard</i>	214
2D/3D Deformable Registration Using a Hybrid Atlas <i>Thomas S.Y. Tang, Randy E. Ellis</i>	223
Reconstruction-Based 3D/2D Image Registration <i>Dejan Tomažević, Boštjan Likar, Franjo Pernuš</i>	231
Comparison of Simultaneous and Sequential Two-View Registration for 3D/2D Registration of Vascular Images <i>Chetna Pathak, Mark Van Horn, Susan Weeks, Elizabeth Bullitt</i>	239
Interpolation Artefacts in Non-rigid Registration <i>P. Aljabar, J.V. Hajnal, R.G. Boyles, D. Rueckert</i>	247
Learning Based Non-rigid Multi-modal Image Registration Using Kullback-Leibler Divergence <i>Christoph Guetter, Chenyang Xu, Frank Sauer, Joachim Hornegger</i>	255

Deformable Registration of Brain Tumor Images Via a Statistical Model of Tumor-Induced Deformation <i>Ashraf Mohamed, Dinggang Shen, Christos Davatzikos</i>	263
Myocardial Motion Estimation in Tagged MR Sequences by Using α MI-Based Non Rigid Registration <i>E. Oubel, C. Tobon-Gomez, A.O. Hero, A.F. Frangi</i>	271
Iterative 3D Point-Set Registration Based on Hierarchical Vertex Signature (HVS) <i>Jun Feng, Horace H.S. Ip</i>	279
Automatic Patient Registration for Port Placement in Minimally Invasive Endoscopic Surgery <i>Marco Feuerstein, Stephen M. Wildhirt, Robert Bauernschmitt, Nassir Navab</i>	287
Hybrid Formulation of the Model-Based Non-rigid Registration Problem to Improve Accuracy and Robustness <i>Olivier Clatz, Hervé Delingette, Ion-Florin Talos, Alexandra J. Golby, Ron Kikinis, Ferenc A. Jolesz, Nicholas Ayache, Simon K. Warfield</i>	295
Automatic Registration and Fusion of Ultrasound with CT for Radiotherapy <i>Wolfgang Wein, Barbara Röper, Nassir Navab</i>	303
Medical Image Computing - Atlases - Shape I	
Lung Deformation Estimation and Four-Dimensional CT Lung Reconstruction <i>Sheng Xu, Russell H. Taylor, Gabor Fichtinger, Kevin Cleary</i>	312
Automatic Parameter Optimization for De-noising MR Data <i>Joaquín Castellanos, Karl Rohr, Thomas Tolxdorff, Gudrun Wagenknecht</i>	320
Towards a Dynamic Model of Pulmonary Parenchymal Deformation: Evaluation of Methods for Temporal Reparameterization of Lung Data <i>Tessa A. Sundaram, Brian B. Avants, James C. Gee</i>	328
4D MR Imaging Using Internal Respiratory Gating <i>M. von Siebenthal, Ph. Cattin, U. Gamper, A. Lomax, G. Székely</i>	336

Anatomically Constrained Surface Parameterization for Cortical Localization <i>C. Clouchoux, O. Coulon, D. Rivière, A. Cachia, J.-F. Mangin, J. Régis</i>	344
Multiresolution Parametric Estimation of Transparent Motions and Denoising of Fluoroscopic Images <i>Vincent Auvray, Jean Liénard, Patrick Bouthemy</i>	352
Plaque and Stent Artifact Reduction in Subtraction CT Angiography Using Nonrigid Registration and a Volume Penalty <i>Dirk Loeckx, Stylianos Drisis, Frederik Maes, Dirk Vandermeulen, Guy Marchal, Paul Suetens</i>	361
Respiratory Motion Correction in Emission Tomography Image Reconstruction <i>Mauricio Reyes, Grégoire Malandain, Pierre Malick Koulibaly, Miguel A. González Ballester, Jacques Darcourt</i>	369
Optimal Embedding for Shape Indexing in Medical Image Databases <i>Xiaoning Qian, Hemant D. Tagare</i>	377
Retrospective Cross-Evaluation of an Histological and Deformable 3D Atlas of the Basal Ganglia on Series of Parkinsonian Patients Treated by Deep Brain Stimulation <i>Eric Bardinet, Didier Dormont, Grégoire Malandain, Manik Bhattacharjee, Bernard Pidoux, Christian Saleh, Philippe Cornu, Nicholas Ayache, Yves Agid, Jérôme Yelnik</i>	385
Anatomical and Electrophysiological Validation of an Atlas for Neurosurgical Planning <i>M. Mallar Chakravarty, Abbas F. Sadikot, Jurgen Germann, Gilles Bertrand, D. Louis Collins</i>	394
Construction of a 4D Statistical Atlas of the Cardiac Anatomy and Its Use in Classification <i>Dimitrios Perperidis, Raad Mohiaddin, Daniel Rueckert</i>	402
Unbiased Atlas Formation Via Large Deformations Metric Mapping <i>Peter Lorenzen, Brad Davis, Sarang Joshi</i>	411
Least Biased Target Selection in Probabilistic Atlas Construction <i>Hyunjin Park, Peyton H. Bland, Alfred O. Hero III, Charles R. Meyer</i>	419

**Automatic Selection of DBS Target Points Using Multiple
Electrophysiological Atlases**

- Pierre-Francois D'Haese, Srivatsan Pallavaram, Ken Niermann,
John Spooner, Chris Kao, Peter E. Konrad, Benoit M. Dawant* 427

**Nonrigid Shape Correspondence Using Landmark Sliding, Insertion
and Deletion**

- Theodor Richardson, Song Wang* 435

**Statistical Face Models for the Prediction of Soft-Tissue Deformations
After Orthognathic Osteotomies**

- Sebastian Meller, Emeka Nkenke, Willi A. Kalender* 443

**Fully Automatic Shape Modelling Using Growing Cell Neural
Networks**

- Luca Ferrarini, Hans Olofsen, Mark A. van Buchem,
Johan H.C. Reiber, Faiza Admiraal-Behloul* 451

Multiscale 3D Shape Analysis Using Spherical Wavelets

- Delphine Nain, Steven Haker, Aaron Bobick,
Allen R. Tannenbaum* 459

Structural and Functional Brain Analysis**Discriminative Analysis of Brain Function at Resting-State for
Attention-Deficit/Hyperactivity Disorder**

- C.Z. Zhu, Y.F. Zang, M. Liang, L.X. Tian, Y. He, X.B. Li,
M.Q. Sui, Y.F. Wang, T.Z. Jiang* 468

**Finding Landmarks in the Functional Brain: Detection and Use
for Group Characterization**

- Bertrand Thirion, Philippe Pinel, Jean-Baptiste Poline* 476

**Topology Correction Using Fast Marching Methods and Its Application
to Brain Segmentation**

- Pierre-Louis Bazin, Dzung L. Pham* 484

**New Ratios for the Detection and Classification of CJD in
Multisequence MRI of the Brain**

- Marius George Linguraru, Nicholas Ayache,
Miguel Ángel González Ballester, Eric Bardinet, Damien Galanaud,
Stéphane Haik, Baptiste Faucheuex, Patrick Cozzone,
Didier Dormont, Jean-Philippe Brandel* 492

Model-Based Image Analysis

Statistical Representation and Simulation of High-Dimensional Deformations: Application to Synthesizing Brain Deformations

- Zhong Xue, Dinggang Shen, Bilge Karacali,
Christos Davatzikos* 500

Model-Based Parameter Recovery from Uncalibrated Optical Images

- S.J. Preece, I.B. Styles, S.D. Cotton, E. Claridge,
A. Calcagni* 509

MRI Tissue Classification with Neighborhood Statistics: A Nonparametric, Entropy-Minimizing Approach

- Tolga Tasdizen, Suyash P. Awate, Ross T. Whitaker,
Norman L. Foster* 517

Image-Guided Intervention: Simulation, Modeling and Display

Robotic Assisted Radio-Frequency Ablation of Liver Tumors – Randomized Patient Study

- A. Patriciu, M. Awad, S.B. Solomon, M. Choti, D. Mazilu,
L. Kavoussi, D. Stoianovici* 526

New Approaches to Catheter Navigation for Interventional Radiology Simulation

- S. Cotin, C. Duriez, J. Lenoir, P. Neumann, S. Dawson* 534

Hybrid Bronchoscope Tracking Using a Magnetic Tracking Sensor and Image Registration

- Kensaku Mori, Daisuke Deguchi, Kenta Akiyama,
Takayuki Kitasaka, Calvin R. Maurer Jr., Yasuhito Suenaga,
Hirotugu Takabatake, Masaki Mori, Hiroshi Natori* 543

Toward Robotized Beating Heart TECABG: Assessment of the Heart Dynamics Using High-Speed Vision

- Loïc Cuvillon, Jacques Gangloff, Michel de Mathelin,
Antonello Forgione* 551

Data-Fusion Display System with Volume Rendering of Intraoperatively Scanned CT Images

- Mitsuhiko Hayashibe, Naoki Suzuki, Asaki Hattori, Yoshito Otake,
Shigeyuki Suzuki, Norio Nakata* 559

Simulation and Modeling II

A Hybrid Cutting Approach for Hysteroscopy Simulation <i>M. Harders, D. Steinemann, M. Gross, G. Székely</i>	567
Hydrometra Simulation for VR-Based Hysteroscopy Training <i>R. Sierra, J. Zátonyi, M. Bajka, G. Székely, M. Harders</i>	575
Brain Shift Computation Using a Fully Nonlinear Biomechanical Model <i>Adam Wittek, Ron Kikinis, Simon K. Warfield, Karol Miller</i>	583
Finite Element Model of Cornea Deformation <i>Jessica R. Crouch, John C. Merriam, Earl R. Crouch III</i>	591
Characterization of Viscoelastic Soft Tissue Properties from <i>In vivo</i> Animal Experiments and Inverse FE Parameter Estimation <i>Jung Kim, Mandayam A. Srinivasan</i>	599
A Fast-Marching Approach to Cardiac Electrophysiology Simulation for XMR Interventional Imaging <i>M. Sermesant, Y. Coudière, V. Moreau-Villéger, K.S. Rhode, D.L.G. Hill, R.S. Razavi</i>	607
An Inverse Problem Approach to the Estimation of Volume Change <i>Martin Schweiger, Oscar Camara-Rey, William R. Crum, Emma Lewis, Julia Schnabel, Simon R. Arridge, Derek L.G. Hill, Nick Fox</i>	616
A Velocity-Dependent Model for Needle Insertion in Soft Tissue <i>Jessica R. Crouch, Chad M. Schneider, Josh Wainer, Allison M. Okamura</i>	624
Material Properties Estimation of Layered Soft Tissue Based on MR Observation and Iterative FE Simulation <i>Mitsunori Tada, Noritaka Nagai, Takashi Maeno</i>	633
Simulating Vascular Systems in Arbitrary Anatomies <i>Dominik Szczerba, Gábor Székely</i>	641

Medical Image Computing - Shape II

Physiological System Identification with the Kalman Filter in Diffuse Optical Tomography <i>Solomon Gilbert Diamond, Theodore J. Huppert, Ville Kolehmainen, Maria Angela Franceschini, Jari P. Kaipio, Simon R. Arridge, David A. Boas</i>	649
Brain Surface Parameterization Using Riemann Surface Structure <i>Yalin Wang, Xianfeng Gu, Kiralee M. Hayashi, Tony F. Chan, Paul M. Thompson, Shing-Tung Yau</i>	657
Automated Surface Matching Using Mutual Information Applied to Riemann Surface Structures <i>Yalin Wang, Ming-Chang Chiang, Paul M. Thompson</i>	666
Optimization of Brain Conformal Mapping with Landmarks <i>Yalin Wang, Lok Ming Lui, Tony F. Chan, Paul M. Thompson</i>	675
A New Method for SPECT Quantification of Targeted Radiotracers Uptake in the Myocardium <i>Shimin Li, Lawrence W. Dobrucki, Albert J. Sinusas, Yi-Hwa Liu</i>	684
Tracking and Analysis of Cine-Delayed Enhancement MR <i>Thomas O'Donnell, Engin Dikici, Randolph Setser, Richard D. White</i>	692
Characterizing Vascular Connectivity from microCT Images <i>Marcel Jackowski, Xenophon Papademetris, Lawrence W. Dobrucki, Albert J. Sinusas, Lawrence H. Staib</i>	701
Shape Modeling Using Automatic Landmarking <i>Jun Xie, Pheng-Ann Heng</i>	709
A Computer-Aided Design System for Revision of Segmentation Errors <i>Marcel Jackowski, Ardeshir Goshtasby</i>	717
Statistical Modeling of Shape and Appearance Using the Continuous Medial Representation <i>Paul A. Yushkevich, Hui Zhang, James C. Gee</i>	725
Vertebral Shape: Automatic Measurement with Dynamically Sequenced Active Appearance Models <i>M.G. Roberts, T.F. Cootes, J.E. Adams</i>	733

Geodesic Active Contours with Adaptive Neighboring Influence <i>Huafeng Liu, Yunmei Chen, Hon Pong Ho, Pengcheng Shi</i>	741
A Construction of an Averaged Representation of Human Cortical Gyri Using Non-linear Principal Component Analysis <i>G. Lohmann, D.Y. von Cramon, A.C.F. Colchester</i>	749
Efficient Kernel Density Estimation of Shape and Intensity Priors for Level Set Segmentation <i>Mikael Rousson, Daniel Cremers</i>	757
Corpus Callosum Subdivision Based on a Probabilistic Model of Inter-hemispheric Connectivity <i>Martin A. Styner, Ipek Oguz, Rachel Gimpel Smith, Carissa Cascio, Matthieu Jomier</i>	765
Image Segmentation and Analysis II	
Random Walks for Interactive Organ Segmentation in Two and Three Dimensions: Implementation and Validation <i>Leo Grady, Thomas Schiwietz, Shmuel Aharon, Rüdiger Westermann</i>	773
Robust Pulmonary Nodule Segmentation in CT: Improving Performance for Juxtapleural Cases <i>K. Okada, V. Ramesh, A. Krishnan, M. Singh, U. Akdemir</i>	781
Tissue Classification of Noisy MR Brain Images Using Constrained GMM <i>Amit Ruf, Hayit Greenspan, Jacob Goldberger</i>	790
Automatic Left Atrium Segmentation by Cutting the Blood Pool at Narrowings <i>Matthias John, Norbert Rahn</i>	798
Automatic Vascular Tree Formation Using the Mahalanobis Distance <i>Julien Jomier, Vincent LeDigarcher, Stephen R. Aylward</i>	806
The Use of Unwrapped Phase in MR Image Segmentation: A Preliminary Study <i>Pierrick Bourgeat, Jurgen Fripp, Andrew Janke, Graham Galloway, Stuart Crozier, Sébastien Ourselin</i>	813

2D and 3D Shape Based Segmentation Using Deformable Models <i>Ayman El-Baz, Seniha E. Yuksel, Hongjian Shi, Aly A. Farag, Mohamed A. El-Ghar, Tarek Eldiasty, Mohamed A. Ghoneim</i>	821
CT Hepatic Venography: 3D Vascular Segmentation for Preoperative Evaluation <i>Catalin Fetita, Olivier Lucidarme, Françoise Prêteux, Philippe Grenier</i>	830
Shape-Based Averaging for Combination of Multiple Segmentations <i>T. Rohlfing, C.R. Maurer, Jr.</i>	838
Automatic Initialization Algorithm for Carotid Artery Segmentation in CTA Images <i>Martijn Sanderse, Henk A. Marquering, Emile A. Hendriks, Aad van der Lugt, Johan H.C. Reiber</i>	846
Automated Nomenclature of Bronchial Branches Extracted from CT Images and Its Application to Biopsy Path Planning in Virtual Bronchoscopy <i>Kensaku Mori, Sinya Ema, Takayuki Kitasaka, Yoshito Mekada, Ichiro Ide, Hiroshi Murase, Yasuhito Suenaga, Hirotsugu Takabatake, Masaki Mori, Hiroshi Natori</i>	854
Spectral Clustering Algorithms for Ultrasound Image Segmentation <i>Neculai Archip, Robert Rohling, Peter Cooperberg, Hamid Tahmasebpour, Simon K. Warfield</i>	862
Using the Fast Marching Method to Extract Curves with Given Global Properties <i>Xiaodong Tao, Christos Davatzikos, Jerry L. Prince</i>	870
Robust Tissue Boundary Detection for Cerebral Cortical Thickness Estimation <i>Marietta L.J. Scott, Neil A. Thacker</i>	878
Statistical Analysis of Pharmacokinetic Models in Dynamic Contrast-Enhanced Magnetic Resonance Imaging <i>Volker J. Schmid, Brandon J. Whitcher, Guang-Zhong Yang, N. Jane Taylor, Anwar R. Padhani</i>	886

Image Registration III

Inter-breath-hold Registration for the Production of High Resolution Cardiac MR Volumes <i>Nicholas M.I. Noble, Redha Boubertakh, Reza S. Razavi, Derek L.G. Hill</i>	894
Consistent Estimation of Cardiac Motions by 4D Image Registration <i>Dinggang Shen, Hari Sundar, Zhong Xue, Yong Fan, Harold Litt</i>	902
Multispectral MR to X-Ray Registration of Vertebral Bodies by Generating CT-Like Data <i>Everine B. van de Kraats, Graeme P. Penney, Theo van Walsum, Wiro J. Niessen</i>	911
Articulated Rigid Registration for Serial Lower-Limb Mouse Imaging <i>Xenophon Papademetris, Donald P. Dione, Lawrence W. Dobrucki, Lawrence H. Staib, Albert J. Sinusas</i>	919
Incorporating Statistical Measures of Anatomical Variability in Atlas-to-Subject Registration for Conformal Brain Radiotherapy <i>Olivier Commowick, Radu Stefanescu, Pierre Fillard, Vincent Arsigny, Nicholas Ayache, Xavier Pennec, Grégoire Malandain</i>	927
Accurate Image Registration for Quadrature Tomographic Microscopy <i>Chia-Ling Tsai, William Warger II, Charles DiMarzio</i>	935
Riemannian Elasticity: A Statistical Regularization Framework for Non-linear Registration <i>X. Pennec, R. Stefanescu, V. Arsigny, P. Fillard, N. Ayache</i>	943
3D Model-Based Approach to Lung Registration and Prediction of Respiratory Cardiac Motion <i>Mikhail G. Danilouchkine, Jos J.M. Westenberg, Hans C. van Assen, Johan H.C. van Reiber, Boudewijn P.F. Lelieveldt</i>	951
Fast DRR Generation for 2D/3D Registration <i>W. Birkfellner, R. Seemann, M. Figl, J. Hummel, C. Ede, P. Homolka, X. Yang, P. Niederer, H. Bergmann</i>	960
Validation of PET Imaging by Alignment to Histology Slices <i>Philip J. Edwards, Ayman D. Nijmeh, Mark McGurk, Edward Odell, Michael R. Fenlon, Paul K. Marsden, David J. Hawkes</i>	968

Adaptive Subdivision for Hierarchical Non-rigid Registration of Multi-modal Images Using Mutual Information <i>Adrian Andronache, Philippe Cattin, Gábor Székely</i>	976
3-D Diffeomorphic Shape Registration on Hippocampal Data Sets <i>Hongyu Guo, Anand Rangarajan, Sarang C. Joshi</i>	984
Two-Stage Registration for Real-Time Deformable Compensation Using an Electromagnetic Tracking Device <i>Hui Zhang, Filip Banovac, Neil Glossop, Kevin Cleary</i>	992
Cadaver Validation of Intensity-Based Ultrasound to CT Registration <i>Graeme P. Penney, Dean C. Barratt, Carolyn S.K. Chan, Mike Slomczykowski, Timothy J. Carter, Phillip J. Edwards, David J. Hawkes</i>	1000
Author Index	1009

Table of Contents – Part I

Image Analysis and Validation

Classification of Structural Images via High-Dimensional Image Warping, Robust Feature Extraction, and SVM

Yong Fan, Dinggang Shen, Christos Davatzikos

1

Bone Enhancement Filtering: Application to Sinus Bone Segmentation and Simulation of Pituitary Surgery

*Maxime Descoteaux, Michel Audette, Kiyoyuki Chinzei,
Kaleem Siddiqi*

9

Simultaneous Registration and Segmentation of Anatomical Structures from Brain MRI

Fei Wang, Baba C. Vemuri

17

Synthetic Ground Truth for Validation of Brain Tumor MRI

Segmentation

Marcel Prastawa, Elizabeth Bullitt, Guido Gerig

26

Vascular Image Segmentation

Automatic Cerebrovascular Segmentation by Accurate Probabilistic Modeling of TOF-MRA Images

*Ayman El-Baz, Aly A. Farag, Georgy Gimel'farb,
Stephen G. Hushek*

34

A Segmentation and Reconstruction Technique for 3D Vascular Structures

*Vincent Luboz, Xunlei Wu, Karl Krissian, Carl-Fredrik Westin,
Ron Kikinis, Stéphane Cotin, Steve Dawson*

43

MRA Image Segmentation with Capillary Active Contour

Pingkun Yan, Ashraf A. Kassim

51

Spatial Graphs for Intra-cranial Vascular Network Characterization, Generation, and Discrimination

*Stephen R. Aylward, Julien Jomier, Christelle Vivert,
Vincent LeDigarcher, Elizabeth Bullitt*

59

Image Registration I

Surface Alignment of 3D Spherical Harmonic Models: Application to Cardiac MRI Analysis

- Heng Huang, Li Shen, Rong Zhang, Fillia Makedon,
Bruce Hettelman, Justin Pearlman* 67

Unified Point Selection and Surface-Based Registration Using a Particle Filter

- Burton Ma, Randy E. Ellis* 75

Elastic Registration of 3D Ultrasound Images

- Pezhman Foroughi, Purang Abolmaesumi* 83

Tracer Kinetic Model-Driven Registration for Dynamic Contrast Enhanced MRI Time Series

- Giovanni A. Buonaccorsi, Caleb Roberts, Sue Cheung,
Yvonne Watson, Karen Davies, Alan Jackson, Gordon C. Jayson,
Geoff J.M. Parker* 91

Generalised Overlap Measures for Assessment of Pairwise and Groupwise Image Registration and Segmentation

- William R. Crum, Oscar Camara, Daniel Rueckert,
Kanwal K. Bhatia, Mark Jenkinson, Derek L.G. Hill* 99

Diffusion Tensor Image Analysis

Uncertainty in White Matter Fiber Tractography

- Ola Friman, Carl-Fredrik Westin* 107

Fast and Simple Calculus on Tensors in the Log-Euclidean Framework

- Vincent Arsigny, Pierre Fillard, Xavier Pennec,
Nicholas Ayache* 115

3D Curve Inference for Diffusion MRI Regularization

- Peter Savadjiev, Jennifer S.W. Campbell, G. Bruce Pike,
Kaleem Siddiqi* 123

Fiber Tract-Oriented Statistics for Quantitative Diffusion Tensor MRI Analysis

- Isabelle Corouge, P. Thomas Fletcher, Sarang Joshi,
John H. Gilmore, Guido Gerig* 131

White Matter Tract Clustering and Correspondence in Populations

- Lauren O'Donnell, Carl-Fredrik Westin* 140

76-Space Analysis of Grey Matter Diffusivity: Methods and Applications <i>Tianming Liu, Geoffrey Young, Ling Huang, Nan-Kuei Chen, Stephen TC Wong</i>	148
Fast Orientation Mapping from HARDI <i>Evren Özarslan, Timothy M. Shepherd, Baba C. Vemuri, Stephen J. Blackband, Thomas H. Mareci</i>	156
An Automated Approach to Connectivity-Based Partitioning of Brain Structures <i>P.A. Cook, H. Zhang, B.B. Avants, P. Yushkevich, D.C. Alexander, J.C. Gee, O. Ciccarelli, A.J. Thompson</i>	164
Deformable Registration of Diffusion Tensor MR Images with Explicit Orientation Optimization <i>Hui Zhang, Paul A. Yushkevich, James C. Gee</i>	172
A Hamilton-Jacobi-Bellman Approach to High Angular Resolution Diffusion Tractography <i>Eric Pichon, Carl-Fredrik Westin, Allen R. Tannenbaum</i>	180
Automated Atlas-Based Clustering of White Matter Fiber Tracts from DTMRI <i>Mahnaz Maddah, Andrea U.J. Mewes, Steven Haker, W. Eric L. Grimson, Simon K. Warfield</i>	188
MR Diffusion-Based Inference of a Fiber Bundle Model from a Population of Subjects <i>V. El Koubby, Y. Cointepas, C. Poupon, D. Rivière, N. Golestani, J.-B. Poline, D. Le Bihan, J.-F. Mangin</i>	196
Knowledge-Based Classification of Neuronal Fibers in Entire Brain <i>Yan Xia, And U. Turken, Susan L. Whitfield-Gabrieli, John D. Gabrieli</i>	205
A Physical Model for DT-MRI Based Connectivity Map Computation <i>Erdem Yörük, Burak Acar, Roland Bammer</i>	213
Image Segmentation and Analysis I	
A Novel 3D Partitioned Active Shape Model for Segmentation of Brain MR Images <i>Zheen Zhao, Stephen R. Aylward, Eam Khwang Teoh</i>	221

Cross Entropy: A New Solver for Markov Random Field Modeling and Applications to Medical Image Segmentation <i>Jue Wu, Albert C.S. Chung</i>	229
Semi-automated Basal Ganglia Segmentation Using Large Deformation Diffeomorphic Metric Mapping <i>Ali Khan, Elizabeth Aylward, Patrick Barta, Michael Miller, M. Faisal Beg</i>	238
Particle Filters, a Quasi-Monte Carlo Solution for Segmentation of Coronaries <i>Charles Florin, Nikos Paragios, Jim Williams</i>	246
Hybrid Segmentation Framework for Tissue Images Containing Gene Expression Data <i>Musodiq Bello, Tao Ju, Joe Warren, James Carson, Wah Chiu, Christina Thaller, Gregor Eichele, Ioannis A. Kakadiaris</i>	254
Fully Automatic Kidneys Detection in 2D CT Images: A Statistical Approach <i>Wala Touhami, Djamal Boukerroui, Jean-Pierre Cocquerez</i>	262
Segmentation of Neighboring Organs in Medical Image with Model Competition <i>Pingkun Yan, Weijia Shen, Ashraf A. Kassim, Mubarak Shah</i>	270
Point-Based Geometric Deformable Models for Medical Image Segmentation <i>Hon Pong Ho, Yunmei Chen, Huafeng Liu, Pengcheng Shi</i>	278
A Variational PDE Based Level Set Method for a Simultaneous Segmentation and Non-rigid Registration <i>Jung-ha An, Yunmei Chen, Feng Huang, David Wilson, Edward Geiser</i>	286
A Tracking Approach to Parcellation of the Cerebral Cortex <i>Chris Adamson, Leigh Johnston, Terrie Inder, Sandra Rees, Iven Mareels, Gary Egan</i>	294
Cell Segmentation, Tracking, and Mitosis Detection Using Temporal Context <i>Fuxing Yang, Michael A. Mackey, Fiorenza Ianzini, Greg Gallardo, Milan Sonka</i>	302

A Unifying Approach to Registration, Segmentation, and Intensity Correction <i>Kilian M. Pohl, John Fisher, James J. Levitt, Martha E. Shenton, Ron Kikinis, W. Eric L. Grimson, William M. Wells</i>	310
Automatic 3D Segmentation of Intravascular Ultrasound Images Using Region and Contour Information <i>Marie-Hélène Roy Cardinal, Jean Meunier, Gilles Soulez, Roch L. Maurice, Éric Thérasse, Guy Cloutier</i>	319
Automatic Segmentation of the Articular Cartilage in Knee MRI Using a Hierarchical Multi-class Classification Scheme <i>Jenny Folkesson, Erik Dam, Ole Fogh Olsen, Paola Pettersen, Claus Christiansen</i>	327
Automatic Segmentation of the Left Ventricle in 3D SPECT Data by Registration with a Dynamic Anatomic Model <i>Lars Dornheim, Klaus D. Tönnies, Kat Dixon</i>	335
Intravascular Ultrasound-Based Imaging of Vasa Vasorum for the Detection of Vulnerable Atherosclerotic Plaque <i>Sean M. O'Malley, Manolis Vavuranakis, Morteza Naghavi, Ioannis A. Kakadiaris</i>	343
Parametric Response Surface Models for Analysis of Multi-site fMRI Data <i>Seyoung Kim, Padhraic Smyth, Hal Stern, Jessica Turner</i>	352
Clinical Applications – Validation	
Subject Specific Finite Element Modelling of the Levator Ani <i>Su-Lin Lee, Ara Darzi, Guang-Zhong Yang</i>	360
Robust Visualization of the Dental Occlusion by a Double Scan Procedure <i>Filip Schutyser, Gwen Swennen, Paul Suetens</i>	368
Segmentation of Focal Cortical Dysplasia Lesions Using a Feature-Based Level Set <i>O. Colliot, T. Mansi, N. Bernasconi, V. Naessens, D. Klironomos, A. Bernasconi</i>	375

Effects of Healthy Aging Measured By Intracranial Compartment Volumes Using a Designed MR Brain Database <i>Bénédicte Mortamet, Donglin Zeng, Guido Gerig, Marcel Prastawa, Elizabeth Bullitt</i>	383
Predicting Clinical Variable from MRI Features: Application to MMSE in MCI <i>S. Duchesne, A. Caroli, C. Geroldi, G.B. Frisoni, D. Louis Collins</i>	392
Finite Element Modeling of Brain Tumor Mass-Effect from 3D Medical Images <i>Ashraf Mohamed, Christos Davatzikos</i>	400
STREM: A Robust Multidimensional Parametric Method to Segment MS Lesions in MRI <i>L.S. Aït-Ali, S. Prima, P. Hellier, B. Carsin, G. Edan, C. Barillot</i>	409
Cross Validation of Experts Versus Registration Methods for Target Localization in Deep Brain Stimulation <i>F. Javier Sánchez Castro, Claudio Pollo, Reto Meuli, Philippe Maeder, Meritxell Bach Cuadra, Olivier Cuisenaire, Jean-Guy Villemure, Jean-Philippe Thiran</i>	417
Localization of Abnormal Conduction Pathways for Tachyarrhythmia Treatment Using Tagged MRI <i>G.I. Sanchez-Ortiz, M. Sermesant, K.S. Rhode, R. Chandrashekara, R. Razavi, D.L.G. Hill, D. Rueckert</i>	425
Automatic Mammary Duct Detection in 3D Ultrasound <i>Mark J. Gooding, Matthew Mellor, Jacqueline A. Shipley, Kathy A. Broadbent, Dorothy A. Goddard</i>	434
Automatic Segmentation of Intra-treatment CT Images for Adaptive Radiation Therapy of the Prostate <i>B.C. Davis, M. Foskey, J. Rosenman, L. Goyal, S. Chang, S. Joshi</i>	442
Inter-Operator Variability in Perfusion Assessment of Tumors in MRI Using Automated AIF Detection <i>Edward Ashton, Teresa McShane, Jeffrey Evelhoch</i>	451
Computer-Assisted Deformity Correction Using the Ilizarov Method <i>A.L. Simpson, B. Ma, D.P. Borschneck, R.E. Ellis</i>	459

Real-Time Interactive Viewing of 4D Kinematic MR Joint Studies <i>Heinrich Schulz, Kirsten Meetz, Clemens Bos, Daniel Bystrov, Thomas Netsch</i>	467
Computer-Assisted Ankle Joint Arthroplasty Using Bio-engineered Autografts <i>R. Sidler, W. Köstler, T. Bardyn, M.A. Styner, N. Südkamp, L. Nolte, M.Á. González Ballester</i>	474
Prospective Head Motion Compensation for MRI by Updating the Gradients and Radio Frequency During Data Acquisition <i>Christian Dold, Maxim Zaitsev, Oliver Speck, Evelyn A. Firle, Jürgen Hennig, Georgios Sakas</i>	482
Harmonic Skeleton Guided Evaluation of Stenoses in Human Coronary Arteries <i>Yan Yang, Lei Zhu, Steven Haker, Allen R. Tannenbaum, Don P. Giddens</i>	490
Acquisition-Related Limitations in MRI Based Morphometry <i>Arne Littmann, Jens Guehring, Christian Buechel, Hans-Siegfried Stiehl</i>	498
Combining Classifiers Using Their Receiver Operating Characteristics and Maximum Likelihood Estimation <i>Steven Haker, William M. Wells III, Simon K. Warfield, Ion-Florin Talos, Jui G. Bhagwat, Daniel Goldberg-Zimring, Asim Mian, Lucila Ohno-Machado, Kelly H. Zou</i>	506
Two Methods for Validating Brain Tissue Classifiers <i>Marcos Martin-Fernandez, Sylvain Bouix, Lida Ungar, Robert W. McCarley, Martha E. Shenton</i>	515
Comparison of Vessel Segmentations Using STAPLE <i>Julien Jomier, Vincent LeDigarcher, Stephen R. Aylward</i>	523
Validation Framework of the Finite Element Modeling of Liver Tissue <i>Hongjian Shi, Rachid Fahmi, Aly A. Farag</i>	531
A Complete Augmented Reality Guidance System for Liver Punctures: First Clinical Evaluation <i>S.A. Nicolau, X. Pennec, L. Soler, N. Ayache</i>	539

Imaging Systems – Visualization

A Novel Approach to High Resolution Fetal Brain MR Imaging <i>F. Rousseau, O. Glenn, B. Iordanova, C. Rodriguez-Carranza, D. Vigneron, J. Barkovich, C. Studholme</i>	548
Respiratory Signal Extraction for 4D CT Imaging of the Thorax from Cone-Beam CT Projections <i>Simon Rit, David Sarrut, Chantal Ginestet</i>	556
Registering Liver Pathological Images with Prior In Vivo CT/MRI Data <i>Huadong Wu, Alyssa M. Krasinskas, Mitchell E. Tublin, Brian E. Chapman</i>	564
Support Vector Clustering for Brain Activation Detection <i>Defeng Wang, Lin Shi, Daniel S. Yeung, Pheng-Ann Heng, Tien-Tsin Wong, Eric C.C. Tsang</i>	572
Inter-frame Motion Correction for MR Thermometry <i>S. Suprijanto, M.W. Vogel, F.M. Vos, H.A. Vrooman, A.M. Vossepoel</i>	580
Adaptive Multiscale Ultrasound Compounding Using Phase Information <i>Vicente Grau, J. Alison Noble</i>	589
3D Freehand Ultrasound Reconstruction Based on Probe Trajectory <i>Pierrick Coupé, Pierre Hellier, Noura Azzabou, Christian Barillot</i>	597
Self-Calibrating Ultrasound-to-CT Bone Registration <i>Dean C. Barratt, Graeme Penney, Carolyn S.K. Chan, Mike Slomczykowski, Timothy J. Carter, Philip J. Edwards, David J. Hawkes</i>	605
A Hand-Held Probe for Vibro-Elastography <i>Hassan Rivaz, Robert Rohling</i>	613
Real-Time Quality Control of Tracked Ultrasound <i>Emad M. Boctor, Julian Iordachita, Gabor Fichtinger, Gregory D. Hager</i>	621
Fully Truncated Cone-Beam Reconstruction on Pi Lines Using Prior CT <i>Krishnakumar Ramamurthi, Norbert Strobel, Rebecca Fahrig, Jerry L. Prince</i>	631

C-arm Calibration - Is it Really Necessary? <i>Ameet Jain, Ryan Kon, Yu Zhou, Gabor Fichtinger</i>	639
Laser Needle Guide for the Sonic Flashlight <i>David Wang, Bing Wu, George Stetten</i>	647
Differential Fly-Throughs (DFT): A General Framework for Computing Flight Paths <i>M. Sabry Hassouna, Aly A. Farag, Robert Falk</i>	654
Panoramic Views for Virtual Endoscopy <i>Bernhard Geiger, Christophe Chefd'hotel, Sandra Sudarsky</i>	662
Computer Assisted Diagnosis	
Toward Automatic Computer Aided Dental X-ray Analysis Using Level Set Method <i>Shuo Li, Thomas Fevens, Adam Krzyżak, Chao Jin, Song Li</i>	670
Exploiting Temporal Information in Functional Magnetic Resonance Imaging Brain Data <i>Lei Zhang, Dimitris Samaras, Dardo Tomasi, Nelly Alia-Klein, Lisa Cottone, Andreana Leskovjan, Nora Volkow, Rita Goldstein</i>	679
Model-Based Analysis of Local Shape for Lesion Detection in CT Scans <i>Paulo R.S. Mendonça, Rahul Bhotika, Saad A. Sirohey, Wesley D. Turner, James V. Miller, Ricardo S. Avila</i>	688
Development of a Navigation-Based CAD System for Colon <i>Masahiro Oda, Takayuki Kitasaka, Yuichiro Hayashi, Kensaku Mori, Yasuhito Suenaga, Jun-ichiro Toriwaki</i>	696
A Prediction Framework for Cardiac Resynchronization Therapy Via 4D Cardiac Motion Analysis <i>Heng Huang, Li Shen, Rong Zhang, Fillia Makedon, Bruce Hettlemann, Justin Pearlman</i>	704
Segmentation and Size Measurement of Polyps in CT Colonography <i>J.J. Dijkers, C. van Wijk, F.M. Vos, J. Florie, Y.C. Nio, H.W. Venema, R. Truyen, L.J. van Vliet</i>	712
Quantitative Nodule Detection in Low Dose Chest CT Scans: New Template Modeling and Evaluation for CAD System Design <i>Aly A. Farag, Ayman El-Baz, Georgy Gimel'farb, Mohamed Abou El-Ghar, Tarek Eldiasty</i>	720

Graph Embedding to Improve Supervised Classification and Novel Class Detection: Application to Prostate Cancer

- Anant Madabhushi, Jianbo Shi, Mark Rosen, John E. Tomaszewski, Michael D. Feldman* 729

Quantification of Emphysema Severity by Histogram Analysis of CT Scans

- Paulo R.S. Mendonça, Dirk R. Padfield, James C. Ross, James V. Miller, Sandeep Dutta, Sardar Mal Gautham* 738

Cellular and Molecular Image Analysis

Efficient Learning by Combining Confidence-Rated Classifiers to Incorporate Unlabeled Medical Data

- Weijun He, Xiaolei Huang, Dimitris Metaxas, Xiaoyou Ying* 745

Mosaicing of Confocal Microscopic *In Vivo* Soft Tissue Video Sequences

- Tom Vercauteren, Aymeric Perchant, Xavier Pennec, Nicholas Ayache* 753

Segmentation and 3D Reconstruction of Microtubules in Total Internal Reflection Fluorescence Microscopy (TIRFM)

- Stathis Hadjidemetriou, Derek Toomre, James S. Duncan* 761

Physically-Based Modeling

Ligament Strains Predict Knee Motion After Total Joint Replacement – A Kinematic Analysis of The Sigma Knee

- Elvis C.S. Chen, Joel L. Lanovaz, Randy E. Ellis* 770

A Boundary Element-Based Approach to Analysis of LV Deformation

- Ping Yan, Ning Lin, Albert J. Sinusas, James S. Duncan* 778

Reconstruction of Cerebrospinal Fluid Flow in the Third Ventricle Based on MRI Data

- Vartan Kurtcuoglu, Michaela Soellinger, Paul Summers, Kevin Boomsma, Dimos Poulikakos, Peter Boesiger, Yiannis Ventikos* 786

Schwarz Meets Schwann: Design and Fabrication of Biomorphic Tissue Engineering Scaffolds

- Srinivasan Rajagopalan, Richard A. Robb* 794

Robotics and Intervention I

Automatic Detection and Segmentation of Robot-Assisted Surgical Motions

- Henry C. Lin, Izhak Shafran, Todd E. Murphy, Allison M. Okamura, David D. Yuh, Gregory D. Hager* 802

DaVinci Canvas: A Telerobotic Surgical System with Integrated, Robot-Assisted, Laparoscopic Ultrasound Capability

- Joshua Leven, Darius Burschka, Rajesh Kumar, Gary Zhang, Steve Blumenkranz, Xiangtian (Donald) Dai, Mike Awad, Gregory D. Hager, Mike Marohn, Mike Choti, Chris Hasser, Russell H. Taylor* 811

Design and Control of In-Vivo Magnetic Microrobots

- K. Berk Yesin, Philipp Exner, Karl Vollmers, Bradley J. Nelson* 819

3D Needle-Tissue Interaction Simulation for Prostate Brachytherapy

- Orcun Goksel, Septimiu E. Salcudean, Simon P. DiMaio, Robert Rohling, James Morris* 827

Development and Application of Functional Databases for Planning Deep-Brain Neurosurgical Procedures

- Ting Guo, Kirk W. Finnis, Andrew G. Parrent, Terry M. Peters* 835

Medical Image Computing for Clinical Applications

Gaze-Contingent Soft Tissue Deformation Tracking for Minimally Invasive Robotic Surgery

- George P. Mylonas, Danail Stoyanov, Fani Deligianni, Ara Darzi, Guang-Zhong Yang* 843

Registration and Integration for Fluoroscopy Device Enhancement

- James C. Ross, David Langan, Ravi Manjeshwar, John Kaufhold, Joseph Manak, David Wilson* 851

Computer Aided Detection for Low-Dose CT Colonography

- Gabriel Kiss, Johan Van Cleynenbreugel, Stylianos Drisis, Didier Bielen, Guy Marchal, Paul Suetens* 859

Photo-Realistic Tissue Reflectance Modelling for Minimally Invasive Surgical Simulation

- Mohamed A. ElHelw, Stella Atkins, Marios Nicolaou, Adrian Chung, Guang-Zhong Yang* 868

Biological Imaging - Simulation and Modeling I

Motion Tracking and Intensity Surface Recovery in Microscopic Nuclear Images

Lopamudra Mukherjee, Mingen Lin, Jinhui Xu, Ronald Berezney 876

Towards Automated Cellular Image Segmentation for RNAi Genome-Wide Screening

Xiaobo Zhou, K.-Y. Liu, P. Bradley, N. Perrimon, Stephen TC Wong 885

Adaptive Spatio-Temporal Restoration for 4D Fluorescence Microscopic Imaging

Jérôme Boulanger, Charles Kervrann, Patrick Bouthemy 893

Kinematic Geometry of Osteotomies

Erin J. Smith, J. Tim Bryant, Randy E. Ellis 902

Predictive Camera Tracking for Bronchoscope Simulation with CONDensation

Fani Deligianni, Adrian Chung, Guang-Zhong Yang 910

Experimental Validation of a 3D Dynamic Finite-Element Model of a Total Knee Replacement

Joel L. Lanovaz, Randy E. Ellis 917

An In Vitro Patient-Tailored Model of Human Cerebral Artery for Simulating Endovascular Intervention

Seiichi Ikeda, Fumihito Arai, Toshio Fukuda, Makoto Negoro, Keiko Irie, Ikuo Takahashi 925

Author Index 933