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Medical Image Computing and Computer-Assisted Intervention – MICCAI 2008

11th International Conference
New York, NY, USA, September 6-10, 2008
Proceedings, Part I

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Preface

The 11th International Conference on Medical Imaging and Computer Assisted Intervention, MICCAI 2008, was held at the Helen and Martin Kimmel Center of New York University, New York City, USA on September 6–10, 2008.

MICCAI is the premier international conference in this domain, with in-depth papers on the multidisciplinary fields of biomedical image computing and analysis, computer assisted intervention and medical robotics. The conference brings together biological scientists, clinicians, computer scientists, engineers, mathematicians, physicists and other interested researchers and offers them a forum to exchange ideas in these exciting and rapidly growing fields.

The conference is both very selective and very attractive: this year we received a record number of 700 submissions from 34 countries and 6 continents, from which 258 papers were selected for publication, which corresponds to a success rate of approximately 36%. Some interesting facts about the distribution of submitted and accepted papers are shown graphically at the end of this preface.

The paper selection process this year was based on the following procedure, which included the introduction of several novelties over previous years.

1. A Program Committee (PC) of 49 members was recruited by the Program Chairs, to get the necessary body of expertise and geographical coverage. All PC members agreed in advance to participate in the final paper selection process.

2. Key words grouped in 7 categories were used to describe the content of the submissions and the expertise of the reviewers.

3. Each submitted paper was assigned to 2 Program Committee members (a primary and a secondary) whose responsibility was to assign each paper to 3 external experts (outside of the Program Committee membership), who provided scores and detailed reports in a double blind procedure.

4. Each primary PC member together with their secondary PC member had to ensure there were no missing reviews. Once they received all three reviews, a novel author *rebuttal* phase was introduced in which the authors could respond to the anonymous reviews, if they did not agree with the reviewer's/reviewers' comments.

5. The Program Committee members provided a set of scores and summary reports for the whole set of papers for which they were responsible (typically 16 papers per PC member). They did this by using the external reviews, the author rebuttal and their own reading of the papers. A summary report by the Primary and Secondary Program Committee members was then written for each paper. Based on the summary report, approximately 36% of the papers were recommended for acceptance.

6. During a two-day meeting at Rutgers University, New Jersey, USA, with all the Program Committee members present, all papers were examined carefully, and special emphasis was placed on borderline papers and oral papers. A

top list of about 120 papers was scrutinized to provide the Program Chairs with a recommended list of 37 podium presentations (approximately 5% of the submitted papers). This recommendation had a reasonable number of oral sessions and spread of content and was adopted by the Program Chairs. The final set of accepted papers has been published in these LNCS proceedings.

7. To increase the time allocated to the 221 excellent accepted poster papers, it was decided in consultation with the MICCAI Society Board to replace the oral poster teasers by continuous video teasers run on large screens during the lunch breaks.

Due to the many submitted papers and the single paper program track, the selection procedure was very selective, and many good papers remained among the 442 rejected. We received 5 factual complaints from the authors of rejected papers. The Program Chairs, in consultation with the relevant Program Committee members who handled the papers and the reviewers, checked carefully that no mistake had been made during the selection procedure. In a few cases, an additional review was requested from an independent Program Committee member. In the end, all the original decisions were maintained and in all cases additional information was provided to the authors to better explain the final decision.

Six MICCAI Young Scientist Awards were presented by the MICCAI Society on the last day of the conference. During the two-day meeting at Rutgers the Program Committee members nominated 18 eligible papers with the highest normalized scores and potential high impact and grouped them into the 6 main categories of the conference. A subgroup of the Program Committee had to vote to elect one paper out of 3 in each category taking into account the paper's presentation at the conference.

The 2008 MedIA-MICCAI Prize was offered by Elsevier to the first author of an outstanding article in the special issue of the Medical Image Analysis Journal dedicated to the previous conference MICCAI 2007. The selection was organized by the guest-editors of this special issue.

Two new awards were also introduced at this year's MICCAI. The first is a new MICCAI Society "*Enduring Impact Award*" sponsored by Philips. This award was given to a paper that was previously published at MICCAI and has proven to have an enduring impact on the field of medical image analysis and computer assisted interventions.

The second was the MICCAI 2008 "*Significant Researcher Award*" sponsored by the organizers of MICCAI 2008 and based on the recommendation of a committee. This award was given to a researcher whose research theme has had a very significant following and impact on one or more of the MICCAI research areas, as well as on other related fields.

We would like to thank the MICCAI Society for providing valuable input and support for the conference and especially Janet Wallace (Robarts Research Institute) for all her efforts and work on making the MICCAI organization a success. We also wish to acknowledge the work of a number of people for their help in putting this conference together. We would like to thank wholeheartedly the

General Chairs, the Program Committee members and the numerous external expert reviewers (who are listed on the next page) for their exceptional work. We would like to thank James Stewart for his support and help related to the MICCAI paper submission and decision making software.

We would also especially like to thank the following people from Rutgers University: Charles McGrew and Rob Toth for providing the necessary software support; Naomi Weinberger, Regina Ribaud, Maryann Holtsclaw, and Skip Carter for making the final PC meeting possible; the team at the Computational Biomedicine, Biomedicine, Imaging and Modeling Center (CBIM) and especially Zhen Qian for the web support and for liaising with the rest of the organizing committee.

We thank our two invited keynote speakers, Prof. Elliot R. McVeigh, Chairman of the Department of Biomedical Engineering at Johns Hopkins University School of Medicine, and Prof. John Condeelis from the Department of Anatomy and Structural Biology at the Albert Einstein College of Medicine, whose excellent presentations were a highlight of the conference.

We also note our thanks on page XV to our sponsors, without whose financial assistance the event would have been a far lesser one.

It was our pleasure to welcome the MICCAI 2008 attendees to the NYU Kimmel Center in New York City. The world's most dynamic and cosmopolitan city was a popular choice that also attracted an increased number of physicians and a record number of associated workshops and tutorials.

We look forward to welcoming you to MICCAI 2009, to be held 20-24 September in London, UK, and MICCAI 2010, scheduled to be held in Beijing, China.

September 2008

Dimitris Metaxas
Leon Axel
Gabor Fichtinger
Gabor Szekely

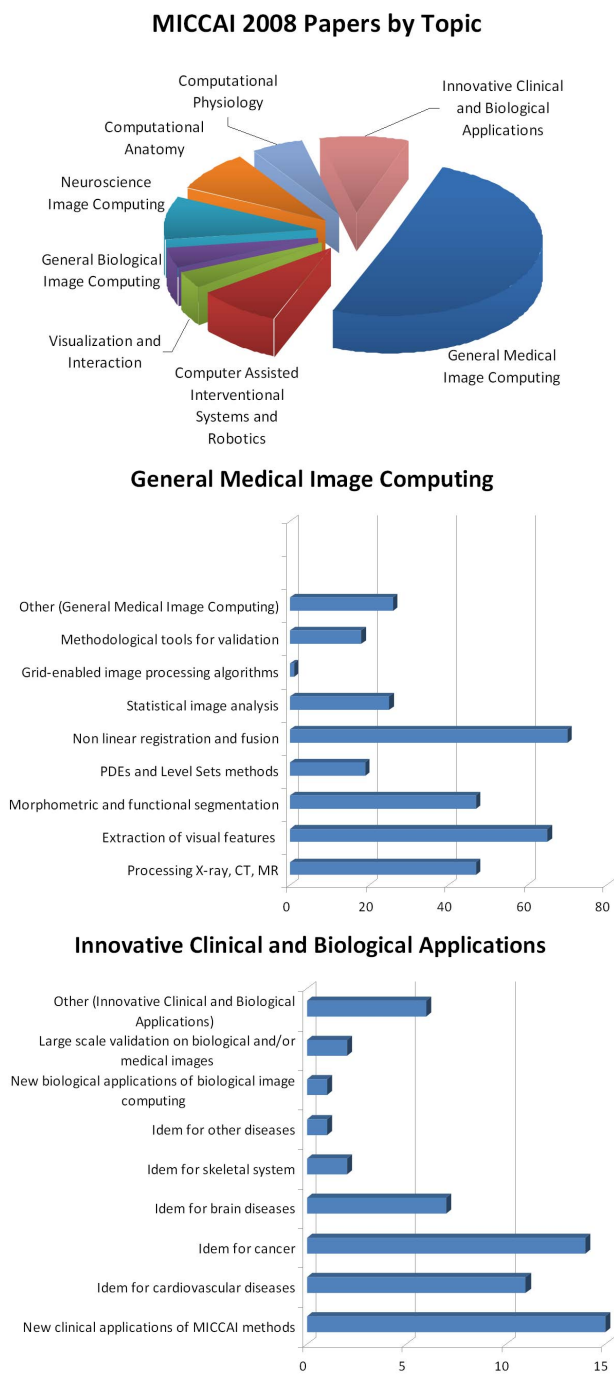


Fig. 1. View at a glance of MICCAI 2008 accepted submissions based on the declared primary keyword. A total of 258 full papers were presented.

MedIA-MICCAI Prizes

MedIA-MICCAI Prizes 2007

Two prizes were awarded by Elsevier during MICCAI 2007 to the first authors of two outstanding articles of the special issue of the Medical Image Analysis journal (volume 11, issue 5, October 2007) dedicated to the previous MICCAI 2006 conference:

- The first prize was awarded to Kilian M. Pohl (USD 700) for the article entitled: Using the Logarithm of Odds to Define a Vector Space on Probabilistic Atlases, co-authored by: Kilian M. Pohl, John Fisher, Sylvain Bouix, Martha Shenton, Robert W. McCarley, W. Eric L. Grimson, Ron Kikinis and William M. Wells. *Medical Image Analysis 11 (2007) 465–477*.
- The second prize was awarded to Masahiko Nakamoto (USD 300) for the article entitled: Recovery of Respiratory Motion and Deformation of the Liver Using Laparoscopic Freehand 3D Ultrasound System, co-authored by: Masahiko Nakamoto, Hiroaki Hirayama, Yoshinobu Sato, Kozo Konishi, Yoshihiro Kakeji, Makoto Hashizume and Shinichi Tamura. *Medical Image Analysis 11 (2007) 429–442*.

MICCAI Young Scientist Awards 2007

MICCAI Young Scientist Awards 2007 selection process:

We selected the 21 highest score papers of which the first author was a graduate student. The papers were categorized into one of 7 prize categories (3 papers/category). A sub-set from the program committee voted on the ranking of the 3 papers. The oral or poster presentations were attended before the final decision was made.

– Prize 1: Computational Anatomy

- Winner:

- * Effects of Registration Regularization and Atlas Sharpness on Segmentation Accuracy, **Boon Thye Thomas Yeo**, Mert T. Sabuncu, Rahul Desikan, Bruce Fischl, Polina Golland, CSAIL MIT, Boston School of Medicine, Athinoula A. Martinos Center for Biomedical Imaging, USA.

- Runners-up:

- * Localized Shape Variations for Classifying Wall Motion in Echocardiograms, **KY Esther Leung**, Johan G. Bosch, Erasmus MC, NL.
- * Automated Segmentation of the Liver from 3D CT Images Using Probabilistic Atlas and Multi-level Statistical Shape Models, **Toshiyuki Okada**, Ryuji Shimada, Yoshinobu Sato, Masatoshi Hori, Keita Yokota, Masahiko Nakamoto, Yen-Wei Chen, Hironobu Nakamura, Shinichi Tamura. Division of Image Analysis, Department of Radiology, Osaka University and College of Information Science and Engineering, Ritsumeikan University, Japan.

– Prize 2: Computational Physiology

- Winner:

- * Modelling Intravasation of Liquid Distension Media in Surgical Simulators, **Stephan Tuchschnid**, M. Bajka, D. Szezerba, B. Lloyd, G. Szekely, M. Harders, Computer Vision Laboratory, ETH Zurich and Clinic of Gynecology, University Hospital Zurich, Switzerland.

- Runners-up:

- * Towards Tracking Breast Cancer Across Medical Images Using Subject-Specific Biomechanical Models, **Vijay Rajagopal**, Angela Lee, Jae-Hoon Chung, Ruth Warren, Ralph P. Highnam, Poul M.F. Nielsen, Martyn P. Nash, Bioengineering Institute, U. Auckland NZ and Dept. of Radiology, Addenbrooke's Hospital, Cambridge, UK and Highnam Associates Ltd., NZ.
- * Real-Time Nonlinear Finite Element Analysis for Surgical Simulation Using Graphics Processing Units, **Zeike A. Taylor**, Mario Cheng, Sebastien Ourselin, BioMedIA Lab, CSIRO ICT Centre, Brisbane, Australia and CMIC UCL, London, UK.

- Prize 3: Innovative Clinical and Biological Applications
 - Winner:
 - * Quantification of Blood Flow from Rotational Angiography, **Irina Waechter**, *J. Bredno, D.C. Barratt, J. Weese, D.J. Hawkes, University College London, UK and Philips Research Aachen, Germany.*
 - Runners-up:
 - * Needle Insertion Force Modeling Using Ultrasound Displacement Measurement, **Ehsan Dehghan**, *Xu Wen, Reza Zahiri-Azar, Maud Marchal, Septimui E. Salucusean, Dept ECE, U. British Columbia, Canada, TINC-GMCAO Laboratory, Grenoble, France.*
 - * Functional Near Infrared Spectroscopy in Novice and Expert Surgeons - a Manifold Embedding Approach, **Daniel R Leff**, *Felipe Orihuela-Espina, Louis Atallah, Ara Darzi, Guang-Zhong Yang, Imperial College London, UK.*
- Prize 4: Visualization and Interaction
 - Winner:
 - * Simulation and Fully Automatic Multimodal Registration of Medical Ultrasound, **Wolfgang Wein**, *Ali Kharmene, Dirk-Andre Clevert, Oliver Kutter, Nassir Navab, Siemens Corporate Research Princeton USA and CAMP, Technische Universität München, Germany and University Hospital Munich-Grosshadern, Germany.*
 - Runners-up:
 - * Three-Dimensional Ultrasound Mosaicing, **Christian Wachinger**, *Wolfgang Wein, Nassir Navab, CAMP, Technische Universität München, Germany and Siemens Corporate Research, Princetown, USA.*
 - * pq-space Based Non-photorealistic Rendering for Augmented Reality, **Mirna Lerotic**, *Adrian J. Chung, George Mylona, Guang-Zhong Yang, Imperial College London, UK.*
- Prize 5: Biological and Neuroscience Image Computing
 - Winner:
 - * Cell Population Tracking and Lineage Construction with Spatiotemporal Context, **Kang Li**, *Mei Chen, Takeo Kanade, Carnegie Mellon University, Intel Research, Pittsburgh, USA.*
 - Runners-up:
 - * In-utero Three Dimension High Resolution Fetal Brain Diffusion Tensor Imaging, **Shuzhou Jiang**, *H. Xue, S. Counsell, M. Anjari, J. Allsop, M. Rutherford, D. Rueckert, J.V. Hajnal, Imperial College London, UK.*
 - * Contributions to 3D Diffeomorphic Atlas Estimation: Application to Brain Images, **Matias Bossa**, *Monica Hernandez, Salvador Olmos, University of Zaragoza, Spain.*
- Prize 6: Computer Assisted Intervention Systems and Robotics
 - Winner:
 - * Cardiolock: An Active Cardiac Stabilizer - First In Vivo Experiments Using a New Robotized Device, **Wael Bachta**, *Pierre Renaud, Edouard Laroche, Jacques Gangloff, Antonello Forgione, LSIIT Strasbourg and LGeCo INSA Strasbourg and University Hospital of Strasbourg, France.*

- Runners-up:
 - * Automatic Target and Trajectory Identification for Deep Brain Stimulation (DBS) Procedures, **Ting Guo**, Andrew G. Parrent, Terry M. Peters, Robarts Research Institute, U. Western Ontario, The London Health Sciences Centre, Dept. Neurosurgery, London, Ontario, Canada.
 - * Closed-Loop Control in Fused MR-TRUS Image-Guided Prostate Biopsy, **Sheng Xu**, Jochen Kruecker, Peter Guion, Neil Glossop, Ziv Neeman, Peter Choyke, Anurag K. Singh, Bradford J. Wood, Philips Research North America Briarcliff, NIH Bethesda USA and Traxtal Inc. Toronto, Canada.
- Prize 7: Medical Image Computing
 - Winner:
 - * Multivariate Normalization with Symmetric Diffeomorphisms for Multivariate Studies, **Brian B. Avants**, J.T. Duda, H. Zhang, J.C. Gee, University of Pennsylvania, USA.
 - Runners-up:
 - * A Hierarchical Unsupervised Clustering Scheme for Detection of Prostate Cancer from Magnetic Resonance Spectroscopy (MRS), **Pallavi Tiwari**, Anant Madabhushi, Mark Rosen, Rutgers University and University of Pennsylvania, USA.
 - * Non-parametric Diffeomorphic Image Registration with the Demons Algorithm, **Tom Vercauteren**, Xavier Pennec, Aymeric Perchant, Nicholas Ayache, INRIA Sophia-Antipolis and Mauna Kea Technologies, Paris, France.

Previous Years' Winners of MedIA-MICCAI Prize Awards

- In 2006, the prize was offered to T. Vercauteren, first author of the article:

T. Vercauteren, A. Perchant, X. Pennec, G. Malandain and N. Ayache, "Mosaicing of Confocal Microscopic In Vivo Soft Tissue Video Sequences".
- In 2005, the prize was offered to D. Burschka and M. Jackowski who are the first authors of the articles:

D. Burschka, M. Li, M. Ishii, R.H. Taylor, G.D. Hager, "Scale Invariant Registration of Monocular Endoscopic Images to CT-Scans for Sinus Surgery".

M. Jackowski, C.Y. Kao, M. Qiu, R.T. Constable, L.H. Staib, "White Matter Tractography by Anisotropic Wavefront Evolution and Diffusion Tensor Imaging".

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