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**Opening**
Nassir Navab
Joachim Hornegger
Alejandro F. Frangi
William M. Wells

**MICCAI Society Session**
- The MICCAI president’s address – Alison Noble
- Announcements

**Closing and Awards**
Nassir Navab
Gabor Fichtinger
Alison Noble
Sebastien Ourselin

**All Special and Social Events on Page 14**

**Opening and Closing**
Nassir Navab
Gabor Fichtinger
Alison Noble
Sebastien Ourselin
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Welcome to MICCAI 2015 in Munich!

It is a great opportunity for the German biomedical engineering community to host MICCAI in Germany for the first time. We are proud to promote and foster the exchange and dissemination of advanced knowledge, expertise and experience in the field produced by leading institutions and outstanding scientists, physicians and educators around the world.

We received 810 submissions and the triple anonymous reviewing process selected 263 papers for publication this year. We scheduled 36 long orals, 227 short orals and poster presentations for all contributions.

This year, we introduced the short orals to give the possibility to all authors to present the essence of their work and appreciate those of their colleagues working on similar focus subjects through a series of parallel five-minutes talks. These short orals are presented on the evening before the start of the main event, allowing the attendees to get a full overview of the papers of their interest and follow this with interactive discussions during the poster sessions.

We present three keynote speeches covering first two relatively young fields of medical physics presented by the world known experts in these fields, Prof. Vasilis Ntziachristos and Prof. Franz Pfeifer, both affiliated to TUM’s biomedical engineering community, and then the exciting field of big data management and analysis for histological imaging presented by the Physics Nobel Laureate Dr. Gerd Binnig.

Another novel feature in the conference program is the industrial session and the industrial-clinical panel that features leading members of the medical software and device companies as well as surgeons, clinicians and data analysis experts that present their current and future research directions and discuss the appropriate strategies for translating scientific observations and results of the MICCAI community into medical solutions impacting the global healthcare.

MICCAI covers many fields of importance but this year we also gave particular attention to Medical Robotics, introducing the tutorial »IROS meets MICCAI« and discussing medical robotics within the industrial-clinical panel, Medical Data Visualization, inviting the world experts in visualization within a tutorial
dedicated to this, and finally Big Data and Machine Learning, covered by several focused workshops and discussed also within the industrial-clinical panel.

This conference would have not been possible without the commitment and hard work of the members of the scientific and organization committees and the support of Technische Universität München and our sponsors and partners.

I would like to thank:

› Alejandro F. Frangi, William M. Wells and Joachim Hornegger, Program Co-chairs, and the 75 Program Committee members and 648 scientific reviewers listed in the proceedings for their support of a fair and rigorous selection process,

› Andreas Maier for supporting Joachim Hornegger in his editorial tasks following his election as president of the Friedrich-Alexander University Erlangen-Nuremberg (FAU) in early 2015, and for supporting the publishing of the proceedings together with his team of students,

› Aslı Okur for her support and dedication in every step of the organization, submission and review process as well as in preparation of the program and in organizational aspects of the conference,

› Ralf Stauder for the successful coordination of contracts, finances, rooms and locations and for all his efforts related to the on-site organization,

› Philipp Matthies for preparing the online video library for the oral talks and for helping in many aspects of the conference organization,

› Tobias Zobel for the organization of the gala dinner and the support in local organization and sponsorship activities,

› Stefanie Demirci for her invaluable effort and success in coordinating the industrial sponsorship,

› Workshop, Tutorial and Challenge Chairs and all the organizers of the satellite events for the hard work in enriching our scientific program,

› All students at TUM and FAU who helped with the local organization,

› MICCAI Society, in particular Janette Wallace, Johanne Langford, Alison Noble and Gabor Fichtinger for provision of support and insightful comments,

› All our sponsors and partners for their fantastic support of the conference.

Finally, I also want to thank all submitting authors for their efforts as well as the MICCAI 2015 participants who join us in Munich from more than 40 countries all around the world. I hope we all enjoy a memorable scientific and social event.

Nassir Navab
General Chair, MICCAI 2015
Registration Desk

Holiday Inn Hotel
SUN, Oct. 4th 10.00–20.00 Lobby
MON, Oct. 5th 07.30–20.00 Foyer
FRI, Oct. 9th 08.00–14.00 Foyer

Gasteig Registration Desk
TUE, Oct. 6th 08.00–17.00
WED, Oct. 7th 08.00–17.00
THU, Oct. 8th 08.00–14.00

For participants staying in Holiday Inn Hotel and arriving earlier, it is recommended to check in already on Sunday to avoid waiting times on the first day of the conference.

Exhibition – Opening Hours

Gasteig Foyer 1st Level
TUE, Oct. 6th 08.00–18.00
WED, Oct. 7th 08.00–18.00
THU, Oct. 8th 08.00–16.00

Name Badges
Please wear your name badge at all times. Only MICCAI 2015 participants wearing official name badges will be allowed to access the conference site and attend the scientific and social programs.

Internet Access
Wifi access is available in the foyer (exhibition and poster area) of Gasteig philharmonic hall for free.

Poster Presentations
All accepted papers are to be presented as posters at the conference. The poster size of MICCAI 2015 is A0 portrait. The posters will stay up throughout the three days of the main conference. During the assigned poster session, one of the authors must present the paper at the poster. The posters may be mounted starting at 8.00 on Tuesday, October 6th. The posters must be taken down on Thursday, October 8th, between 16.00 and 19.00. Posters left behind by presenters will be discarded.

Poster Identifiers
Each poster is assigned a unique identifier. The letter indicates the location of the poster in the venue. Posters blocks A, B, C, D and E are located in the second level, whereas F, G, H, I, J and K are placed in the entrance level (Page 8–9).

Parallel Short Oral Talks for Posters
This year, for the first time, we offer all papers accepted as poster presentation the opportunity of presenting the work in a 5-minute talk in addition to the regular poster sessions. These talks are organized in eleven parallel sessions setting the stage for further scientific discussions during the poster sessions of the main single-track conference. All short oral talks will happen after the satellite events on Monday in the conference hotel Holiday Inn (See pages 28–39 for details).

Long Oral Presentations
Each presentation is allocated a 15-minute time slot. The actual presentation may not exceed 12 minutes, leaving 3 minutes for questions. Timing will be strictly enforced. Presenters were asked to upload their slides online beforehand and therefore must use the conference system and not their own laptop.
We suggest that each presenter checks their presentation for problems during the break that precedes their session.

**Satellite Events**
Most of workshops, challenges and tutorials will be held at Holiday Inn Hotel Munich – City Centre. The remaining ones will be held at Klinikum rechts der Isar, approx. 1 km walking distance to the conference venue. Alternatively, you can use public transportation (Tram 16). No onsite registration will be available at the Klinikum rechts der Isar. To register onsite, you must come to Holiday Inn Hotel first, before going to the Klinikum rechts der Isar.

**Transportation**
Your name badge is also your public transportation ticket in Munich City Center between October 4th–9th, 2015. Please note that it is valid for the Inner Area (See page 12) and only in combination with your personal ID. The airport transfer requires a separate ticket.

**Tourist Information**
Maps, restaurant lists and information about attractions are available at the registration desk. The Munich tourism office staff will be more than happy to help you planning your trip.

**Emergency Services**
Police 110
Fire Brigade 112
Emergency Medical Services 112
Poison Emergency Telephone Service 089-19240
Patient Transport Ambulance 089-19222

**Smoking Policy**
Smoking is prohibited in indoor public places. It is strongly recommended to respect smoking/no smoking signs.

**Money and Currency**
While an increasing number of restaurants, hotels and stores accept credit cards, it is advisable to ask about methods of payment before ordering a meal or making a purchase. The EC banking card is widely accepted. For cash, you will find ATMs in many places in the city center. In Germany, prices are in Euro and are inclusive of all taxes and service fees. However, it is pretty common to leave a tip (5–10%) after a bite or drink.

**Opening Hours**
Shops are usually open from 9.00 to 20.00 from Monday to Saturday. Banks are generally open from 8.30 to 12.30 and 13.30 to 15.30, Monday to Friday.

**Health Insurance and Health Emergencies**
The Organizers will accept no liability for personal injuries sustained by or for loss or damage to property belonging to Congress participants, either during or as a result of the Congress or during all events. Participants are strongly recommended to seek insurance coverage for health and accident, lost luggage and trip cancellation.

**Lunches and Breaks**
Lunches are included in the registration and served on site.
Philharmonie/Gasteig
Tram: Am Gasteig | Tram, S-Bahn: Rosenheimer Platz

- Plenary Sessions
- Poster Blocks A–K
- Industrial Exhibition
Klinikum rechts der Isar
Tram, U-Bahn: Max-Weber-Platz

Satellite Events
1 IFL (1.UG), 2 Spiegelsaal (EG), 3 Radiology Library (1.UG), 4 MeDiCAL (3.OG)
C & D Lecture Hall (EG), P Pavillion (EG)
Holiday Inn
Tram: Am Gasteig | Tram, S-Bahn: Rosenheimer Platz

- Satellite Events
  Forum 1–16
Siemens Healthcare is one of the world’s largest suppliers of technology to the healthcare industry and a leader in medical imaging, laboratory diagnostics and healthcare IT. All supported by a comprehensive portfolio of clinical consulting, training, and services available across the globe and tailored to customers’ needs. www.healthcare.siemens.com

KUKA Robotics, with its headquarters in Augsburg, is a member of the KUKA Aktiengesellschaft and one of the leading manufacturers of robotic systems worldwide. KUKA offers a unique and wide range of industrial robots and robot systems, covering all common payload categories and robot types. KUKA, together with its system partners, has automation solutions perfectly tailored to its customers’ applications and industries – or can develop robotic systems for individual needs. www.kuka-robotics.com

Carl Zeiss Meditec AG is one of the world’s leading medical technology companies. The company supplies innovative technologies and application-oriented solutions designed to help doctors improve the quality of life of their patients. The company offers complete solutions, including implants and consumables, to diagnose and treat eye diseases. The company also creates innovative visualization solutions in the field of microsurgery. www.zeiss.de

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SPECIAL AND SOCIAL EVENTS

MICCAI Football
THU 19.00–21.30

The MICCAI Football match is traditionally played between Europe and the rest of the world on a full size pitch, often with a rather large number of players on either side. Register on the conference website to join a team and meet in Holiday Inn hotel lobby at 18.45 to leave together for the football field.

MICCAI Runs!
TUE & WED 6.30–7.30, Holiday Inn Hotel

Join us for a running tour along the river Isar and through the green lung of Munich, the English Garden. Run along famous Munich sights such as the surfers wave, the Chinese Tower and the Monopteros temple. Meet at the lobby of Holiday Inn Hotel at 6.30 to join the run. The total length of each run is around 7.2km (4.5mi). We will run at the pace of approximately 6 minutes per kilometer (10 minutes per mile). On Wednesday we will take a group photo. Participants must be in good physical health and be fit to participate. Visit the conference website for more details.

MICCAI Yoga
TUE & WED 7.15–8.00, Holiday Inn Hotel (Sportstudio Innings)

MICCAI Yoga is making its debut this year. Whether you always wanted to try out Yoga or do it every day – our Yoga teacher will find an appropriate program. A great way to start a long conference day! Meet at the sports studio Innings (Inside Holiday Inn Hotel) at 7.10 to join. Participants should wear comfortable clothes and bring a towel, mats will be provided. Visit the conference website for more details and registration (max. 30 participants).

MICCAI Oktoberfest
SUN, 13.00–16.00, Oktoberfest,
Location: »Festzelt Tradition«

What better way to start a MICCAI in Munich is there than to visit world-famous Oktoberfest. We have a limited amount of seats, as they are very hard to get. So, make sure to register as soon as possible for this unique opportunity to meet some MICCAI members in a very informal way. Please register under miccai2015.org. Meet at 12.30 at the main entrance of Oktoberfest very close to Underground station »Theresienwiese«.

MICCAI Educational Challenge

The MICCAI Educational Challenge is a video challenge that will be held for the second time at MICCAI 2015. The goal is to build a collection of educational videos on fundamental concepts in medical image analysis and computer-aided interventions created by members of the MICCAI community. Cast your vote using the enclosed ballot. For more information please visit miccai.org/edu/

Student Event Philharmonie:

MICCAI Academia & Industry
TUE 19.00–21.30, Philharmonie, Gasteig

The MICCAI Student Board will also host the yearly »Academia and Industry Event« on Tuesday, October 6th, 2015. It will take place at the Philharmonie after the main conference activities are finished for the day, and will have a duration of 90 minutes. Our aim is to help facilitate communication between students and experts working in medical imaging, who can give insights into what working in academia and industry entails within this field. The event is free and everyone is invited.
Social Events: Tours

The MICCAI Student Board will also host a series of social events, which require sign ups at miccai2015.org. These events are open to all MICCAI participants and their guest(s). Special offers at a reduced rate are available for MICCAI Society Members. Places are limited! Please sign up as early as possible! For any questions regarding the educational challenge or tours, please contact the student board at: student-board@miccai.org

BMW Plant Tours
MON 15.00–16.30 and FRI 18.15–19.45

The tour through BMW’s original plant offers an exciting insight into all areas of automobile production. The experts guiding the tour naturally focus on the guests’ specific requests and questions. In its concept and route, the BMW plant tour follows specific content-related criteria, giving guests access to all automobile production technologies at BMW Plant Munich: the press shop, body shop, paint shop, engine shop, the production of interior equipment and seats, as well as assembly. Meet us 10 minutes before the tour at main entrance of BMW Museum (Am Olympiapark 2).

Munich Nightwatch Tour
TUE 21.00

When the honorable citizens go to bed it is night watch time. Old legends become alive when the night watchman tells tales, historic facts and anecdotes of his century-long life. With the flickering lights of the lantern you follow him or her through the old town of Munich. Meet us at Gasteig lobby at 20.40.

Neuschwanstein Castle Tour
SAT 8.00–18.00

As has now become tradition, we will host a whole-day student event after MICCAI on October 10th, 8.00–18.00. In the solitude of the mountains, King Ludwig II built two of his dream castles: Neuschwanstein and Linderhof. The tour allows you to visit both of these great testimonies of Western architecture, followed by a short shopping stop in Oberammergau. You will have about four hours time to visit Castle Neuschwanstein and have lunch in Hohenschwangau. The tour will conclude with a visit to Castle Linderhof. Limited Availability! Meet us at 7.45 between Gasteig and Hilton (Rosenheimerstr. 15). We will return to the same location.
19.00–Open End

**Gala Dinner**

Löwenbräukeller

The neatly painted tower of the historical Löwenbräukeller can already be perceived from far away and it shapes decisively the appearance of Stiglmaier Place in downtown Munich. Inside the visitor finds what is best characterized as the typically traditional and authentic Munich public house. Its excellent Bavarian cuisine, the freshly tapped Löwenbräu beer, brewed in the world-famous brewery a stone throw across the street, and the typically cozy and welcoming Bavarian atmosphere have made the Löwenbräukeller so popular with locals and tourists alike ever since. Venue for this year’s MICCAI gala dinner is the magnificent banqueting hall, one of the largest in the city, with seating accommodation for up to 1600 guests.

The Löwenbräukeller is situated in the heart of Munich at Stiglmaierplatz and scores with perfect accessibility: It is a 15 min trip with public transportation from Gasteig and Holiday Inn. Take any S-Bahn at »Rosenheimer Platz« heading towards »Zentrum« (City Center), change at »Hauptbahnhof« (Main station) to U1 direction »Olympia-Einkaufszentrum« and get off at »Stiglmaierplatz«. Typical Bavarian dinner will be served. Do not forget to bring your gala dinner ticket to enter. Legal drinking age for beer is 16.
Keynote at Gala Dinner

Prof. Dr. Gerd Binnig

Prof. Dr. Gerd Binnig is Founder and CTO of Definiens AG. Born in Frankfurt, Germany, Dr. Binnig studied at the J. W. Goethe University in Frankfurt, where he received his doctorate degree in 1978. He then joined IBM’s Zurich Research Laboratory until 2002. During this time, Dr. Binnig invented and developed the Scanning Tunneling Microscope, STM (together with his colleague Dr. Heinrich Rohrer) and the Atomic Force Microscope, AFM. Both of them were then awarded the Nobel Prize in Physics in 1986. In 1987, Dr. Binnig opened and headed a small IBM research group within the University of Munich, which was the precursor of Definiens. Together with his team at Definiens, Dr. Binnig developed the Cognition Network Technology, nowadays enabling the novel field of Tissue Phenomics®.

Seeing the Invisible – from Microscopy to Big Data

In a brief personal historical journey the path from building the first microscope capable of imaging surfaces and molecules atomically resolved to image analysis based big data approaches is presented. With the invention of local probe microscopy the field of nanotechnology was kicked off some 30 years ago. Image processing was performed mainly on individual images and only for visualization purposes or to reduce noise. Image analysis, however, enables the holistic access to the content of a large number of images. This has led recently to a new big data approach in medicine, in particular in histopathology. Through modern staining and imaging techniques of tissue slides nano-sized particles like proteins can be visualized on the basis of conventional optical microscopic methods. This nano-scale information can be combined with morphological evaluations on larger scales. Such comprehensive quantified image contents from many patients can statistically be investigated and correlated to patient survival or therapy response resulting in new insights into the mechanisms of diseases like cancer. This way hypotheses can be tested and knowledge is created which otherwise would not be achievable.
Prof. Dr. Vasilis Ntziachristos has been a full professor and Chair for Biological Imaging at Technische Universität München and director of the Institute of Biological and Medical Imaging at Helmholtz Zentrum München since 2007. Dr. Ntziachristos studied electrical engineering at Aristotle University, Thessaloniki, and received his Master’s and Doctorate degrees in Bioengineering from the University of Pennsylvania. He was faculty at Harvard University and the director of the Laboratory for Bio-Optics at Massachusetts General Hospital. His research focuses on novel optical and optoacoustic imaging methods for probing physiological and molecular events in tissues. Among many awards, he has received the 2014 Germany’s Innovation Award, the Leibniz Prize in 2013 and the Erwin Schrödinger Prize in 2011.

Revolutionizing Optical Imaging with Multispectral Optoacoustic Tomography

Optical imaging is unequivocally the most versatile and widely used visualization modality in the life sciences. Yet it is significantly limited by photon scattering. For the past few years there has been an emergence of powerful new optical imaging methods that can offer high resolution imaging beyond the penetration limits of microscopic methods. Of particular importance is the development of multi-spectral opto-acoustic tomography (MSOT) that brings unprecedented optical imaging performance in visualizing anatomical, physiological and molecular imaging biomarkers. Some of the attractive features of the method are the ability to offer 10–100 microns resolution through several millimeters to centimeters of tissue and real-time imaging. In parallel we have achieved the clinical translation of targeted fluorescent probes, which opens new ways in the interventional detection of cancer. This talk describes current progress with methods and applications for in-vivo optical and opto-acoustic imaging and outlines how new opto-acoustic and fluorescence imaging concepts are necessary for accurate and quantitative molecular investigations in tissues.
Prof. Dr. Franz Pfeiffer is a full professor at the Technische Universität München where he heads the Biomedical Physics group. After studying physics at the Ludwig Maximilian University in Munich, Dr. Pfeiffer completed his PhD studies at the University of Saarland while experimenting at large research facilities like the DESY in Hamburg. As a postdoctoral fellow, he conducted research at the University of Illinois, later at the renowned Paul Scherrer Institute in Switzerland. In 2007, he became an assistant professor at the ETH Lausanne and was appointed a full professor at the Technische Universität München in 2009, where he developed a laboratory for biomedical X-ray imaging. In 2011, Dr. Pfeiffer was awarded the prestigious Leibniz Prize for his development of X-ray based phase contrast imaging.

X-ray Phase-Contrast and Dark-Field Imaging for Pre-Clinical and Clinical Applications

The basic principles of x-ray image formation in radiography have remained essentially unchanged since Röntgen first discovered x-rays over a hundred years ago. The conventional approach relies on x-ray attenuation as the sole source of contrast and draws exclusively on ray or geometrical optics to describe and interpret image formation. This approach ignores another, potentially more useful source of contrast, namely the phase information. Phase-contrast imaging techniques, which can be understood using wave optics rather than ray optics, offer ways to augment or complement standard attenuation contrast by incorporating phase information. This presentation will review the recent development and status of x-ray phase-contrast and dark-field imaging in general, and focus particularly on our recent efforts to evaluate x-ray phase-contrast for future clinical applications in radiography and computed tomography. A variety of experimental results will be shown that highlight the potential of this novel method for biomedical, clinical, and industrial applications. The talk concludes with a presentation of first in-vivo results obtained with a small-animal phase-contrast CT scanner, recently developed in our lab.
8.30–10.30

Industrial Session

Chairs: Nassir Navab, Joachim Hornegger

In this session as well as in the following panel, leading members of medical software and device companies and expert clinicians and scientists will present their current and future research directions and discuss the impact of their collaboration with the MICCAI scientists on the future of healthcare.

Dr. Bernd Montag
CEO Siemens Healthcare

Dr. Ludwin Monz
CEO Carl-Zeiss-Meditec AG

Homer Pien, PhD
Senior VP for Lead Innovations and CTO for Imaging Systems, Philips

Dr. Carlos Härtel
Managing Director GE Global Research Center – Europe

Jonathan Sorger, PhD
Senior Director of Medical Research, Intuitive Surgical

David Rath
CEO Northern Digital

David Simon, PhD
Director of Medical Research, Medtronic

Martín J. Sepúlveda, MD
IBM Fellow and Vice President, Health Systems and Policy Research, IBM Research
Industrial/Clinical Panel

Chairs: Nassir Navab, Markus Schwaiger

Topics: Future of Medical Robotics and Big Data
1. Role of robotics in the future of surgery and patient and process specific (personalized) intra-operative imaging
2. Impact of machine learning and big data in medical science and practice

Michael Otto
VP KUKA Healthcare

Jonathan Sorger, PhD
Senior Director of Medical Research, Intuitive Surgical

Dr. Bernd Montag
CEO Siemens Healthcare

Dr. med. Dogu Teber
Senior surgeon at the Department of Urology, University Hospital Heidelberg

Prof. Dr. med. Hubertus Feußner
Senior surgeon at the Department of Surgery, Klinikum rechts der Isar, Technische Universität München

Prof. Dr. Dr. med. Monique M.B. Breteler
Director of Population Health Sciences at DZNE and Professor at the University Bonn

Prof. Dr. Steffen E. Petersen
Professor of Cardiovascular Medicine, William Harvey Research Institute, Queen Mary University of London

Martín J. Sepúlveda, MD
IBM Fellow and Vice President, Health Systems and Policy Research, IBM Research
München

**Chairs:** Stefanie Demirci, Wolfgang Wein

Papers are open for discussion during Poster Session Karlsruhe

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**Robust 5DOF Transesophageal Echo Probe Tracking at Fluoroscopic Frame Rates**

Charles Hatt, Michael Speidel, Amish Raval

University of Wisconsin

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**A System for MR-Ultrasound Guidance during Robot-Assisted Laparoscopic Radical Prostatectomy**

Omid Mohareri, Guy Nir, Julio Lobo,

Richard Savdie, Peter Black, Tim Salcudean

Intuitive Surgical Inc., University of British Columbia

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**Cooperative Robotic Gamma Imaging: Enhancing US-guided Needle Biopsy**

Marco Esposito, Benjamin Busam, Christoph Hennersperger, Julia Rackerseder, An Lu,

Nassir Navab, Benjamin Frisch

Technische Universität München,

Framos GmbH, Johns Hopkins University

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**A Registration Approach to Endoscopic Laser Speckle Contrast Imaging for Intrauterine Visualisation of Placental Vessels**

Gustavo Sato dos Santos, Efthymios Maneas,

Daniil Nikitchev, Anamaria Barburas,

Anna L. David, Jan Deprest, Adrien Desjardins,

Tom Vercauteren, Sebastien Ourselin

University College London, University Hospital KU Leuven

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**A Liver Atlas Using the Special Euclidean Group**

Mohamed Hefny, Toshiyuki Okada, Masatoshi Hori, Yoshinobu Sato, Randy Ellis

Queen’s University, Tsukuba University,

Osaka University, NAIST

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**Surgical Augmented Reality with Topological Changes**

Christoph Paulus, Nazim Haouchine,

David Cazier, Stephane Cotin

INRIA, Université de Strasbourg
13.30–15.30

Bremen

Chairs: Ron Kikinis, Bernhard Preim
Papers are open for discussion during Poster Session Magdeburg/Leipzig

Sample Size Estimation for Outlier Detection
Timothy Gebhard, Inga Koerte, Sylvain Bouix
Brigham & Women’s Hospital

Fast Preconditioning for Accelerated Multi-Contrast MRI Reconstruction
Ruoyu Li, Yeqing Li, Ruogu Fang, Shouting Zhang, Hao Pan, Junzhou Huang
University of Texas at Arlington, Florida International University, University of North Carolina at Charlotte, Beijing Institute of Petrochemical Technology

Bayesian Tomographic Reconstruction using Riemannian MCMC
Stefano Pedemonte, Ciprian Catana, Koen Van Leemput
Massachusetts General Hospital, Aalto University, Technical University of Denmark

Harmonizing Diffusion MRI Data Across Multiple Sites and Scanners
Hengameh Mirzaalian, Amicie de Pierrefeu, Peter Savadjiev, Ofer Pasternak, Sylvain Bouix, Marek Kubicki, Carl-Fredrik Westin, Martha E. Shenton, Yogesh Rathi
Brigham & Women’s Hospital, Harvard Medical School

Topography-Based Registration of Developing Cortical Surfaces in Infants Using Multidirectional Varifold Representation
Islem Rekik, Gang Li, Weili Lin, Dinggang Shen
University of North Carolina at Chapel Hill

Perfusion Paths: Inference of Voxelwise Blood Flow Trajectories in CT Perfusion
David Robben, Stefan Sunaert, Vincent Thijs, Guy Wilms, Frederik Maes, Paul Suetens
KU Leuven – University of Leuven, University Hospitals Leuven

Automatic Artery-Vein Separation from Thoracic CT Images Using Integer Programming
Christian Payer, Michael Pienn, Andrea Olschewski, Zoltán Bálint, Horst Olschewski, Martin Urschler
Graz University of Technology, Ludwig Boltzmann Institute for Lung Vascular Research, Medical University of Graz

Estimate, Compensate, Iterate: Joint Motion Estimation and Compensation in 4-D Cardiac C-arm Computed Tomography
Oliver Taubmann, Günter Lauritsch, Andreas Maier, Rebecca Fahrig, Joachim Hornegger
Friedrich-Alexander-University Erlangen-Nuremberg, Siemens AG, Stanford University
Analysis of High-Throughput Microscopy Videos: Catching Up with Cell Dynamics
Assaf Arbelle, Nir Drayman, Mark Bray, Uri Alon, Anne Carpenter, Tammy Riklin Raviv
Ben Gurion University, Weizmann Institute, Broad Institute

Robust Cell Detection and Segmentation in Histopathological Images using Sparse Reconstruction and Stacked Denoising Autoencoders
Hai Su, Fuyong Xing, Xiangfei Kong, Yuanpu Xie, Shaoting Zhang, Lin Yang
University of Florida, University of North Carolina at Charlotte

Restoring the Invisible Details in Differential Interference Contrast Microscopy Images
Wenchao Jiang, Zhaozheng Yin
Missouri University of Science and Technology

Visibility Map: A New Method in Evaluation Quality of Optical Colonoscopy
Mohammad Ali Armin, Hans de Visser, Girija Chetty, Cedric Dumas, David Conlan, Florian Grimpen, Olivier Salvado
University of Canberra, CSIRO, Royal Brisbane Women’s Hospital, The Australian E-Health Research Centre

Visual Force Feedback for Hand-Held Microsurgical Instruments
Gauthier Gras, Hani J. Marcus, Christopher J. Payne, Philip Pratt, Guang Zhong Yang
Imperial College London

Direct Calibration of a Laser Ablation System in the Projective Voltage Space
Adrian Schneider, Simon Pezold, Kyung-won Baek, Dilyan Marinov, Philippe C. Cattin
University of Basel, University Hospital Basel, AOT AG

Automatic Prostate Brachytherapy Preplanning Using Joint Sparse Analysis
Saman Nouranian, Mahdi Ramezani, Ingrid Spadinger, William J. Morris, Tim Salcudean, Purang Abolmaesumi
University of British Columbia, British Columbia Cancer Agency

Robust Live Tracking of Mitral Valve Annulus for Minimally-Invasive Intervention Guidance
Ingmar Voigt, Mihai Scutaru, Tommaso Mansi, Bogdan Georgescu, Noha El-Zehiry, Helene Houle, Dorin Comaniciu
Siemens AG, Siemens SRL, Siemens Corporation
**Wed | 14.00–16.00**

**Heidelberg**

**Chairs:** Hans-Peter Meinzer, Tobias Heimann  
*Papers are open for discussion during Poster Session Hamburg*

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**Scandent Tree: A Random Forest Learning Method for Incomplete Multimodal Datasets**  
Soheil Hor, Mehdi Moradi  
University of British Columbia, IBM Research

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**Uncertainty-Driven Forest Predictors for Vertebral Localization and Segmentation**  
David Richmond, Dagmar Kainmueller, Ben Glocker, Carsten Rother, Gene Myers  
Max Planck Institute, Imperial College London, TU Dresden

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**Why Does Synthesized Data Improve Multi-Sequence Classification?**  
Gijs van Tulder, Marleen de Bruijne  
Erasmus MC

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**Semantic 3-D Labeling of Ear Implants Using a Global Parametric Transition Prior**  
Alexander Zouhar, Carsten Rother, Siegfried Fuchs  
TU Dresden

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**Fast Reconstruction of Accelerated Dynamic MRI Using Manifold Kernel Regression**  
Kanwal Bhatia, Jose Caballero, Anthony Price, Ying Sun, Joseph Hajnal, Daniel Rueckert  
Imperial College London, King’s College London, National University of Singapore

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**Bayesian Personalization of Brain Tumor Growth Model**  
Matthieu Le, Hervé Delingette, Jayashree Kalpathy-Cramer, Elizabeth Gerstner, Tracy Batchelor, Jan Unkelbach, Nicholas Ayache  
INRIA, Massachusetts General Hospital

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**Spatiotemporal Parsing of Motor Kinematics for Assessing Stroke Recovery**  
Borislav Antic, Uta Buechler, Anna-Sophia Wahl, Martin E. Schwab, Björn Ommer  
Heidelberg University, University of Zurich, ETH Zurich

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**Hashing Forests for Morphological Search and Retrieval in Neuroscientific Image Databases**  
Sepideh Mesbah, Sailesh Conjeti, Ajayama Kumaraswamy, Philipp Rautenberg, Nassir Navab, Amin Katouzian  
Technische Universität München, Ludwig-Maximilians-Universität München, Max Plank Digital Library, Johns Hopkins University
15.30–17.00

Erlangen

Chairs: Andreas Maier, Rebecca Fahrig
Papers are open for discussion during Poster Session Hannover

A 3D Fractal-Based Approach Towards Understanding Changes in the Infarcted Heart Microvasculature
Polyxeni Gkontra, Magdalena Zak, Kerri-Ann Norton, Andres Santos, Alexander S. Popel, Alicia G. Arroyo
Centro Nacional de Investigaciones Cardiovasculares, Johns Hopkins University, Universidad Politecnica de Madrid

Computer-Aided Infarction Identification from Cardiac CT Images: A Biomechanical Approach with SVM
Ken C.L. Wong, Michael Tee, Marcus Chen, David Bluemke, Ronald Summers, Jianhua Yao
National Institutes of Health, University of Oxford

Learning Patient-Specific Lumped Models for Interactive Coronary Blood Flow Simulations
Hannes Nickisch, Yechiel Lamash, Sven Prevrhal, Moti Freiman, Mani Vembar, Liran Goshen, Holger Schmitt
Philips Research, Philips Healthcare

Longitudinal Analysis of Pre-term Neonatal Ventricle in Ultrasound Images Based on Convex Optimization
Wu Qiu, Jing Yuan, Jessica Kishimoto, Yimin Chen, Martin Rajchl, Eranga Ukwatta, Sandrine de Ribauipierre, Aaron Fenster
Robarts Research Institute, City University of Hong Kong, Imperial College London, University of Toronto, Johns Hopkins University, University of Western Ontario

Rigid Motion Compensation in Interventional C-arm CT Using Consistency Measure on Projection Data
Robert Frysch, Georg Rose
Otto von Guericke University Magdeburg

Marker-Less AR in the Hybrid Room Using Equipment Detection for Camera Relocalization
Nicolas Loy Rodas, Fernando Barrera, Nicolas Padoy
University of Strasbourg
The new *syngo*.via Frontier¹ is your Siemens research environment for advanced post-processing in medical imaging. Whether you want to evaluate new post-processing techniques in medical imaging or develop your own algorithms in close link with the clinicians able to evaluate the potential impact of your ideas, *syngo*.via Frontier is your solution.

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18.00–20.00
Short Oral Talks Overview

Advanced MRI: Diffusion, fMRI, DCE
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Machine Learning
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Registration: Method and Advanced Applications
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Modeling and Simulation for Diagnosis and Intervention
Holiday Inn | Forum 16 | Page 34

Computational Imaging: Reconstruction, image formation, advanced acquisition
Holiday Inn | Forum 9 | Page 35

Quantitative Image Analysis I:
Segmentation and Measurement
Holiday Inn | Forum 2 | Page 36

Quantitative Image Analysis II: Microscopy, Fluorescence and Histological Imagery
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Quantitative Image Analysis III:
Motion, Deformation, and its Applications
Holiday Inn | Forum 15 | Page 38

Quantitative Image Analysis IV: Classification, Detection, Features, and Morphology
Holiday Inn | Forum 11 | Page 39
# Advanced MRI: Diffusion, fMRI, DCE

**Chair:** Alison Noble

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Computer Assisted and Image-guided Interventions

Chair: Lena Maier-Hein

**B-1** Autonomous Ultrasound-Guided Tissue Dissection

**B-2** A Compact Retinal-surgery Telemanipulator that uses Disposable Instruments

**B-3** Surgical Tool Tracking with Pose Estimation in Retinal Microsurgery

**B-8** Hough Forests for Real-time, Automatic Device Localization in Fluoroscopic Images: Application to TAVR

**B-10** A Portable Intra-operative Framework applied to Distal Radius Fracture Surgery

**B-11** Image Based Surgical Instrument Pose Estimation with Multi-class Labelling and Optical Flow

**B-13** Projection-Based Phase Features for Localization of a Needle Tip in 2D Curvilinear Ultrasound

**B-14** Inertial Measurement Unit for Radiation-Free Navigated Screw Placement in Slipped Capital Femoral Epiphysis Surgery

**B-15** Pictorial Structures on RGB-D Images for Human Pose Estimation in the Operating Room

**B-16** Interventional Photoacoustic Imaging of the Human Placenta with Ultrasonic Tracking for Minimally Invasive Fetal Surgeries

**B-17** Automated Segmentation of Surgical Motion for Performance Analysis and Feedback

**B-18** Vision-based Intraoperative Cone-Beam CT Stitching for Non-overlapping Volumes

**B-20** Tissue Surface Reconstruction Aided by Local Normal Information Using a Self-calibrated Endoscopic Structured Light System

**B-22** Towards an Efficient Computational Framework for Guiding Surgical Resection through Intra-operative Endoscopic Pathology

**B-23** Automated Assessment of Surgical Skills Using Frequency Analysis

**B-28** Hybrid Retargeting for High-Speed Targeted Optical Biopsies

**B-30** Automated Three-Piece Digital Dental Articulation

**E-9** A 2D-3D Registration Framework for Freehand TRUS-Guided Prostate Biopsy

**E-15** Crossing-Lines Registration for Direct Electromagnetic Navigation

**E-18** Combining Transversal and Longitudinal Registration in IVUS Studies
Computer Aided Diagnosis I: Machine Learning
Chair: Tanveer Syeda-Mahmood

C-1 Automatic Fetal Ultrasound Standard Plane Detection Using Knowledge Transferred Recurrent Neural Network

C-3 Identification of Cerebral Small Vessel Disease Using Multiple Instance Learning

C-5 Label Stability in Multiple Instance Learning

C-6 Spectral Forests: Learning of Surface Data, Application to Cortical Parcellation

C-7 DeepOrgan: Multi-level Deep Convolutional Networks for Automated Pancreas Segmentation

C-8 3D Deep Learning for Efficient and Robust Landmark Detection in Volumetric Data

C-9 A Hybrid of Deep Network and Hidden Markov Model for MCI Identification with Resting-State fMRI

C-11 Automatic Coronary Calcium Scoring in Cardiac CT Angiography using Convolutional Neural Networks

C-12 A Random Riemannian Metric for Probabilistic Shortest-Path Tractography

C-13 Deep Learning and Structured Prediction for the Segmentation of Mass in Mammograms

C-14 Learning Tensor-Based Features for Whole-Brain fMRI Classification

C-15 Prediction of Bone Micro-architecture from Quantitative Computed Tomography using Supervised Learning and a Novel Morphometric Feature Descriptor

C-16 Automatic Diagnosis of Ovarian Carcinomas via Sparse Multi Resolution Tissue Representation

C-17 Scale-Adaptive Forest Training via an Efficient Feature Sampling Scheme

C-18 Multiple instance cancer detection by boosting regularised trees

C-20 Who Is Talking to Whom: Synaptic Partner Detection in Anisotropic Volumes of Insect Brain

C-21 Direct and Simultaneous Four-Chamber Volume Estimation with Supervised Feature Learning

C-22 Cross-Domain Synthesis of Medical Images Using Efficient Location-Sensitive Deep Network

C-23 Grouping Total Variation and Sparsity: Statistical Learning with Segmenting Penalties

C-25 Disentangling Disease Heterogeneity with Max-Margin Multiple Hyperplane Classifier

C-26 Marginal Space Deep Learning: Efficient Architecture for Detection in Volumetric Image Data

C-27 Nonlinear Regression on Riemannian Manifolds and Its Applications to Neuro-Image Analysis
Computer Aided Diagnosis II: Automation
Chair: Su-Lin Lee

D-1 Computer-Aided Detection and Quantification of Intracranial Aneurysms

D-2 Discriminative Feature Selection for Multiple Ocular Diseases Classification by Sparse Induced Graph Regularized Group Lasso

D-3 Detection of Glands and Villi by Collaboration of Domain Knowledge and Deep Learning

D-4 Minimum s-Excess Graph for Segmenting and Tracking Multiple Borders with HMM

D-6 Automatic Dual-View Mass Detection in Full-Field Digital Mammograms

D-7 Leveraging Mid-Level Semantic Boundary Cues for Computer-Aided Lymph Node Detection

D-8 Computer-aided Pulmonary Embolism Detection Using a Novel Vessel-Aligned Multi-Planar Representation and Convolutional Neural Networks

D-9 Ultrasound-based Detection of Prostate Cancer Using Automatic Feature Selection with Deep Belief Networks

D-10 MCI Identification by Joint Learning on Multiple MRI Data

D-11 Medical Image Retrieval using Multi-Graph Learning for MCI Diagnostic Assistance

D-12 Regenerative Random Forest with Automatic Feature Selection to Detect Mitosis for Invasive Breast Cancer Grading

D-13 HoTPiG: A Novel Geometrical Feature for Vessel Morphometry and Its Application to Cerebral Aneurysm Detection

D-14 Robust Segmentation of Various Anatomies in 3D Ultrasound Using Hough Forests and Learned Data Representations

D-15 Improved Parkinson’s Disease Classification from Diffusion MRI Databy Fisher Vector Descriptors

D-16 Automated Shape and Texture Analysis for Detection of Osteoarthritis from Radiographs of the Knee

D-19 Automatic Graph-Based Localization of Cochlear Implant Electrodes in CT

D-20 Towards Non-Invasive Image-Based Early Diagnosis of Autism

D-21 Identifying Connectome Module Patterns via New Balanced Multi-Graph Normalized Cut

D-23 Learning the Correlation between Images and Disease Labels Using Ambiguous Learning

D-24 Longitudinal Analysis of Brain Recovery After Mild Traumatic Brain Injury Based on Groupwise Consistent Brain Network Clusters
### Registration: Method and Advanced Applications

**Chair:** Tal Arbel

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### Modeling and Simulation for Diagnosis and Intervention

**Chair:** Gozde Unal

<p>| A-8 | An Iterated Complex Matrix Approach for Simulation and Analysis of Diffusion MRI processes |
| A-30 | Modeling Task FMRI Data via Supervised Stochastic Coordinate Coding |
| B-12 | Adaption of 3D Models to 2D X-Ray Images during Endovascular Abdominal Aneurysm Repair |
| C-2 | Automatic Localization and Identification of Vertebrae in Spine CT via a Joint Learning Model with Deep Neural Networks |
| F-1 | Illustrative Visualization of Vascular Models for Static 2D Representations |
| F-6 | Vito - A Generic Agent for Multi-Physics Model Personalization: Application to Heart Modeling |
| F-7 | Database-Based Estimation of Liver Deformation Under Pneumoperitoneum for Surgical Image-Guidance and Simulation |
| F-8 | Computational Sonography |
| F-9 | Hierarchical Shape Distributions for Automatic Identification of 3D Diastolic Vortex Rings from 4D Flow MRI |
| F-10 | Robust CT Synthesis for Radiotherapy Planning: Application to the Head &amp; Neck region |
| F-12 | Application of L0-Norm Regularization to Epicardial Potential Reconstruction |
| F-13 | MRI-Based Lesion Profiling of Epileptogenic Cortical Malformations |
| F-14 | Patient-specific 3D Ultrasound Simulation based on Convolutional Ray-tracing and Appearance Optimization |
| F-15 | Robust Transmural Electrophysiological Imaging: Integrating Sparse and Dynamic Physiological Models into ECG-based Inference |
| F-16 | Estimating Biophysical Parameters from BOLD Signals through Evolutionary-Based Optimization |
| F-17 | Radiopositive Tissue Displacement Compensation for SPECT-guided Surgery |
| F-18 | A Partial Domain Approach to Enable Aortic Flow Simulation without Turbulent Modeling |
| H-19 | Filling Large Discontinuities in 3D Vascular Networks using Skeleton- and Intensity-based Information |
| K-21 | Structural Edge Detection for Cardiovascular Model Building |</p>
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**Chair:** Hayit Greenspan

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Chair: Diana Mateus

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**Chair:** Julia Schnabel

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**Chairs:** Joerg Raczkowsky, Stefanie Speidel

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CARE: Computer-Assisted and Robotic Endoscopy
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CBMX: Computational Biomechanics for Medicine X
Full time | Holiday Inn | Forum 2 | Page 75

CLIP: CLinical Image-based Procedures: Translational Research in Medical Imaging
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CMMI: Computational Methods for Molecular Imaging
AM | Klinikum | Hörsaal C | Page 78

CSI: Computational Methods and Clinical Applications for Spine Imaging
AM | Holiday Inn | Forum 15 | Page 79

CVII-STENT: Computing and Visualization for Intravascular Imaging and Computer Assisted Stenting
PM | Klinikum | Hörsaal C | Page 81

IM: Interventional Microscopy
Full time | Klinikum | MeDiCAL | Page 82

IntellMR: Intelligent imaging: Linking MR acquisition and processing
AM | Klinikum | Hörsaal D | Page 83

MAPPING: MAnagement and Processing of images for Population Imaging
PM | Klinikum | Hörsaal D | Page 83

MCBR-CDS: Medical Content-based Retrieval for Clinical Decision Support and Treatment Planning
PM | Holiday Inn | Forum 14 | Page 84

MLMI: Machine Learning in Medical Imaging
Full time | Holiday Inn | Forum 1 | Page 84

SAMI: Spectral Analysis in Medical Imaging
AM | Holiday Inn | Forum 12 | Page 87
Challenges

BRATS: Challenge on Multimodal Brain Tumor Image Segmentation
Full time | Holiday Inn | Forum 8 | Page 88

ISLES: Ischemic Stroke Lesion Segmentation Challenge
Full time | Holiday Inn | Forum 8 | Page 89

CSI-1: Automatic Vertebral Fracture Analysis and Identification from VFA by DXA
Full time | Holiday Inn | Forum 15 | Page 79

CSI-2: Automatic Intervertebral Disc Localization and Segmentation from 3D T2 MRI Data
Full time | Holiday Inn | Forum 15 | Page 79

DTI: MICCAI DTI Challenge on Tractography for Brain Tumor Surgery
Full time | Holiday Inn | Forum 10 | Page 90

GlaS: Gland Segmentation in Colon Histology Images
PM | Holiday Inn | Forum 12 | Page 91

OPTIMA: Retinal Cyst Segmentation Algorithm Challenge
Full time | Holiday Inn | Forum 11 | Page 91

Tutorials

Advanced Medical Visualization: Techniques and Applications
Full time | Holiday Inn | Forum 9 | Page 92

Advanced Robotic Assistance in Medicine: IROS meets MICCAI
Full time | Klinikum | IFL | Page 93

Biomedical Texture Analysis: Review, Applications and Challenges Ahead
PM | Holiday Inn | Forum 3 | Page 94

Deep Learning for Medical Imaging
AM | Holiday Inn | Forum 3 | Page 94

Gaussian Process Models with Applications to Medical Data
AM | Holiday Inn | Forum 16 | Page 95

Navigation of Interventional and Surgical Devices Using Open-Source Software
PM | Holiday Inn | Forum 16 | Page 95

SimpleITK Registration: An Interactive, Python-Based Introduction to Registration with the Insight Toolkit (ITK)
AM | Holiday Inn | Forum 14 | Page 95
BrainLes: Brain lesions workshop (in conjunction with BRATS and ISLES challenges)

08.30 Invited Talk »MS«
Gray matter damage and dysfunction in MS
Maria Assunta Rocca

08.55 Invited Talk »STROKE I«
Stroke. Arya Nabavi

09.20 Invited Talk »TBI«
Medical Imaging of Trauma Brain Injuries.
Guido Gerig

09.45 Fiber Tracking in Traumatic Brain Injury: Comparison of 9Tractography Algorithms
Emily Dennis

09.55 Simultaneous Whole-Brain Segmentation and White Matter Lesion Detection Using Contrast-Adaptive Probabilistic Models
Oula Puonti

10.05 A Nonparametric Model for Brain Tumor Segmentation and Volumetry in Longitudinal MR Sequences
Esther Alberts

10.15 Combining Unsupervised and Supervised Methods for Lesion Segmentation.
Tim Jerman

10.30 Coffee Break

11.00 BRATS: Invited Talk »TUMOR II«
Fusing annotations. Simon Warfield

11.25 BRATS: 4 Contributed papers

12.05 BRATS: Presentation of Results, Awards, Discussion, Further Plans

12.30 Lunch and Poster Session with Workshop and Challenge Contributions

13.30 ISLES: Invited Talk »STROKE II«
(Semi)-automated lesion segmentation in stroke. Bianca de Haan

13.55 ISLES: 4 Contributed papers

14.35 ISLES: Presentation of Results, Awards

15.00 ISLES: Summary and Discussion

15.30 Coffee Break

16.00 Invited Talk »TUMOR I«
Advanced Neuroimaging for Glioma.
Roland Wiest

16.25 Assessment of Tissue Injury in Severe Brain Trauma
Michel Dojat

16.35 A Quantitative Approach to Characterize MR Contrasts with Histology
Yael Balbastre

16.45 Afternoon discussion with invited speakers

17.00 General Discussion
Final workshop and challenge discussion with organizers & speakers

17.25 Adjourn
WORKSHOPS • MONDAY

List of Posters

**Workshop**

- **P-1** Stroke Lesion Segmentation using a Probabilistic Atlas of Cerebral Vascular Territories. *Alexandra Derntl*
- **P-2** A Semi-Automatic Method for Segmentation of Multiple Sclerosis Lesions on Dual-Echo Magnetic Resonance Images. *Massimo Filippi*
- **P-3** Automatic Segmentation of Cerebral Ischemic Lesions in Neonatal Apparent Diffusion Coefficient Maps. *Keelin Murphy*
- **P-4** Bayesian stroke lesion estimation for automatic registration of DTI images. *Félix Renard*

**BRATS Challenge**
For list of posters please check page 88.

**ISLES Challenge**
For list of posters please check page 89.

**CARE: Computer-Assisted and Robotic Endoscopy**

- **08.55** Registration and Poster Setup
- **09.00** Welcome Remarks
- **09.05** **Keynote**
  Emanuele Trucco, NRP Professor of Computational Vision
- **09.45** **Computer-Assisted Colonoscopy**
  - 3D Stable Spatio-temporal Polyp Localization in Colonoscopy Videos. *J. Bernal* et al.
  - Enhancing Normal-Abnormal Classification Accuracy in Colonoscopy Videos via Temporal Consistency. *Puerto-Souza* et al.
  - Impact of lossy image compression on CAD support systems for colonoscopy. *A. Uhl* et al.

- **10.30** Coffee Break
- **10.45** **Keynote**
  Robert Howe, IEEE Fellow, School of Eng. Appl. Scienc., Harvard University

- **11.30** **Endoscopic Computer Vision**
  - Tissue Shape Acquisition with a Hybrid Structured Light and Photometric Stereo Endoscopic System. *M. Visentini-Scarzanella* et al.
  - Using Shading to Register an Intraoperative CT Scan to a Laparoscopic Image. *S. Bernhardt* et al.
12.15 Teaser Poster Presentations
› P-1 Pointing with a One-Eyed Cursor for Supervised Training in Minimally Invasive Robotic Surgery. M. Kraus et al.
› P-2 Stereoscopic Motion Magnification in Minimally-Invasive Robotic Prostatectomy. J. McLeod et al.
› P-3 Surgical Simulation Robot with Haptics and Friction Compensation. T. Yang et al.
› P-4 A Real-Time Target Tracking Algorithm for a Robotic Flexible Endoscopy Platform. N. van der Stap et al.
› P-5 A novel dual LevelSets competition model for colon region segmentation. H. Wang et al.
› P-6 Uninformative Frame Detection in Colonoscopy Through Motion, Edge and Color Features. M. Armin et al.

12.30 Lunch

13.30 Keynote
Robert J. Webster, Assoc. Prof. Mech. Eng. Vanderbilt University

14.15 Poster Session

15.30 Coffee Break

15.45 Computer-Assisted Colonoscopy
› Instrument Tracking with Rigid Part Mixtures Model. D. Wesierski et al.
› 2D/3D Real-Time Tracking of Surgical Instruments Based on Endoscopic Image Processing. A. Agustinos et al.
› Tracking accuracy evaluations of a electromagnetic sensor-based colonoscope tracking method. M. Oda et al.

16.30 Keynote
Mahdi Azizian, Intuitive Surgical

17.10 Panel Moderation
CBMX: Computational Biomechanics for Medicine X

08.30 Opening
Ten Years of Computational Biomechanics for Medicine Workshop Series. Karol Miller, The University of Western Australia

08.50 Keynote
Medical Image Computing Meets Biomechanics. Ron Kikinis, Harvard Medical School and Fraunhofer MEVIS

L. Liu, T.M. Ecker, S. Schumann, K.A. Siebenrock, G. Zheng

10.10 Role of Ligaments in the Knee Joint Kinematic Behavior: Development and Validation of a Finite Element Model

10.40 Coffee Break

11.00 Challenges to Validate Multi-physics Model of Liver Tumor Radiofrequency Ablation from Pre-clinical Data

11.30 Investigation of Modelling Parameters for Finite Element Analysis of MR Elastography
L. Hollis, L. EJ Thomas-Seale, N. Conlisk, N. Roberts, P. Pankaj, P. R. Hoskins

12.00 Forward Problem of Time-resolved Diffuse Optical Tomography Considering Biological Tissue Deformation
A. Y. Potlov, T. I. Avsieich, S. V. Frolov, S. G. Proskurin

12.30 Lunch and Posters

13.40 Keynote
Improving Patient Safety through Real-time Numerical Simulation. Stephane Cotin, INRIA

14.30 Computational Simulation of Blood Flow and Drug Transportation in a Large Vasculature
C. Coutey, M. Berg, H. Ho, P. Hunter

15.00 Fundus Image Based Blood Flow Simulation of the Retinal Arteries
A. Kristen, L. Kelsey, E. Winternmantel, B. Doyle

15.30 Coffee Break

16.00 Integration of an Electrophysiologically-Driven Heart Model into Three-Dimensional Haemodynamics Simulation using the CRIM-SON Control Systems Framework
C. J. Arthurs, C. A. Figueroa

16.30 Simulating Patient Specific Multiple Time-point MRIs from a Biophysical Model of Brain Deformation in Alzheimer’s Disease
B. Khanal, M. Lorenzi, N. Ayache, X. Pennec

17.00 Panel Discussion and Best Paper Award
K. Miller, P. Nielsen

17.30 Closing
List of Posters

› P-1 Mechanical Models of Endothelial Mechanotransmission Based on a Population of Cells. Yi Chung Lim, Michael T. Cooling, Sue R. McGlashan, David S. Long

› P-2 Robust Landmark Identification for Generating Subject-Specific Models for Biomechanics. Duane T.K. Malcolm, Habib Y. Baluwala, Poul M.F. Nielsen, Martyn P. Nash

› P-3 Traumatic Brain Injury – an Investigation into Shear Waves Interference Effects. Grand R. Joldes, Alesio L. Lanzara, Adam Wittek, Barry Doyle, Karol Miller

› P-4 Modelling the Presence of Diffuse Axonal Injury in Primary Phase Blast-Induced Traumatic Brain Injury. Matthew Sinclair, Adam Wittek, Barry Doyle, Karol Miller, Grand R. Joldes

› P-5 Fuzzy Tissue Classification for Nonlinear Patient-Specific Biomechanical Models for Whole-Body Image Registration. Mao Li, Adam Wittek, Grand Joldes, Karol Miller

› P-6 Modeling of Bifurcated Tubular Structures for Vessel Segmentation. Haoyin Zhou, Peng Sun, Seongmin Ha, James K. Min, Guanglei Xiong

› P-7 GPU-based Fast Finite Element Solution for Nonlinear Anisotropic Material Behavior and Comparison of Integration Strategies. Vukasin Strbac, David M. Pierce, Jos Vander Sloten, Nele Famaey

› P-8 Fast Prediction of Femoral Biomechanics Using Supervised Machine Learning and Statistical Shape Modeling. Elham Taghizadeh, Michael Kistler, Philippe Bührler, Mauricio Reyes

› P-9 Some Use Cases for Composite Finite Elements in Image Based Computing. Lars Ole Schwen, Torben Patz, Tobias Preusser
### CLIP: CLinical Image-based Procedures: Translational Research in Medical Imaging

**08.30 Opening Remarks**

**08.45 Keynote**

MRI Guided Interventions and Surgery
Prof. Dr. Andreas Melzer

**09.30 Session I**

- Classification of Tumor Epithelium and Stroma in Colorectal Cancer based on Discrete Tchebichef Moments.* Rodrigo Nava, Germán González, Boris Escalante, Jan Kybic
- Navigation Path Retrieval from Videobronchoscopy using Bronchial Branches.* Carles Sanchez, Marta Diez-Ferrer, F. Javier Sánchez, Jorge Bernal, Antoni Rosell, Debora Gil
- Improving Patient Specific Neurosurgical Models with Intraoperative Ultrasound and Augmented Reality Visualizations in a Neuronavigation Environment.* Ian J. Gerard, Marta Kersten-Oertel, Simon Drouin, Jeffery A. Hall, Kevin Petrecca, Dante De Nigris, Tal Arbel, D. Louis Collins

**10.30 Coffee Break**

**11.00 Session II**

- Patient-Specific Cranial Nerve Identification Using a Discrete Deformable Contour Model for Skull Base Neurosurgery Planning and Simulation.* Sharmin Sultana, Jason E. Blatt, Yueh Lee, Matthew Ewend, Justin S Cetas, Anthony Costa, Michel Audette
- CRIMSON. Towards a software environment for patient-specific blood flow simulation for diagnosis and treatment.* Rostislav Khlebnikov, C. Alberto Figueroa
- Monopolar stimulation of the implanted cochlea. a synthetic population-based study.* Nerea Mangado, Mario Ceresa, Hector Dejea, Hans Martin Kjer, Sergio Vera, Rasmus Reinhold Paulsen, Jens Fagertun, Pavel Mistrik, Gemma Piella, Miguel Ángel González Ballester
- Statistical Shape Modeling from Gaussian Distributed Incomplete Data for Image Segmentation. Marius Erdt, Katharina Lentzen, Jonas Honsdorf, Jingting Ma, Feng Lin
- Partitioned Shape Modeling with On-the-Fly Sparse Appearance Learning for Anterior or Visual Pathway Segmentation. Awais Mansoor, Juan Cerrolaza, Robert Avery, Marius George Linguraru

**12.30 Lunch**

**13.30 Keynote**

3D/4D Planning for Cranio-facial and Reconstruction Surgery. Prof. Dr. Hans-Florian Zeilhofer

**13.45 Session III**

- Atlas-guided transcranial Doppler ultrasound examination with a neuro-surgical navigation system. case study. Yiming Xiao, Ian J. Gerard, Vladimir Fonov, Dante De Nigris, Catherine Therrien, Bérengère Aubert-Broche, Simon Drouin, Anna Kochanowska, Donatella Tampieri, D. Louis Collins
- Prediction of Rib Motion during Free-Breathing from Liver Observations using 4D MRI. Golnoosh Samei, Gabor Szekely, Christine Tanner
Continue: CLIP

From Subjective to Objective. Quantitative Computerized Monitoring Tool for MRI-guided Cryoablation. Jonathan Scalera, Xinyang Liu, Gary Zientara, Kemal Tuncali

Accuracy assessment of CBCT-based volumetric brain shift field. Iris Smit-Ockeloen, Daniel Ruijters, Marcel Breeuwer, Drazenko Babic, Olivier Brina, Vitor Mendes Pereira

Open-source platform for prostate motion tracking during in-bore targeted MRI-guided biopsy. Peter A. Behringer, Christian Herz, Tobias Penzkofer, Kemal Tuncali, Clare Tempany, Andriy Fedorov

15.30 Coffee Break and Best Paper Voting

16.00 Session IV

Left Atrial Wall Segmentation from CT for Radiofrequency Catheter Ablation Planning. Jiro Inoue, John Baxter, Maria Drangova

Efficient and Extensible Workflow. Reliable Whole Brain Segmentation for Large-scale, Multi-center Longitudinal Human MRI Analysis using High Performance/Throughput Computing Resources. Regina Kim, Hans Johnson

16.30 Closing Discussion and Best Paper Awards

Papers preceded with [*] are candidates for a best paper award.

CMMI: Computational Methods for Molecular Imaging

08.30 Opening
Prof. Sibylle Ziegler

08.35 Keynote
Prof. Dimitris Visvikis, National Institute of Health and Medical Sciences

09.20 Oral Session I
(Only presentation, discussions are encouraged during poster session)

Multimodal Brain Extraction from Structural MRI using Co-registered FDG-PET. Henrik Jensen

Estimation of Regional Seasonal Variations in SERT-levels using the FreeSurfer PET pipeline. a reproducibility study. Martin Nørgaard

Prognostic and Predictive Feature Selection for Oesophageal Cancer Using Random Forest Classifier. Paul Desbordes

Latent Discriminative Modeling for Lesion Detection in PET-CT Images. Yang Song

A Gaussian Mixture Model for Automated Vesicle Fusion Detection and Classification. Haohan Li

Demo of MIAKA T, a MATLAB toolbox for quantitative analysis of dynamic PET neuroimaging data. Graham Searle

Value of Dual Time Point 18F-FDG PET/CT in Solid Solitary Pulmonary Nodules with Initial SUVmax over 2.5 in Areas with a High Incidence of Tuberculosis. Wenchan Li

10.30 Poster Session and Coffee Break
11.00  Oral Session II
(Only presentation, discussions are encouraged during poster session)

› Statistical Texture Modeling of Tumour Perfusion Heterogeneity in Dynamic Contrast-Enhanced MRI. Jolanta Mirecka
› Combining covariance and intensity-based features for the differential diagnosis of parkinsonism. Sasa Cheng
› Adaptive Supervoxel Patch-based Region Classification in Whole-Body PET-CT. Lei Bi

11.35  Keynote
Prof. Bernd Pichler, University of Tubingen

12.20  Best Presentation Award Voting and Closing Remarks

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CSI: Computational Methods and Clinical Applications for Spine Imaging (in conjunction with two challenges)

08.40  Opening

08.50  Computer Aided Intervention and Diagnosis

› Statistical Shape Model Construction of Lumbar Vertebrae and Intervertebral Discs in Segmentation for Discectomy Surgery Simulation. Rabia Haq, Josha Cates, David Besachio, Roderick Borgie, Michel Audette
› Automatic Modic Changes Classification in Spinal MRI. Amir Jamaludin, Timor Kadir, Andrew Zisserman
› Automated Pedicle Screw Size and Trajectory Planning. Maximization of Fastening Strength, Dejan Knez, Bostjan Likar, Franjo Pernus, Tomaz Vrtovec

09.50  Invited Talk
Dr. Thomas Baum, Klinikum rechts der Isar

10.30  Coffee Break

11.00  Segmentation, Registration and Localization

› Automatic Localisation of Vertebrae in DXA Images using Random Forest Regression Voting. Paul Bromiley, Judith Adams, Tim Cootes
› Robust CT to US 3D-3D Registration using Principal Component Analysis and Kalman Filtering. Rebeca Echeverría, Camilo Cortes, Alvaro Bertelsen, Ivan Macia, Óscar E. Ruiz, Julián Flórez
Continue: CSI

› Multi-Atlas Segmentation with Joint Label Fusion of Osteoporotic Vertebral Compression Fractures on CT. Yinong Wang, Jianhua Yao, Holger Roth, Joseph Burns, Ronald Summers
› Cortical Bone Thickness Estimation in CT Images. A Model-based Approach Without Profile Fitting. Oleg Museyko, Bastian Gerner, Klaus Engelke

12.00 Lunch and Live Challenge

13.50 Invited Talk
Dr. Martin Haimerl, BrainLab

14.30 Intervertebral Disc Localization and Segmentation Challenge
› Segmentation of intervertebral discs in 3D MRI data using multi-atlas based registration. Chunliang Wang, Daniel Forsberg
› Deformable Model-Based Segmentation of Intervertebral Discs from MR Spine Images by using the SSC descriptor. Robert Korez, Bulat Ibragimov, Bostjan Likar, Franjo Pernus, Tomaz Vrtovec
› 3D Intervertebral Disc Segmentation from MRI using Supervoxel-Based CRFs. Hugo Hutt, Richard Everson, Judith Meakin
› Automatic Intervertebral Disc Localization and Segmentation in 3D MR Images based on Regression Forests and Active Contours. Martin Urschler, Kerstin Hammernik, Thomas Ebner, Darko Stern, Ludwig Boltzmann

15.30 Coffee Break

16.00 Challenge summary
Guoyan Zheng, University of Bern

16.20 Invited Talk
Dr. Margaret Paggiosi, University of Sheffield

17.00 Discussion
CVII-STENT: Computing and Visualization for Intravascular Imaging and Computer Assisted Stenting

13.30 Welcome

13.35 Invited Talk

Dr. med. Stephan Wildhirt, AdjuCor  
Dr. Arash Taki, Covidien

14.05 Teaser session (13 posters à 5 minutes)

› P-1 Fusion of wall shear stress and fibrous cap thickness for prediction of plaque rupture in coronary arteries - A pilot study.  

› P-2 A Statistical Model of the Main Bifurcation of the Left Coronary Artery using Coherent Point Drift.  
P. Medrano-Gracia, J. Ormiston, M. Webster, S. Beier, C. Ellis, C. Wang, A. Young, B. Cowan

› P-3 Ball Winding. A Novel Virtual Coiling Method with Ensured Blocking Ability.  
Z. Chen, D. Chen, X. Wang, J. Xiang, H. Meng, J. Xu

› P-4 Rapid Virtual Stenting for Intracranial Aneurysms.  

› P-5 Hemodynamic assessment with large scale PC-MRI and CFD - a study of idealised, stented and patient left main geometries.  

› P-6 Automatic Detection of Stent Graft Markers in 2-D Fluoroscopy Images.  
S. Reiml, M. Pfister, D. Toth, A. Maier, M. Hoffmann, M. Kowarschik, J. Hornegger

› P-7 Automatic stent placement and stent size selection for preoperative planning of pulmonary artery intervention.  
L. Gundelwein, J. Miró, L. Duong

› P-8 Implicit Background Subtraction for Cardiac Digital Angiography.  
R. Brosig, S. G. Hariharan, D. Volpi, M. Kowarschik, S. Cartier, S. Demirici

› P-9 Interventional Coronary Motion Extraction.  
S. G. Hariharan, D. Hein, S. Cartier, P. Fallavollita, S. Demirici

› P-10 Blind estimation of the arterial input function from DSC perfusion-weighted MRI datasets of the brain.  
N. D. Forkert

› P-11 Strategies for Robust Aortic Arch Segmentation and Analysis in CTA Images.  
K. López-Linares Román, I. Macía, J. H. Legarreta

› P-12 Carotid Artery Segmentation in Ultrasound Images.  

› P-13 Automatic Image Classification in Intravascular Optical Coherence Tomography Images.  

15.10 Coffee Break and Poster Session

16.20 Invited Talk

Dr. med. Reza Ghotbi,  
Helios Klinikum München-West  
Dr. med. Felix Bouner,  
Deutsches Herzzentrum

16.40 Oral talk I

17.00 Oral talk II

17.20 Concluding Remarks and Awards
IM: Interventional Microscopy

08.45 Opening Session

09.00 Invited Talk
The Role of Imaging in Computer-Integrated Interventional Systems. Prof. Russell H. Taylor, Johns Hopkins University

09.50 Evaluation of a 9D-Position Measurement Method of a C-Arm Based on X-Ray Projections

10.10 Performance Evaluation of Keypoint Detectors in Retina Microsurgery

10.30 Coffee Break

11.00 Invited Talk
Microneurosurgery – The Operating Microscope. Revolution, Challenges and Future Perspectives. Prof. Dr. med. Arya Nabavi, International Neuroscience Institute Hannover Germany

11.50 Intraoperative Optical Imaging of Activated Functional Brain Areas in Neurosurgery – State of the Art

12.10 Intraoperative Optical Imaging of Direct Electrical Cortical Stimulation – a Novel Approach for Assessment of Brain Tissue Functionality

12.30 Lunch

13.30 Invited Talk
History and future of surgical Microscopes. Mr. Falk Hartwig, Carl Zeiss Meditec AG

14.10 Invited Talk
Micro-manipulators – design and fabrication. Prof. Guang-Zhong Yang, The Hamlyn Centre, Imperial college London

14.50 Microscopic Surgical Tool Type Detection

15.10 Automated Visual Scanpath Analysis Reveals the Expertise Level of Micro-neurosurgeons

15.30 Coffee Break

16.00 Invited Talk
Latest Advancements in Ophthalmic Surgery. Prof. Dr. med. Dr. [Lond] Chris P. Lohman, Klinikum rechts der Isar, Technische Universität München

16.40 Closing Session and Best Paper Award
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<td>08.20</td>
<td><strong>Opening</strong></td>
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| 08.30 | Introduction to Magnetic Resonance Imaging (MRI)  
Bruno Madore                                      | **MAPPING: Management and Processing of images for Population Imaging** |
| 09.20 | High resolution MR imaging of the human brain at 7 Tesla. Promises for neuroscience, challenges for image computing  
Pierre-Louis Bazin            | **13.35 Keynote**  
Prof. Monique Breteler, German Center for Neurodegenerative Diseases |
| 10.00 | Poster Session, Q/A and Coffee Break                               | **14.15 Population Imaging Study IT Infrastructure. An Automated Continuous Workflow Approach**  
M. Koek, H. Achterberg, M. de Groot, E. Vast, S. Klein, W. Niessen |
| 10.20 | Hardware considerations for reducing susceptibility distortion  
Dominic Graziani            | **14.30 Fastr: a workflow engine for advanced data flows**  
H. C. Achterberg, M. Koek, W. J. Niessen |
| 11.00 | Accelerating MRI acquisitions from parallel MRI to multi-dimensional Compressed Sensing  
Jana Hutter            | **14.45 Design and implementation of a generic DICOM archive for clinical and pre-clinical research**  
J. Lamy, R. Lahaxe, J. Armspach, F. Heitz |
| 11.30 | Radial sampling and motion compensation in MRI  
Robert Grimm            | **15.00 Data-driven probabilistic atlases capture whole-brain individual variation**  
Y. Huo, K. Swett, S. Resnick, L. Cutting, B. Landman |
| 12.00 | Susceptibility mapping, searching the true forward problem  
José P. Marques            | **15.15 Shanoir: Software as a Service Environment to Manage Population Imaging Research Repositories**  
C. Barillot, E. Bannier, O. Commowick, I. Corouge, J. Guillaumont, Y. Yao, M. Kain |
| 12.30 | Discussions and Concluding Remarks                                 | **15.30 Coffee Break** |
| 13.35 | Keynote  
Prof. Gunter Schumann, MRC-SGDP Centre, Institute of Psychiatry, King’s College |
| 16.00 | Round Table                                                        | **16.40 Closing** |
| 17.20 | Closing                                                             |
MON WORKSHOPS

**MCBR-CDS: Medical Content-based Retrieval for Clinical Decision Support and Treatment Planning**

13.30 Welcome

13.35 Invited Speaker

_Eliot Siegel, M.D._

14.20 Automatic View-Point Selection for Inter-Operative Endoscopic Surveillance


15.00 A Multilevel Statistical Model for the Automatic Analysis of Cataract Surgeries

_K. Charriere, G. Quellec, D. Martiano, M. Lamard, G. Cazuguel, G. Coatrieux, B. Cochat_

15.20 A Computerized Decision-Support Method of Detecting AD Dementia

_P. Guo, A. Evans_

15.40 Coffee Break with Poster Session

› Influence of Weighting Function in Graph-based Approach for Left Ventricle Segmentation. _S. Dakua, J. Abinahed, A. Al-Ansar_

› Compression-scenarios for LIRE-based CBIR on colonoscopy data. _A. Uhl_

› Classification of Brain Tissues on Supporting Clinical Decision-Making Systems. _P. Guo, A. Evans_

› Application of the Intelligent Automation in the Diagnosis of Disease Patterns. _P. Guo, P. Bhattacharya, A. Evans_

16.00 Invited Speaker

_U. Balis, M.D._

16.45 Panel with experts from academia, clinician, industry, and NCI

**MLMI: Machine Learning in Medical Imaging**

08.30 Registration, Speaker Check-in and Poster Setup

09.00 Opening Remarks

09.15 Morning Session I: Plenary Talk

_Dr. Heng Huang, University of Texas_

10.30 Coffee Break

11.00 Morning Session II

› Segmentation of Right Ventricle in Cardiac MR Images using Shape Regression. _S. Sedai, P. Roy, R. Granavi_

› Visual Saliency Based Active Learning For Prostate MRI Segmentation. _D. Mahapatra_

› Soft-Split Random Forest for Anatomy Labeling. _G. Ma, Y. Gao, L. Wang, L. Wu, D. Shen_

› A New Image Data Set and Benchmark for Cervical Dysplasia Classification Evaluation. _T. Xu, C. Xin, X. Huang_

› Machine Learning on High Dimensional Shape Data from Subcortical Brain Surfaces. A Comparison of Feature Selection and Classification Methods. _B. Wade, S. Joshi, B. Gutman, P. Thompson_

12.30 Lunch and Posters

13.30 Afternoon Session I

› Node-based Gaussian Graphical Model for Identifying Discriminative Brain Regions from Connectivity Graphs. _B. Ng, A. Milazzo, A. Altmann_


Cranio-maxillofacial Deformity Correction via Sparse Representation in Coherent Space. Z. Li, L. An, J. Zhang, L. Wang, J. Xia, D. Shen

Nonlinear Graph Fusion for Multi-Modal Classification of Alzheimer’s Disease. T. Tong, K. Gray, Q. Gao, L. Chen, D. Rueckert

HEp-2 Staining Pattern Recognition Using Stacked Fisher Network for Encoding Weber Local Descriptor. X. Han

Coffee Break

Afternoon Session II


Non-rigid Free-form 2D-3D Registration using Statistical Deformation Model. G. Zheng, W. Yu


List of Posters


P-2 Retinal Image Segmentation By Boosting Convolutional Filters With Entropy Sampling. Dwarikanath Mahapatra

P-3 Brain fiber clustering using non negative kernelized matching pursuit. Kuldeep Kumar, Christian Desrosiers, Kaleem Siddiqi

P-4 Automatic Detection of Good/Bad Colonies of iPS Cells Using Local Features. Atsuki Masuda, Bisser Raytchev, Takio Kurita, Toru Imamura, Masashi Suzuki, Toru Tamaki, Kazufumi Kaneda

P-5 Detecting Abnormal Cell Division Patterns in Early Stage Human Embryo Development. Aisha Khan, Stephen Gould, Mathie Salzmann


P-7 Group-constrained Laplacian Eigenmaps: Longitudinal AD biomarker learning. Ricardo Guerrero, Christian Ledig, Alexander Schmidt-Richberg, Daniel Rueckert

P-8 Automatic Learning-based Segmentation of Bone and Cartilage in 3D MR Images. Qin Liu, Qian Wang, Dinggang Shen

Closing Remarks
» P-9 Longitudinal Patch-Based Segmentation of Multiple Sclerosis White Matter Lesions. Snehashis Roy, Aaron Carass, Jerry Prince, Dzung Pham

» P-10 Hierarchical Multi-modal Image Registration by Learning Common Feature Representations. Hongkun Ge, Guorong Wu, Li Wang, Yaozong Gao, Dinggang Shen


» P-12 Flexible and Latent Structured Output Learning: Application to Histology. Gustavo Carneiro, Tingying Peng, Christine Bayer, Nassir Navab


» P-14 Multimodal Multi-label Transfer Learning for Early Diagnosis of Alzheimer’s Disease. Bo Cheng, Mingxia Liu, Daoqiang Zhang

» P-15 Soft-split Sparse Regression Based Random Forest for Predicting Future Clinical Scores of Alzheimer’s Disease. Lei Huang, Yaozong Gao, Yan Jin, KimHan Thung, Dinggang Shen

» P-16 Multi-View Classification for Identification of Alzheimer’s Disease. Xiaofeng Zhu, Heung-Il Suk, Guorong Wu, KimHan Thung, Yue Gao, Dinggang Shen

» P-17 Clustering Analysis for Semi-supervised Learning Improves Classification Performance of Digital Pathology. Mohammad Peikari, Anne Martel

» P-18 A Composite of Features for Learning-based Coronary Artery Segmentation on Cardiac CT Angiography. Yanling Chi, Weimin Huang, Jiayin Zhou, Liang Zhong, Swee Yaw Tan, Keng Yung Jih Felix, Low Choon Seng Sheon, Ru San Tan

» P-19 Improved performance of ensemble-based prostate tumor classification on H&E whole mount images via stain normalization and cell density estimation. Michaela Weingant, Annette Haworth, Hayley Reynolds, Catherine Mitchell, Matthew DiFranco

» P-20 Computer-assisted Diagnosis of Lung Cancer using Topological and Local Features. Jiawen Yao, Dheeraj Ganti, Junzhou Huang

» P-21 Inherent Structure-guided Multi-view Learning for Alzheimer’s Disease and Mild Cognitive Impairment Classification. Mingxia Liu, Daoqiang Zhang, Dinggang Shen


» P-23 Tumor Classification by Deep Polynomial Network and Multiple Kernel Learning on Small Ultrasound Image Dataset. Xiao Liu, Jun Shi, Qi Zhang

» P-24 Multi-Source Information Gain for Random Forest: An Application to CT Image Prediction from MRI Data. Tri Huynh, Yaozong Gao, Pei Zhang, Dinggang Shen

» P-25 Joint Learning of Multiple Longitudinal Prediction Models by Exploring Internal Relations. Baiying Lei, Dong Ni, Tianfu Wang
SAMI: Spectral Analysis in Medical Imaging

08.30 Introduction to spectral methods in medical imaging
M. Reuter, C. Wachinger, H. Lombaert

09.20 Oral session I
› The graph windowed Fourier transform: a tool to quantify the gyrification of the cerebral cortex. Hamed Rabiei, Frédéric Richard, Muriel Roth, Jean-Luc Anton, Olivier Coulon, Julien Lefèvre

10.00 Coffee Break

10.30 Invited Talk: Daniel Cremers

11.20 Oral session II
› Transitively Consistent and Unbiased Multi-Image Registration using Numerically Stable Transformation Synchronisation. Florian Bernard, Johan Thunberg, Andreas Husch, Luis Salamanca, Peter Gemmar, Frank Hertel, Jorge Goncalves

12.00 Closing
In conjunction with BrainLes workshop and ISLES challenge. For the schedule of the workshop please see page 72.

List of Posters

P-1 Brain Tumor Segmentation by a Generative Model with a Prior on Tumor Shape. Mikael Agn, Oula Puonti, Ian Law, Per Munck af Rosenschold, Koen Van Leemput

P-2 Segmentation of Gliomas in Multimodal Magnetic Resonance Imaging Volumes Based on a Hybrid Generative-Discriminative Framework. Spyridon Bakas, Ke Zeng, Aristeidis Sotiras, Saima Rathore, Hamed Akbari, Bilwaj Gaonkar, Martin Rozycki, Sarthak Pati, Christos Davatzikos

P-3 Structured Prediction with Convolutional Neural Networks for Multimodal Brain Tumor Segmentation. Pavel Dvorak, Bjoern H. Menze

P-4 Automated Model-Based Segmentation of Brain Tumors in MR Images. Tom Haeck, Frederik Maes, Paul Suetens

P-5 A Convolutional Neural Network Approach to Brain Tumor Segmentation. Mohammad Havaei, Francis Dutil, Chris Pal, Hugo Larochelle, Pierre-Marc Jodoin

P-6 Multimodal Brain Tumor Segmentation (BRATS) using Sparse Coding and 2-layer Neural Network. Assaf Hoogi, Andrew Lee, Vivek Bharadwaj, Daniel L. Rubin

P-7 Highly discriminative features for Glioma Segmentation in MR Volumes with Random Forests. Oskar Maier, Matthias Wilms, Heinz Handels

P-8 CaBS: A Cascaded Brain Tumor Segmentation Approach. Eric Malmi, Shameem Parambath, Jean-Marc Peyrat, Julien Abinahed, Sanjay Chawla

P-9 Parameter Learning for CRF-based Tissue Segmentation of Brain Tumors. Raphael Meier, Venetia Karamitsou, Simon Habegger, Roland Wiest, Mauricio Reyes

P-10 Deep Convolutional Neural Networks for the Segmentation of Gliomas in Multi-Sequence MRI. Sergio Pereira, Adriano Pinto, Victor Alves, Carlos A. Silva

P-11 Brain Tumor Segmentation with Deep Learning. Vinay Rao, Mona Shari Sarabi, Ayush Jaiswal

P-12 Multi-Modal Brain Tumor Segmentation Using Stacked Denoising Autoencoders. Kiran Vaidhya, Roshan Santhosh, Subramaniam Thirunavukkarasu, Varghese Alex, Ganapathy Krishnamurthi

BRATS: Challenge on Multimodal Brain Tumor Image Segmentation
ISLES: Ischemic Stroke Lesion Segmentation Challenge

In conjunction with BrainLes workshop and BRATS challenge. For the schedule of the workshop please see page 72.

List of Posters

› P-1 Segmentation of Stroke Lesions in Multi-spectral MR Images Using Bias Correction Embedded FCM and Three Phase Level Set. C. Feng, D. Zhao, M. Huang
› P-2 A Novel Framework for Sub-acute Stroke Lesion Segmentation Based on Random Forest. L. Chen, P. Bentley, D. Rueckert
› P-3 Multi-Scale 3D Convolutional Neural Networks for Lesion Segmentation in Brain MRI. K. Kamnitsas, L. Chen, C. Ledig, D. Rueckert, B. Glocker
› P-4 Random Forests with Selected Features for Stroke Lesion Segmentation. O. Maier, M. Wilms, H. Handels
› P-5 Ischemic Stroke Lesion Segmentation Using Local Gradient and Texture Features. S. MS Reza, L. Pei, K. M Iftekharuddin
› P-8 Stroke Lesion Segmentation of 3D Brain MRI Using Multiple Random Forests and 3D Registration. C. Wang, J. Lee
› P-9 Input Data Adaptive Learning (IDAL) for Sub-acute Ischemic Stroke Lesion Segmentation. M. Goetz, C. Weber, K. Maier-Hein
› P-10 Distributed Deep Learning Framework for Large-Scale 3D Medical Image Segmentation. T. Klein, N. K. Batmanghelich, W. M. Wells III
› P-11 Automatic Ischemic Stroke Lesion Segmentation in Multi-Spectral MRI Images Using Random forests Classifier Qaiser M. and A. Basit
› P-12 ISLES Challenge 2015: Automated Model-Based Segmentation of Ischemic Stroke in MR Images. T. Haeck, F. Maes, P. Suetens
› P-13 A Convolutional Neural Network Approach to Brain Lesion Segmentation. F. Dutil, M. Havaei, C. Pal, H. Larochelle, P. Jodoin
› P-14 Hierarchical Segmentation of Normal and Lesional Structures Combining an Ensemble of Probabilistic Local Classifiers and Regional Random Forest Classification. A. Jesson, T. Arbel
› P-15 A Vascular Territory Prior for Bayesian Sub-Acute Ischemic Stroke Lesion Segmentation. S. Doyle, F. Forbes, M. Dojat
› P-16 Segmentation of Ischemic Stroke Lesions Using Dictionary Learning. J. Huang, L. Staib, J. Duncan
› P-17 Segmenting the Ischemic Penumbra: A Spatial Random Forest Approach with Automatic Threshold Finding. R. McKinley, L. Häni, R. Wiest, M. Reyes
› P-20 Prediction of Ischemic Lesions using Local Image Properties and Random Forests. J. Muschelli
DTI: MICCAI DTI Challenge Workshop on Tractography for Brain Tumor Surgery

08.30 The MICCAI DTI Challenge, Opening Remarks and Introduction

08.40 Keynote
Prof. Christopher Nimsky, University of Marburg

09.20 Neurosurgical Cases Results
Sonia Pujol, Brigham and Women’s Hospital, Harvard Medical School

09.40 On-site DTI Tractography Challenge: Analysis of Neurosurgical Cases by Participating Teams

10.30 Coffee Break

10.45 Tractography Session: Presentation of Methods and Results by Contestants
› Team Hungary. Increasing the Anatomical Reliability of Probabilistic Tractography of the Corticospinal Tract with Perpendicular Double-ROI Approach. D. Kis, A. Mate
› Team Germany 1. Machine Learning Based Tractography of the Corticospinal Tract. P. F. Neher, K. H. Maier-Hein
› Team China. Feasibility of Two-tensor Unscented Kalman Filter Tractography using Quality-Controlled Diffusion Weighted Images for Pyramidal Tracts Reconstruction. Y. Li, X. Chen
› Team Germany 2. NeuroQLab DTI – Probabilistic Parameter Adaption for Efficient Fiber Tracking. J. Klein, B. Geisler, H. K. Hahn
› Team Italy. Reconstruction of Cortico-Spinal Tracts and Arcuate Fasciculus using a Multi-Process Pipeline. G. K. Ricciardi, C. Lemonis, G. Pinna, R. I. Foroni
› Team Australia. DTI Tractography Challenge with Constrained Spherical Deconvolution. S. Liu, S. Liu, W. Cai
› Team USA. Corticospinal Tract Reconstruction with Deterministic Multi-fiber Tractography and Model-based Processing. R. P. Cabeen, D.H. Laidlaw
› Team Japan. On the Effect of Diffusion Tensor Estimation Accuracy for Pyramidal Tract Tracking with Crossing Fiber Cancelling. Y. Masutani

12.20 DTI Visualization
Prof. Sarang Joshi, Scientific Computing and Imaging Institute, University of Utah

12.30 Lunch

13.30 Keynote
Prof. Hatsuho Mamata, Brigham and Women’s Hospital, Harvard Medical School

14.00 Neurosurgery Case Review
› Clinical case presentation. Prof. Yoshihiro Muragaki, Tokyo Women’s Medical University
› Open Review Session by DTI Challenge Jury

15.10 Neurosurgery Forum: Past and Future of DTI tractography for Neurosurgery
› Prof. Alexandra Golby, Brigham and Women’s Hospital, Harvard Medical School
› Prof. Arya Nabavi, International Neuroscience Institute
## OPTIMA: Retinal Cyst Segmentation Algorithm Challenge

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<td>08.45</td>
<td>Keynote</td>
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<td></td>
<td>Value of Intraretinal Cyst Quantification for Visual Prognosis in Retinal Disease. <em>Sebastian Waldstein</em>, Medical University of Vienna</td>
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<tr>
<td>09.15</td>
<td>Oral Presentations I</td>
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<td>11.00</td>
<td>Oral Presentations II</td>
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<td>14.30</td>
<td>Overview/Discussion of Final Results</td>
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<td>15.30</td>
<td>Coffee Break</td>
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<tr>
<td>16.00</td>
<td>Panel Discussion of methods and results. Challenge discussion, impressions, and future developments. <em>Jing Wu, Sebastian Waldstein, Ana-Maria Philip</em></td>
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<td>16.50</td>
<td>Wrap up and Final Comments</td>
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<td></td>
<td><em>Jing Wu</em></td>
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<td>17.00</td>
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## GlaS: Gland Segmentation in Colon Histology Images

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<td>Oral presentations by the contestants</td>
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<td>Coffee Break and Poster Presentation</td>
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<td>16.00</td>
<td>Oral presentations by the contestants</td>
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<td>16.40</td>
<td>Announcement of the final challenge results</td>
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# Advanced Medical Visualization: Techniques and Applications

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<td>08.30</td>
<td>Introduction</td>
<td>Bernhard Preim, Anna Vilanova</td>
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<td>08.40</td>
<td>Volume Rendering</td>
<td>Timo Ropinski, Markus Hadwiger</td>
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<td>09.40</td>
<td>Recent Developments in Ultrasound Visualization</td>
<td>Stefan Bruckner</td>
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<td>10.10</td>
<td>Simplifying Medical Visualization through Sparse Interaction and Reformation</td>
<td>Eduard Gröller</td>
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<td>10.40</td>
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<tr>
<td>10.55</td>
<td>Visualization of Cardiac Bloodflow Data</td>
<td>Anna Vilanova</td>
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<td>11.25</td>
<td>Diffusion Imaging Visualization</td>
<td>Thomas Schultz</td>
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<td>11.55</td>
<td>Visual Analytics of Cohort Study Data</td>
<td>Bernhard Preim</td>
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<td>13.30</td>
<td>Visual Fusion of Multi-Modal and Multi-Parametric Image Data</td>
<td>Katja Buehler</td>
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<td>Interactive Visualization of Whole-Body Medical Volume Data</td>
<td>Anders Ynnerman</td>
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<td>14.30</td>
<td>GPU-based Biomechanical Simulations and Steering</td>
<td>Rüdiger Westermann</td>
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<td>15.00</td>
<td>Questions and Answers</td>
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<td>15.15</td>
<td>Creating an Open API for the First Digital Operating Microscope</td>
<td>Christoph Bichlmeier</td>
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<td>16.00</td>
<td>Panel Discussion »Open Problems in Medical Image Analysis and Visualization Getting Closer or Bridging the Gap«</td>
<td>Katja Bühler, Thomas Deserno, Bernhard Kainz, Wiro Nissen, Bernhard Preim, Anders Ynnerman</td>
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Advanced Robotic Assistance in Medicine: IROS meets MICCAI

08.30 Opening and Introduction
Tim C. Lüth, Technische Universität München

09.00 Lightweight Robotics in Medicine
Cyrill von Tiesenhausen, KUKA

09.25 Challenges for Image Guidance in Soft Tissue Procedures
Jonathan Sorger, Intuitive Surgical Inc.

09.50 Challenges of New Technology Development in Medicine
Hans-Georg Mathé, Karl Storz GmbH

10.15 Coffee Break

10.30 Demos at IFL
CAMP, Technische Universität München
MITI, Klinikum rechts der Isar

11.15 Surgical and Healthcare Assistance Robots
Alin Albu-Schäffer, DLR

11.40 Advanced Robotic Assistance in Visceral Medicine
Hubertus Feußner, Klinikum rechts der Isar

12.05 Medical Robotics in Image-Guided Interventions
Russell Taylor, Johns Hopkins University

12.30 Lunch Boxes and departure of bus to Garching

13.15 Demos in Garching MIMED
› Medical Robotics
› Kinematics and OR
› Rapid Prototyping

14.30 Bus transportation to Oberpfaffenhofen
DLR

15.15 Demos at DLR

16.45 Bus transportation back to Munich City Center
Biomedical Texture Analysis: Review, Applications and Challenges Ahead

13.30 Introduction
J. Ross Mitchell, Adrien Depeursinge

Adrien Depeursinge

14.20 Wavelet-based operators for texture characterization
Michael Unser

15.05 Overview of applications
J. Ross Mitchell

15.40 Coffee Break

15.55 Texture analysis of glioblastoma multiforme (GBM)
Leland Hu

16.40 Texture analysis in a core lab/for gastrointestinal pathologies
Alvin Silva

17.25 Closing remarks
J. Ross Mitchell, Adrien Depeursinge

Deep Learning for Medical Imaging

08.30 Neural Network and Deep Learning: Theories
Dr. S. Kevin Zhou, Siemens

09.00 Neural Network and Deep Learning: Practices/Demos
Dr. Hien V Nguyen, Siemens

09.30 Deep Learning History
Prof. Juergen Schmidhuber, IDSIA

10.30 Coffee Break

11.00 Deep Learning Applications to Medical Image Analysis
Prof. Dinggang Shen, Univ. of North Carolina

11.30 Chest Radiograph Categorization with Deep Feature Selection
Prof. Hayit Greenspan, Tel Aviv University

12.00 From DBNs to Deep ConvNets: Pushing the State of the Art in Medical Image Analysis
Prof. Gustavo Carneiro, University Adelaide

12.30 Lunch
Gaussian Process Models with Applications to Medical Data

08.30 Introduction to GP regression
Philipp Hennig

09.45 Research perspective. GPs for surface and image registration
Marcel Luethi

10.30 Coffee break

11.00 GP regression. Some advanced aspects
Philipp Hennig

11.30 GP for Numerics with application in DTI
Søren Hauberg

SimpleITK Registration: An Interactive, Python-Based Introduction to Registration with the Insight Toolkit (ITK)

08.30 Setup and Introduction

09.00 SimpleITK basics: loading data, image access, image transformations, image resampling, basic filters

10.00 Coffee Break

10.30 Registration 1: composite transform, transformation initialization, embedded multi-resolution, scale parameter estimation, optimization termination criteria.

11.30 Registration 2: nonrigid registration – Nonrigid registration, Bspline and displacement field transformations.

12.30 Lunch

Navigation of Interventional and Surgical Devices Using Open-Source Software

13.30 Opening remarks
Gabor Fichtinger

13.35 Intellectual property in the era of open-source
Ron Kikinis

13.50 Translation of open-source software into commercial systems
Stephen Aylward

14.10 Common interface between research and commercial systems (OpenIGTLink)
Junichi Tokuda

14.30 Hands-on tutorial, Part 1: System setup and calibration methods
Tamas Ungi, Junichi Tokuda

15.30 Coffee Break

15.45 Hands-on tutorial, Part 2: Step-by-step development of a surgical navigation system
Tamas Ungi, Junichi Tokuda

17.15 Closing Remarks, Q & A

17.30 Adjourn
Workshops

AE-CAI: Augmented Environments for Computer-Assisted Interventions
Full time | Klinikum | Hörsaal C | Page 98

BAMBI: Bayesian and grAphical Models for Biomedical Imaging
Full time | Holiday Inn | Forum 15 | Page 99

BIA: Breast Image Analysis
Full time | Klinikum | Pavillon | Page 100

CBTC: Computational Brain Tumor Cluster of Events
Full time | Holiday Inn | Forum 11 | Page 102

CDMRI: Computational Diffusion MRI
Full time | Holiday Inn | Forum 12 | Page 103

DLMIA: Deep Learning in Medical Image Analysis: From Random Search to Optimization Heuristics
PM | Holiday Inn | Forum 1 | Page 105

HPC: High Performance Computing
AM | Holiday Inn | Forum 1 | Page 106

ICART: Imaging and Computer Assistance in Radiation Therapy
Full time | Klinikum | Hörsaal D | Page 107

IMIC: Interactive Medical Image Computing
PM | Holiday Inn | Forum 8 | Page 109

M2CAI: Modeling and Monitoring of Computer Assisted Interventions
AM | Klinikum | Radiology | Page 110

MCV: Medical Computer Vision Workshop: Algorithms for Big Data
Full time | Holiday Inn | Forum 3 | Page 111

MFCA: Mathematical Foundations of Computational Anatomy
Full time | Holiday Inn | Forum 16 | Page 112

MICGen: Imaging Genetics
Full time | Holiday Inn | Forum 10 | Page 113

OMIA: Ophthalmic Medical Image Analysis
AM | Holiday Inn | Forum 8 | Page 114

Patch-MI: Patch-based Technique in Medical Imaging
AM | Holiday Inn | Forum 2 | Page 116

STACOM: Statistical Atlases and Computational Models of the Heart
Full time | Holiday Inn | Forum 14 | Page 118
Challenges

CBTC-1: Segmentation of Nuclei in Digital Pathology Images
Full time | Holiday Inn | Forum 11 | Page 102

CBTC-2: Combined Imaging and Digital Pathology Primary Tumor Classification
Full time | Holiday Inn | Forum 11 | Page 102

CBTC-3: Guess the Primary
Full time | Holiday Inn | Forum 11 | Page 102

CLUST: Challenge on Liver Ultrasound Tracking
Full time | Holiday Inn | Forum 9 | Page 120

Head and Neck Auto Segmentation Challenge
PM | Holiday Inn | Forum 2 | Page 120

EndoVis: Endoscopic Vision Challenge
Full time | Klinikum | Spiegelsaal | Page 121

Multi-Atlas Labeling beyond the Cranial Vault: Workshop and Challenge
AM | Klinikum | MeDiCAL | Page 121
### AE-CAI: Augmented Environments for Computer-Assisted Interventions

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<td>Cristian A. Linte, Ziv R. Yaniv, Pascal Fallavollita</td>
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<td>‣ Ultrasound-Guided Navigation System for Orthognathic Surgery</td>
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<td>‣ Augmented Reality Ultrasound Guidance for Central Line Procedures: Preliminary Results</td>
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<td>‣ Interaction-based Registration Correction for Improved Augmented Reality Alignment in Neurosurgery</td>
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<td>‣ On the Fly Reconstruction and Tracking system for Patient Setup in Radiation Therapy</td>
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<td>‣ 3D Catheter Tip Tracking in 2D X-ray Image Sequences Using a Hidden Markov Model and 3D RA</td>
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<td>11.00</td>
<td>The ARRISCOPe: A new digital microscope by ARRI, by Dr. Christoph Bichlmeier</td>
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<td>11.20</td>
<td>Poster Teasers and Poster Session</td>
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<td>‣ P-1 Human-PnP: Ergonomic AR interaction paradigm for Manual Placement of Rigid Bodies</td>
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<td>‣ P-2 Real-time Markerless Respiratory Motion Management using Thermal Sensor Data</td>
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<td>‣ P-3 An Iterative Closest Point Framework for Ultrasound Calibration</td>
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<td>‣ P-4 Development of 4D Human Body Model that Enables Deformation of Skin, Organ and Blood Vessels According to Dynamic Change</td>
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<td>‣ P-5 Augmented Reality for Specific Neuro-vascular Surgical Tasks</td>
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<td>‣ P-6 Layer Separation for Vessel Enhancement in Interventional X-ray Angiograms Using Morphological Filtering and Robust PCA</td>
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<td>‣ P-7 Automatic Guide-wire Detection for Neurointerventions Using Low-rank Estimation and Denoising</td>
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<td>Dr. Med. Simon Weidert Department of Traumatology &amp; Orthopaedic Surgery, Ludwig-Maximilian-University, Munich</td>
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<td>Oral Session III: Video-enhanced Augmented Reality Applications</td>
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<td>‣ 3D Surgical Overlay With Markerless Image Registration Using a Single Camera</td>
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<td>‣ Simultaneous Estimation of Feature Correspondence and Stereo Object Pose with Application to Ultrasound Augmented Robotic Laparoscopy</td>
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<td>‣ Patient-adapted Augmented Reality System for Real-time Echocardiographic Applications</td>
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<tr>
<td>15.30</td>
<td>Coffee Break</td>
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<tr>
<td>15.45</td>
<td>Awards, Closing Remarks and Laboratory Tour</td>
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<td>Ziv R. Yaniv, Cristian A. Linte, Pascal Fallavollita</td>
</tr>
</tbody>
</table>
### Opening Session and Welcome
09.00

#### Invited Speaker
09.05
Nikos Paragios

#### First Session: Image Registration
09.45
- Simultaneous Linear and Deformable Registration Through a Higher Order MRF Model. *Vivien Fécamp, Aristeidis Sotiras, Nikos Paragios*
- A Mixture Model for Automatic Diffeomorphic Multi-Atlas Building. *Miaomiao Zhang, Hang Shao, Tom Fletcher*

#### First Session: Image Registration
10.30
Coffee Break and Posters

#### Second Session: Methods for Connectomics
11.00
- Community Detection in the Space of Functional Abnormalities Reveals both Heightened and Reduced Brain Synchrony in Autism. *Archana Venkataraman, Daniel Yang, Kevin Pelphrey, James Duncan*

#### Third Session: Population Analysis
11.45
- Modelling the longitudinal evolution of white matter disease. *Carole Sudre, M. Jorge Cardoso, Sebastien Ourselin*
- Accounting for Heterogeneity Across Multiple Imaging Sites Using Multi-Task Learning. *Michelle Hromatka, Wei Liu, Jeffrey Anderson, Brandon Zielinski, Molly Dubray*

#### Third Session: Population Analysis
12.30
Lunch and Posters

#### Invited Speaker
14.05
Generative Models for Medical Images
*John Ashburner*

#### Fourth Session: Image Segmentation
14.45
- Directed Acyclic Graphical Continuous Max-Flow Image Segmentation. *John Baxter*
- Variational Inference for Image Segmentation. *Claudia Blaiotta, John Ashburner, M. Jorge Cardoso*

#### Fourth Session: Image Segmentation
15.30
Coffee Break and Posters

#### Fifth Session: Shape and Appearance
16.00
- Segmentation of clusters by template rotation expectation maximization. *Carl-Magnus Svensson, Marc Thilo Figge*

#### Fifth Session: Shape and Appearance
16.45
Best Paper Award and Closing Remarks
BIA: Breast Image Analysis

08.30 Informal Get-Together

09.00 Opening

09.15 Session I
› Pectoral muscle surface segmentation in automated 3D breast ultrasound using cylindrical transform and atlas information. Albert Gubern-Mérida, Tao Tan, Jan van Zelst, Ritse M. Mann, Bram Platel, Nico Karssmeijer
› An optimization approach to segment breast lesions in ultra-sound images using clinically validated visual cues. Joan Massich, Guillaume Lemaitre, Joan Marti, Fabrice Meriaudeau

10.30 Coffee Break

11.00 Session II
› Automated Mass Detection from Mammograms using Deep Learning and Random Forest. Neeraj Dhungel, Gustavo Carneiro, Andrew Bradley
› Comparing regional breast density using Full-Field Digital Mammograms and Magnetic Resonance Imaging. A preliminary study. Eloy García, Arnau Oliver, Yago Diez, Oliver Diaz, Joachim Georgii, Robert Martí, Joan Martí
› A two-stage SVM-based mammographic CBIR for CADx. Lazaros Tsochatzidis, Anna Karahaliou, Konstantinos Zagoris, Spyros Skiadopoulos, Nikolaos Arikidis, Lena Costaridou and Ioannis Pratikakis
› Deep Artificial Neural Network Approach to Automated Lesion Segmentation in Breast DCE-MRI. Hongbo Wu, Cristina Gallego-Ortiz, Anne Martel

12.30 Lunch

13.30 Session III
› Random Projections for Mammographic Texture Segmentation and High/Low Risk Classification. Jolanta Mirecka, Erika Denton, Reyer Zwiggelaar, Harry Strange
› Sliding Level Set-Based Boundary. Fully Automated Dense Breast Segmentation in Native MR Mammograms. Tatyana Ivanovska, Lei Wang, Oliver Gloger, Horst Hahn, Henry Völzke, Katrin Hegenscheid

14.30 Session IV
› Breast MRI segmentation using supervoxel classification. Habib Baluwala, Duane Malcolm, Anthony Doyle, Poul Nielsen, Martyn Nash
› Comparison of biomechanical models for MRI to X-ray mammography registration. Torsten Hopp, Wagner de Barros Rupp Simioni, Jose Antonio Exposito Perez, Nicole V. Ruiter
› Real-Time Optical Flow with Theoretically Justied Warping Applied to Medical Imaging. Anke Meyer-Baese

15.30 Coffee Break
16.00  Keynote
   Computer Aided Plastic Surgery (CAPS).
   Prof. Dr. med. Laszlo Kovacs, Technische Universität München

17.15  Closing Remarks

17.30  End

List of Posters
   › P-1 First step for Computer Aided Diagnosis (CAD) combining Supersonic Shear Imaging (SSI) and ultrasound BI-RADS categories of solid breast lesions. Katrin Skerl, Sarah Vinnicombe, Kim Thomson, Denic McLean, Andrew Evans
   › P-2 Comparison of fibroglandular tissue segmentation algorithms in breast MRI. Habib Baluwala, Parita Sanghani, Duane Malcolm, Poul Nielsen, Martyn Nash
   › P-3 Finding Correspondence in Longitudinal Breast MRI Using a Geometric Model. Dominik Kutra, Martin Bergholdt, Jörg Sabczynski, Olaf Dössel, Thomas Buelow
   › P-4 RICE. Region of Interest Contrast Enhancement of Mammographic Density Maps. Faraz Janan, Michael Brady, Ralph Highnam
   › P-5 Sliding Motion in Breast Deformation Modeling. Torben Pätz, Markus Harz, Lei Wang, Christina Stöcker, Kathy Schilling, Joseph Colletta, Margrethe Schlooz-Vries, Horst Karl Hahn, Joachim Georgii
   › P-6 Early Prediction of Breast Cancer Therapy Response to Neoadjuvant Chemotherapy through Texture Analysis of DCE-MRI. Guillaume Thibault, Alina Tudorica, Aneela Afzal, Stephen Chui, Arpana Naik, Megan Troxell, Kathleen Kemmer, Karen Oh, Nicole Roy, Megan Holtorf, Wei Huang, Xubo Song
   › P-7 Shortest Paths of Mass Contour Estimates in Mammography. Nikolaos Arikidis, Spyros Skiadopoulos, Anna Karahaliou, Alexandra Kazantzi, Katerina Vassiou, Lazaros Tsochatzidis, Ioannis Pratikakis, Lena Costaridou
CBTC: Computational Brain Tumor Cluster of Events

08.30 Opening
K. Farahani, National Cancer Institute

08.45 Session I: Informatics and Clinical Decision Support in Precision Medicine
Review the feasibility of engaging stakeholders on an international scale from academia, government, and industry to develop an open source interoperable informatics research infrastructure for the evaluation of clinical support systems and the technical requirements to meet this goal.

08.45 L. Clarke/J. Freymann, National Cancer Institute
09.00 J. Salz, Stony Brook University
09.15 A. Dekker, Maastro Clinic
09.30 T. Fox, Varian Inc.
09.45 A. Shuali, Philips Healthcare
10.00 Panel I.
D. Hawkes, University College London
A. Kamen, Siemens Corporate Research
R. Kikinis, Harvard University

10.30 Coffee Break

11.00 Session II: Computational Challenges and Precision Medicine
Discussion of software challenges that target brain tumor segmentation and diagnosis. This session will have an emphasis on integration of Big Data, including imaging, »omics«, and other laboratory and clinical data, cloud-based computing, open archives, open science, validation and benchmarking of algorithms in support of precision medicine in the context of imaging and image-guided interventions.

11.00 C. Davatzikos/S. Bakas
University of Pennsylvania
11.15 J. Klesiek, University of Heidelberg
11.30 J. Kalpathy-Cramer, Harvard University
11.45 H. Muller, Techno Pole
12.00 Panel II.
T. Fuchs, Memorial Sloan Kettering Cancer Center
B. Menze, Technical University of Munich
B. Wiestler, Technical University of Munich

12.30 Lunch

13.30 Session III: Brain Tumor Challenges
› Challenge 1. Segmentation of Nuclei in Digital Pathology
› Challenge 2. Combined Imaging and Digital Pathology Primary Tumor Classification

15.30 Coffee Break

16.00 Session III: Brain Tumor Challenges
› Challenge 3. Guess the Primary

17.00 Group Discussion and Wrap-up
CDMRI: Computational Diffusion MRI

08.30 Welcome and Introduction

08.45 Keynote
Mesoscopic Diffusion MRI. What Maximum Likelihood cannot tell. Valerij Kiselev, University of Freiburg

09.30 Oral Session I
› An efficient finite element solution of the complete Bloch-Torrey equation for arbitrary domains. Leandro Beltrachini et al., University of Sheffield
› Super-Resolution Reconstruction of Diffusion-Weighted Images using 4D Low-Rank and Total Variation. Feng Shi et al., University of North Carolina at Chapel Hill
› Holistic Image Reconstruction for Diffusion MRI. Vladimir Golkov et al., Technische Universität München

10.30 Coffee Break

11.00 Keynote
Interactive Analysis of Clinical dMRI data. Ron Kikinis, Harvard Medical School

11.45 Oral Session II
› Alzheimer's Disease Classification with Novel Microstructural Metrics from Diffusion-Weighted MRI. Talia Nir et al., University of Southern California

12.05 Poster Power Pitch

12.30 Lunch and Posters

13.30 Poster Session

14.00 Keynote
Groupwise tractography registration and data-driven white matter parcellation. Lauren O’donnell, Harvard Medical School

14.45 Oral Session III
› Brain Tissue Micro-structure Imaging from diffusion MRI using Least Squares Variable Separation. Hamza Farooq et al., University of Minnesota
› Multi-Tensor MAPMRI. how to estimate microstructural information from crossing fibers. Mauro Zucchelli et al., University Of Verona

15.30 Coffee Break

16.00 Oral Session IV
› On the Use of Antipodal Optimal Dimensionality Sampling Scheme on the Sphere for Recovering Intra-voxel Fibre Structure in Diffusion MRI. Alice Bates et al., Australian National University
› Estimation of Fiber Orientations Using Neighborhood Information. Chuyang Ye et al., Institute of Automation, Chinese Academy of Sciences

16.40 Panel Discussion
Open Challenges In Computational Diffusion MRI

17.15 Closing Remarks
Continue: CDMRI

List of Posters

» P-1 A framework for creating population specific multimodal brain atlas using clinical T1 and diffusion tensor images. Vikash Gupta et al., INRIA Sophia Antipolis

» P-2 Alignment of Tractograms as Linear Assignment Problem. Nusrat Sharmin et al., University of Trento

» P-3 Accelerating Global Tractography Using Parallel Markov Chain Monte Carlo. Haiyong Wu et al., University of North Carolina at Chapel Hill

» P-4 Adaptive Enhancement in Diffusion MRI Through Propagator Sharpening. Tom Dela Haije et al., Eindhoven University of Technology

» P-5 Angular Resolution Enhancement of Diffusion MRI Data Using Inter-Image Information Transfer. Geng Chen et al., Northwestern Polytechnical University

» P-6 Crossing versus Fanning. Model Comparison Using HCP Data. Aurobrata Ghosh et al., University College London

» P-7 White Matter Fiber Set Simplification by Redundancy Reduction with Minimum Anatomical Information Loss. Gali Zimmerman-Moreno et al., Tel Aviv University

» P-8 A Temperature Phantom to Probe the Ensemble Average Propagator Asymmetry. an In-Silico Study. Marco Pizzolato et al., Inria Sophia Antipolis - Méditerranée

» P-9 Registration Strategies for Whole-Body Diffusion-Weighted MRI Stitching. Jakub Ceranka et al., Vrije Universiteit Brussel

» P-10 HARDI Feature Selection, Registration and Atlas Building for Aβ Pathology Classification. Evan Schwab et al., Johns Hopkins University

» P-11 Reliability of Structural Connectivity Examined with Four Different Diffusion Reconstruction Methods at Two Different Spatial and Angular Resolutions. Julio Villalon-Reina et al., University of Southern California
DLMIA: Deep Learning in Medical Image Analysis: From Random Search to Optimization Heuristics

13.30 Opening Remarks

13.45 Multi-scale Structured CNN with Label Consistency for Brain MR Image Segmentation. 
Siqi Bao, Albert Chung; Hong Kong University of Science and Technology

14.00 Convolutional Networks for Kidney Segmentation in Contrast-Enhanced CT Scans. 
William Thong, Samuel Kadoury, Nicolas Piché, Christopher Pal; Polytechnique Montreal, Object Research Systems Inc

14.15 Deep Similarity Learning for Multimodal Medical Images 
Xi Cheng, Li Zhang, Yefeng Zheng; Siemens Corporate Technology

14.30 Keynote 
Deep Learning. State of the Art 
Juergen Schmidhuber, IDSIA

15.30 Coffee Break

16.00 Microscopy Cell Counting with Fully Convolutional Regression Networks. 
Weidi Xie, Alison Noble, Andrew Zisserman 
University of Oxford

16.15 Closing Remarks and Poster Session

List of Posters

› P-1 Computational Mammography using Deep Neural Networks. Anastasya Dubrovina, Pavel Kisilev, Ron Kimmel, Boris Ginzburg; Technion, IBM, Intel
› P-2 Holistic Classification of CT Attenuation Patterns for Interstitial Lung Diseases via Deep Convolutional Neural Networks. Mingchen Gao, Ulas Bagci, Le Lu, Mario Buty, Aaron Wu, Hoo-Chang Shin, Holger Roth, Georgios Papadakis Adrien Depeursinge, Ronald Summers, Ziyue Xu, Daniel Mollura; NIH, University of Central Florida, University of Applied Sciences Western Switzerland
› P-3 Convolutional Neural Networks for Real-Time Epileptic Seizure Detection. Felix Achilles, Federico Tombari, Vasileios Belagiannis, Soheyl Noachtar, Nassir Navab 
Technical University of Munich
› P-4 Chest Pathology Identification using Deep feature selection with Non-Medical Training. Yaniv Bar, Idit Diamant, Sivan Lieberman, Eli Konen, Lior Wolf, Hayit Greenspan; Tel Aviv University, Sheba
› P-5 An Analysis of Robust Cost Functions for Deep CNN in Computer-Aided Diagnosis. Adrian Barbu, Le Lu, Holger Roth, Ari Seff, Ronald Summers; FSU, USA, NIH, USA
› P-6 A Resolution Adaptive Hierarchical Deep Learning Scheme Applied to Nuclear Segmentation in Histology Images. Andrew Janowczyk, Scott Doyle, Hannah Gilmore, Anant Madabhushi; Case Western Reserve, University at Buffalo, University Hospitals
HPC: High Performance Computing

08.40 Opening Remarks

08.50 Skeletal Muscle Cell Segmentation Using Distributed Convolutional Neural Network
Manish Sapkota, Fuyong Xing, Fujun Liu, Lin Yang

09.10 High Performance Analysis of Compressed Dynamic CT Perfusion Image Data for Acute Care of Ischemic Stroke
Renan Sales Barros, Edwin Bennink, Jorrit Posthuma, Jaap Oosterbroek, Charles Majoie, Hugo de Jong, Silvia Delgado Olabarriaga, Henk Marquering

09.30 Nuclei Detection Ensemble Workflows Across Clustered Infrastructure
Jian Ren, Javier Diaz-Montes, Joel Saltz, Tahsin Kurc, Manish Parashar, David Foran, Xin Qi

09.50 A GPGPU-based Efficient Framework For Microscopic Muscle Images Enhancement
Bing Liu, Xiangfei Kong, Yuanpu Xie, Lin Yang

10.10 A Study of Database Configurations for Managing and Querying Large Volumes of Image Segmentation Results
Mehak Mehta, Sai Santhosh Vaidam Anandan, Joel Saltz, Tahsin Kurc

10.30 Coffee Break

11.00 A Framework for The Creation of Ultra-high Resolution 3-dimensional Models of The Human Brain on Massively Parallel Supercomputers
Hartmut Mohlberg, Bastian Twedde, Katrin Amunts

11.20 High Throughput Automatic Muscle Image Segmentation Using Cloud Computing and Multi-core Programming
Zizhao Zhang, Fuyong Xing, Fujun Liu, Lin Yang

11.40 Characterizing Human Retinotopic Mapping with Conformal Geometry. Conformal Distortion Analysis
Duyan Ta, Jie Shi, Brian Barton, Alyssa Brewer, Zhong-Lin Lu, Yalin Wang

12.00 Enabling Large-scale Image Analysis Workflows on Federated High-performance Resources
Daihou Wang, Manish Parashar, David J. Foran, Xin Qi

12.20 Closing Remarks
## ICART: Imaging and Computer Assistance in Radiation Therapy

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<td>Welcome and Opening Remarks</td>
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<tr>
<td>08.45</td>
<td>Machine-learning based image segmentation using Manifold Learning and Random Patch Forests.</td>
<td>Karl Fritscher, Patrik Raudaschl, Paolo Zaffino, Gregory Sharp, Maria Francesca Spada, Rainer Schubert</td>
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<tr>
<td>09.00</td>
<td>A novel atlas-selection approach for multiple atlas segmentation based on Manifold Learning and Random Forests using Multi-Scale Image Patches</td>
<td>Patrik Raudaschl, Karl Fritscher, Paolo Zaffino, Gregory Sharp, Maria Francesca Spada, Rainer Schubert</td>
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<td>09.15</td>
<td>Groupwise Registration for Robust Motion Field Estimation in Artifact-Affected 4D CT Images</td>
<td>Alexander Tack, Yuske Kobayashi, Tobias Gauer, Alexander Schlaefer, René Werner</td>
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<td>09.30</td>
<td>Pythagorean Mean Images for Efficient Groupwise Registration</td>
<td>Mathias Polfliet, Wyke Huizinga, Stefan Klein, Johan de Mey, Jef Vandemeulebroucke</td>
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<td>09.45</td>
<td>Feature Based Atlas Selection Strategy for Segmentation of Organs at Risk in Head and Neck District</td>
<td>Paolo Zaffino, Davide Limardi, Salvatore Scaramuzzino, Daniela Alterio, Federico Javier Diaz, Sabrina Vigorito, Delia Ciardo, Rosalinda Ricotti, Barbara Alicja Jereczek-Fossa, Patrik Raudaschl, Karl Fritscher, Gregory Sharp, Maria Francesca Spada</td>
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<td>10.00</td>
<td>Optimization of Multimodal and Multi-temporal Deformable Image Registration for Head and Neck Cancer</td>
<td>Catarina Veiga, Ruheena Mendes, Dhanasekaran Kittappa, Swee-Ling Wong, Rachel Bodey, Marc Modat, Sebastien Ourselin, Gary Royle, Jamie McClelland</td>
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<td>10.15</td>
<td>4D Lung CT Segmentation for Radiation Therapy Applications</td>
<td>Sarah G. Yeary, Sandeep Bodduluri, Yue Pan, Joo Hyun Song, Bowen Zhao, Ipek Oguz, John E. Bayouth, Gary E. Christensen, Joseph M. Reinhardt</td>
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<td>11.00</td>
<td>Application and Evaluation of Wavelet-based Surface Reconstruction for Contour Propagation in Radiotherapy</td>
<td>Stefano Moriconi, Elisa Scalco, Tiziana Rancati, Antonella Messina, Tommaso Giandini, Riccardo Valdagni, Giovanna Rizzo</td>
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<td>11.15</td>
<td>Organ Contour Adaptor to create new structures to use for adaptive radiotherapy of cervix cancer using Matlab Bridge and 3DSlicer / SlicerRT</td>
<td>Yvette Seppenwoolde, Michaela Daniel, Hugo Furtado, Dietmar Georg</td>
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<td>11.30</td>
<td>Prediction of Geometric Variations of the Bladder in Image Guided Radiotherapy of Prostate Cancer</td>
<td>Richard Rios, Juan D. Ospina, Frederic Commandeur, Caroline Lafond, Oscar Acosta, Jairo J. Espinosa, Renaud De Crevoisier</td>
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| 11:45 | Population-based Correspondence Models for Respiratory Motion Estimation in the Presence of Intera-fraction Motion Variations  
Matthias Wilms, Rene Werner, Tokihiro Yamamoto, Heinz Handels, Jan Ehrhardt |
| 12:00 | Fast automated non-linear contour propagation for adaptive head and neck radiotherapy  
Weiler Florian, Christoph Brachmann, Nadine Traulsen, Grzegorz Chlebus, Mark Schenk, Stefan Wirtz, Horst Hahn, Reinoud Nijhuis, Ute Ganswindt, Christian Thieke, Claus Belka |
| 12:15 | Lunch |
| 13:30 | Invited Talk. Prof. Dr. K. Parodi |
| 14:30 | Respiratory Motion Compensation with Topology Independent Surrogates  
Christoph Jud, Frank Preiswerk, Philippe C. Cattin |
| 14:30 | Patient localization for robotized ultrasound-guided radiation therapy  
Ivo Kuhlemann, Philipp Jauer, Achim Schweikard, Floris Ernst |
| 15:00 | Real-time tumor tracking during VMAT radiotherapy treatments based on 2D/3D registration using CBCT projections  
Hugo Furtado, Yvette Seppenwoolde, Dietmar Georg, Wolfgang Birkfellner |
| 15:15 | A Generalized Strategy for 3D Dose Verification of IMRT/VMAT Using EPID-measured Transit Images  
Aiping Ding, Bin Han, Lei Wang, Lei Xing |
| 15:30 | Coffee Break |
| 16:00 | Simulation of abdominal MRI sequences in a computational 4D phantom for MRI-guided radiotherapy  
Chiara Paganelli, Paul Summers, Massimo Bellomi, Guido Baroni, Marco Riboldi |
| 16:15 | Flat-Field Correction Pipeline for a Cone-Beam Computed Tomography Imaging Device with Independently Movable Source and Detector  
Peter Keuschnigg, Philipp Steininger, Horst Schoedl, Katja Presich, Daniel Kellner, Philipp Huber, Ulrich Mayer, Markus Mehrwald, Heinz Deutschmann |
| 16:30 | Real-Time Beam Visualization for Monitoring External Beam Radiotherapy  
Cesare Jenkins, Dominik Naczynski, Shu-Jung Yu, Lei Xing |
| 16:45 | Fast processing of CBCT to improve delivered dose assessment  
Kiran Joshi, Tom Marchant |
| 17:00 | Closing Remarks |
IMIC: Interactive Medical Image Computing

13.30 Welcome

13.35 A Multi-Platform Interactive 3D Educational Application for Bronchoscopy & Bronchial Anatomy
Tamara Vagg

13.50 Intuitive and Smart Editing of Three-Dimensional Geometric Heart Valve Apparatus Models from Cardiac CT Data
Félix Lades, Michael Wels, Stefan Steidl, Michael Suehling

14.05 An immersive virtual reality environment for diagnostic imaging
Franklin King, Jayender Jagadeesan, Tina Kapur, Steve Pieper, Andras Lasso, Gabor Fichtinger

14.20 3D Segmentation using Perceptual Computing
Moshe Samson, Shlomo Shenzis, Leo Joskowicz

14.35 GraphMIC. Easy Prototyping of Medical Image Computing Applications
Alexander Zehner, Alexander Eduard Szalo, Christoph Palm

14.50 Demo and Coffee Break (at 15.30)

16.30 Minimally Interactive Placenta Segmentation from Motion Corrupted MRI for Fetal Surgical Planning
Guotai Wang, Maria A. Zuluaga, Rosalind Pratt, Michael Aertsen, Anna L. David, Jan Deprest, Tom Vercauteren, Sebastien Ourselin

16.45 A Virtual Bronchoscopic Tool to Explore the Impact of Physical Restrictions in Bronchoscopy Planning
Agnés Borràs, Debora Gil, Antoni Rosell, Marta Diez

17.00 Shape-Aware Segmentation of Colorectal Polyps in CT Colonography using Surface-Based Front Propagation
Karthik Krishnan

17.15 Model-based Catheter Segmentation in MRI-images
Andre Mastmeyer

17.30 Best Demo Award and Adjourn

List of Further Demos

- Interactive Deformation of Volume Images for Image Registration. Filip Malmberg, Robin Strand, Joel Kullberg
- Multimodal histological image registration using locally rigid transforms. Robin Strand
- An implementation example of the deformation method for real-time simulation of biological tissue formed by fibers and fluid. Ivan Costa
- Fast Correction Method for Abdominal Multi-Organ Segmentation Using 2D/3D Free Form Deformation and Posterior Shape Models. Waldo Valenzuela, Juan Cerrolaza, Mauricio Reyes, Ronald Summers, Marius Linguraru
- Early Recognition of Surgeons’ Hand Actions from Continuous Surgery Videos. Ye Li, Jun Ohya, Toshio Chiba, Rong Xu, Hiromasa Yamashita
# M2CAI: Modeling and Monitoring of Computer Assisted Interventions

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<td>08.45</td>
<td>Keynote</td>
<td>Trends and challenges in the next generation of computer-aided interventions. <strong>H. Feussner</strong></td>
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<td>09.40</td>
<td>Learning Shared, Discriminative Dictionaries for Surgical Gesture Segmentation and Classification</td>
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<td><strong>S. Sefati, N. J. Cowan, R. Vidal</strong>; Johns Hopkins University</td>
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<td>10.30</td>
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<td>11.00</td>
<td>Adaptive surgical process models for prediction of surgical work steps from surgical low-level activities</td>
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<td><strong>S. Franke, T. Neumuth</strong>; Universität Leipzig</td>
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<td>11.25</td>
<td>Surgical workflow and process modeling – An evaluation of modeling languages and process modeling tools</td>
<td></td>
<td><strong>J. Neumann, S. Vinz, T. Neumuth</strong>; Universität Leipzig</td>
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<td>11.50</td>
<td>Robust Situation Interpretation with a Composition of Random Forests and Ontological Background Knowledge</td>
<td></td>
<td><strong>D. Katic, J. Schuck, A-L. Wekerle, H. Kenngott, B. Müller-Stich, R. Dillmann, S. Speidel</strong>; Karlsruhe Institute of Technology, University of Heidelberg</td>
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<tr>
<td>12.15</td>
<td>Final Discussion</td>
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09.00 Clinical Data Intelligence
Volker Tresp, Ludwig Maximilian University of Munich, Siemens Corporation

09.45 Predicting disease
› Relationship Induced Multi-atlas Learning for Alzheimer’s Disease Diagnosis. M. Liu, D. Zhang, D. Shen

10.30 Coffee Break

11.00 Atlas exploitation and avoidance
› Hierarchical multi-organ segmentation without registration in 3D abdominal CT images. V. Zografos, B. Menze, F. Tombari
› Structure specific atlas generation and its application to pancreas segmentation from contrasted abdominal CT volumes. K. Karasawa, M. Oda, K. Mori, T. Kitasaka

11.45 Modeling Brain Circuitry over a Wide Range of Scales. Pascal Fua
École Polytechnique Fédérale de Lausanne

12.30 Lunch Time and Poster Session
› P-1 Joint Feature-Sample Selection and Robust Classification for Parkinson’s Disease Diagnosis. E. Adeli-M, C. Wee, L. An, F. Shi, D. Shen
› P-2 Dynamic Tree-Based Large-Deformation Image Registration for Multi-Atlas Segmentation. P. Zhang, G. Wu, Y. Gao, P. Yap, D. Shen
› P-3 Hippocampus Segmentation from Infant Brains via Boundary Regression. Y. Shao, Y. Gao, X. Yang, D. Shen

13.30 Efficient Machine Learning for Medical Image Analysis.
Antonio Criminisi, Microsoft Research

14.15 Machine learning based analyses
› Structured Prediction with Convolutional Neural Networks for Multimodal Brain Tumor Segmentation. P. Dvorak, B. Menze
› Automated Segmentation of CBCT Image with Prior-guided Sequential Random Forest. L. Wang, Y. Gao, F. Shi, G. Li, J. Xia, D. Shen
› Subject-specific Estimation of Missing Cortical Thickness in Dynamic Developing Infant Brains. Y. Meng, G. Li, Y. Gao, W. Lin, J. Gilmore, D. Shen

15.30 Coffee Break

16.00 Advanced methods for image analysis
› Calibrationless Parallel Dynamic MRI with Joint Temporal Sparsity. Y. Yu, Z. Yan, D. Metaxas, L. Axel
› Psoas major muscle segmentation using higher-order shape prior. T. Inoue, Y. Kitamura, Y. Li, W. Ito, H. Ishikawa

17.00 Adjourn
MFCA: Mathematical Foundations of Computational Anatomy

08.30 Welcome Announcements

08.40 Diffeomorphisms and matching of densities and shape
› Weighted Diffeomorphic Density Matching with Applications to Thoracic Image Registration. **Caleb Rottman, Martin Bauer, Klas Modin, Sarang Joshi**
› Variational Principles for Stochastic Soliton Dynamics. **Tomasz Tyranowski, Darryl Holm**
› Reconstructing Karcher Means of Shapes on a Riemannian Manifold of Metrics and Curvatures. **Boris Gutman, Tom Fletcher, Greg Fleishman, Paul Thompson**
› Adaptive time-stepping in diffeomorphic image registration with bounded inverse consistency error. **Akshay Pai, Stefan Klein, Stefan Somner, Sune Darkner, Jon Sporring, Mads Nielsen**

11.00 Longitudinal and multivariate analysis on manifolds
› Mixed-effects model for the spatiotemporal analysis of longitudinal manifold-valued data. **Jean-Baptiste Schiratti, Stéphanie Allassonnière, Olivier Colliot, Stanley Durrleman**
› Geodesic Refinement Using James-Stein Estimators. **Greg Fleishman, Tom Fletcher, Boris Gutman, Gautam Prasad, Yingnian Wu, Paul Thompson**
› Barycentric Subspaces Analysis on Spheres. **Xavier Pennec**

12.30 Lunch

13.30 Matching the shape of curves and signals
› Curve Matching with Applications in Medical Imaging. **Martin Bauer, Martins Bruveris, Philipp Harms, Jakob Møller-Andersen**
› Covariant un-reduction for curve matching. **Alexis Arnaudon, Marco Castrillon-Lopez, Darryl Holm**
› Kernel Metrics on Normal Cycles and Application to Curve Matching. **Pierre Roussillon, Joan Alexis Glaunès**
› Efficient Metamorphosis Computation for Grouping Embryonic Cardiac Action Potentials. **Giann Gorospe, Renjun Zhu, Jia-Qiang He, Leslie Tung, Rene Vidal, Laurent Younes**

15.35 Coffee Break

16.00 Fréchet mean on manifolds and quotient spaces
› Estimating the Template in the Total Space with the Fréchet Mean on Quotient Spaces may have a Bias. a Case Study on Vector Spaces Quotiented by the Group of Translations. **Loïc Devilliers, Stéphanie Allassonnière, Xavier Pennec**
› An efficient recursive estimator of the Fréchet mean on hypersphere with applications to Medical Image Analysis. **Hesamoddin Salehian, Rudrasis Chakraborty, Edward Ofori, David Vaillancourt, Baba Vemuri**
› An efficient recursive algorithm for atlas construction. **Rudrasis Chakraborty, Monami Banerjee, Dohyung Seo, Sara Turner, David Fuller, John Forder, Baba Vemuri**
MICGen: Imaging Genetics

08.40 Welcome Remarks
Adrian Dalca, EECS, Massachusetts Institute of Technology

09.00 Invited Talk
Burkhard Rost, Technical University of Munich

09.45 Invited Talk
Giovanni Montana, Imperial College London

10.30 Coffee Break

11.00 Invited Talk
Liana Apostolova, Indiana University School of Medicine

11.45 Oral Session
› Genetic correlation between cortical gray matter thickness and white matter connections. Kaikai Shen, Vincent Dore, Jurgen Fripp, Stephen Rose, Katie McMahon, Greig de Zubicaray, Nicholas Martin, Paul Thompson, Margaret Wright, Olivier Salvado
› BoSCCA. Mining Stable Imaging and Genetic Associations with Implicit Structure Learning. Jingwen Yan, Lei Du, Sungeun Kim, Shannon Risacher, Heng Huang, Mark Inlow, Jason Moore, Andrew Saykin, Li Shen
› Multi-site meta-analysis of image-wide genome-wide associations with morphometry. Neda Jahanshad, Gennady Roshchupkin, Joshua Faskowitz, Derrek Hibar, Boris Gutman, Hieab Adams, Wiro Niessen, Meike Vernooij, M. Arfan Ikram, Marcel Zwiens, Alejandro Arias Vasquez, Barbara Franke, Alex Ing, Sylvane Desrivieres, Gunter Schumann, Greig de Zubicaray, Katie McMahon, Sarah Medland, Margaret Wright, Paul Thompson

12.30 Lunch
Please set up your posters before the end of lunch on boards marked with our workshop code. MICGen-P-#

13.30 Invited Talk
Derrek Hibar, University of Southern California

14.15 Oral Session
› Continuous inflation analysis. a threshold-free method to estimate genetic overlap and boost power in imaging genetics. Derrek Hibar, Neda Jahanshad, Sarah Medland, Paul Thompson
› Network-based analysis for subcortical imaging measures and genetics association. Hong Liang, Xianglian Meng, Feng Chen, Qiushi Zhang, Jingwen Yan, Xiaohui Yao, Sungeun Kim, Lei Wang, Weixing Feng, Andrew J. Saykin, Jin Li, Li Shen
› Genetic connectivity – correlated genetic control of cortical thickness, brain volume and white-matter. Daniel Rinker, Neda Jahanshad, Derrek P. Hibar, Katie L. McMahon, Greig I. de Zubicaray, Margaret J. Wright, Paul M. Thompson

15.00 Poster Session
All accepted papers and abstracts will present a poster.

15.30 Coffee Break
Continue poster session MICGen wraps up at the end of the poster session.
OMIA: Ophthalmic Medical Image Analysis

08.30 Opening Remarks

08.40 Keynote
Ocular Imaging Research and the Singapore Perspective. Jiang (Jimmy) Liu, Institute for Infocomm Research, A*STAR

09.20 Stability Analysis of Fractal Dimension in Retinal Vasculature
Fan Huang, Jiong Zhang, Erik Bekkers, Behdad Dashtbozorg, Bart ter Haar Romeny

09.35 Classification of SD-OCT Volumes with LBP. Application to DME Detection
Guillaume Lemaître, Mojdeh Rastgoo, Joan Massich, Shrinivasan Sankar, Fabrice Meriaudeau, Désiré Sidibé

09.50 Poster session I

10.30 Coffee Break

11.00 Poster session II

11.20 Glaucoma Detection by Learning from Multiple Informatics Domains
Yanwu Xu, Lixin Duan, Damon Wong, Tien Yin Wong, Jiang (Jimmy) Liu

11.35 Segmentation of Corneal Endothelial Cells Contour by Means of a Genetic Algorithm
Fabio Scarpa, Alfredo Ruggeri

11.50 Automated Bruch’s Membrane Opening Segmentation in Cases of Optic Disc Swelling in Combined 2D and 3D SD-OCT Images Using Shape-Prior and Texture Information
Jui-Kai Wang, Randy Kardon, Mona Garvin

12.05 Obtaining Consensus Annotations for Retinal Image Segmentation Using Random Forest and Graph Cuts
Dwarikanath Mahapatra

12.20 Closing Remarks
List of Posters

- P-1 Geodesic Graph Cut Based Retinal Fluid Segmentation in Optical Coherence Tomography. Hrvoje Bogunovic, Michael Abràmoff, Milan Sonka
- P-2 Multimodal Graph-Theoretic Approach for Segmentation of the Internal Limiting Membrane at the Optic Nerve Head. Mohammad Saleh Miri, Victor Robles, Michael Abràmoff, Young Kwon, Mona Garvin
- P-3 Segmentation of the Retinal Vasculature within Spectral-Domain Optical Coherence Tomography Volumes of Mice. Wenxiang Deng, Bhavna Antony, Elliot Sohn, Michael Abràmoff, Mona Garvin
- P-4 Effective Drusen Localization for Early AMD Screening Using Sparse Multiple Instance Learning. Huiying Liu, Yanwu Xu, Damon Wong, Jiang (Jimmy) Liu
- P-5 Adaptive Super-Candidate Based Approach for Detection and Classification of Drusen on Retinal Fundus Images. Vaanathi Sundaresan, Keerthi Ram, Kulasekaran Selvaraj, Niranjan Joshi, Mohanasankar Sivaprakasam
- P-6 Refining Coarse Manual Segmentations with Stable Probability Regions. Lauri Laaksonen, Joni Herttuainen, Hannu Uusitalo, Lasse Lensu
- P-7 Automatic Grading of Diabetic Retinopathy on a Public Database. Lama Seoud, Jihed Chelbi, Farida Cheriet
- P-8 EyeArt + EyePACS. Automated Retinal Image Analysis for Diabetic Retinopathy Screening in a Telemedicine System. Malavika Bhaskaranand, Jorge Cuadros, Chaithanya Ramachandra, Sandeep Bhat, Muneeswar Nittala, SriniVas Sadda, Kaushal Solanki
- P-9 Curvature Based Biomarkers for Diabetic Retinopathy via Exponential Curve Fits in SE(2). Erik Bekkers, Jiong Zhang, Remco Duits, Bart ter Haar Romeny
- P-10 Retinal Artery/Vein Classification via Graph Cut Optimization. Koen Eppenhof, Erik Bekkers, Tos Berendschot, Josien Pluim, Bart ter Haar Romeny
- P-11 A New Method of Blind Deconvolution for Colour Fundus Retinal Images. Bryan Williams, Ke Chen, Simon Harding, Yalin Zheng
- P-13 A Polar Map Based Approach Using Retinal Fundus Images for Glaucoma Detection. Akshaya Ramaswamy, Keerthi Ram, Niranjan Joshi, Mohanasankar Sivaprakasam
- P-14 Boosting Convolutional Filters with Entropy Sampling for Optic Cup and Disc Image Segmentation from Fundus Images. Dwarikanath Mahapatra
**FRI WORKSHOPS**

**08.00 Registration, Speaker Check-in and Poster Setup**

**08.30 Opening Remarks**

**08.45 Keynote**
*Dr. Jose V. Manjon Herrera*, Universidad Politécnica de Valencia

**09.30 Poster Session and Coffee Break**

**11.00 Oral Presentations**

- Dual-Layer l1-Graph Embedding for Semi-Supervised Image Labeling. *Qian Wang, Guorong Wu, Dinggang Shen*
- Laplacian Shape Editing with Local Patch Based Force Field for Interactive Segmentation. *Chaowei Tan, Zhennan Yan, Kang Li, Shaoing Zhang, Dimitris Metaxas*
- Fast Regions-of-Interest Detection in Whole Slide Histopathology Images. *Ruoyu Li, Junzhou Huang*
- Multi-Atlas Segmentation using Patch-Based Joint Label Fusion with Non-Negative Least Squares Regression. *Mattias Heinrich, Matthias Wilms, Heinz Handels*

**12.15 Closing Remarks and Best Paper Award**

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**List of Posters**

- **P-1** A Multi-level Canonical Correlation Analysis Scheme for Standard-dose PET Image Estimation. *Le An, Pei Zhang, Ehsan Adeli-Mosabbeb, Yan Wang, Feng Shi, Dinggang Shen*
- **P-2** Image Super-Resolution by Supervised Adaption of Patchwise Self-Similarity from High-Resolution Image. *Guorong Wu, Pei Zhang, Qian Wang, Xiaofeng Zhu, Dinggang Shen*
- **P-3** Automatic Hippocampus Labeling using the Hierarchy of Sub-Region Random Forests. *Lichi Zhang, Qian Wang, Yaozong Gao, Guorong Wu, Dinggang Shen*
- **P-4** Isointense Infant Brain Segmentation by Stacked Kernel Canonical Correlation Analysis. *Li Wang, Feng Shi, Yaozong Gao, Gang Li, Weili Lin, Dinggang Shen*
- **P-5** Improving Accuracy of Automatic Hippocampus Segmentation in Routine MRI by Features Learned from Ultra-high Field MRI. *Shuyu Li, Feng Shi, Guangkai Ma, Minjeong Kim, Dinggang Shen*
- **P-6** Automatic liver tumor segmentation in follow-up CT studies using Convolutional Neural Networks. *Refael Vivanti, Leo Joskowicz, Ariel Ephrat, Naama Lev-Cohain, Onur Karaaslan, Jacob Sosna*
- **P-7** Block-Based Statistics for Robust Non-Parametric Morphometry. *Geng Chen, Pei Zhang, Ke Li, Chong-Yaw Wee, Yafeng Wu, Dinggang Shen, Pew-Thian Yap*
- **P-8** Automatic Collimation Detection in Digital Radiographs with the Directed Hough Transform and Learning-based Edge Detection. *Liang Zhao, Zhigang Peng, Klaus Finkler, Anna Jerebkko, Sean Zhou, Jason Corso*
P-9 Efficient Lung Cancer Cell Detection with Deep Convolution Neural Network. Zheng Xu, Junzhou Huang

P-10 An Effective Approach for Robust Lung Cancer Cell Detection. Hao Pan, Zheng Xu, Junzhou Huang (UTA)

P-11 Hippocampus Segmentation through Distance Field Fusion. Shumao Pang, Zhentai Lu, Wei Yang, Yao Wu, Zixiao Lu, Liming Zhong, Qianjin Feng

P-12 Learning a Spatiotemporal Dictionary for Magnetic Resonance Fingerprinting with Compressed Sensing. Pedro Gómez, Cagdas Ulas, Jonathan Sperl, Tim Sprenger, Miguel Molina, Marion Menzel, Bjoern Menze

P-13 Reliability Guided Forward and Backward Patch-based Method for Multi-atlas Segmentation. Liang Sun, Chen Zu, Daoqiang Zhang

P-14 Correlating Tumour Histology and ex vivo MRI Using Dense Modality-Independent Patch-Based Descriptors. Andre Hallack, Bartłomiej Papiez, James Wilson, Lai Mun Wang, Tim Maughan, Mark Gooding, Julia Schnabel


P-16 A Novel Cell Orientation Congruence Descriptor for Superpixel-based Epithelium Segmentation in Endometrial Histology Images. Guannan Li

P-17 Patch-based segmentation from MP2RAGE images: comparison to conventional techniques. Erhard Næss-Schmidt, Anna Tietze, Irene Mikkelsen, Mikkel Petersen, Jakob Blicher, Pierrick Coupe, Jose Herrera, Simon Eskildsen


P-20 Efficient Multi-Scale Patch-based Segmentation. Abinash Pant, David Rivest-Henault, Pierrick Bourgeat
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| 09.00 | **Keynote**  
MRI for Guiding Ventricular Arrhythmia Management. *Graham Wright*, Sunnybrook Research Institute |
| 10.00 | **Poster teasers**  
Short presentations from selected participants                                                   |
| 10.30 | **Coffee Break**                                                                            |
| 11.00 | **Statistical Shape Challenge. Myocardial Infarction**  
Short presentations from selected participants, challenge results and round-table discussions. |
| 12.00 | **Posters and Lunch**                                                                       |
| 13.30 | **Keynote**  
Patient–tailored heart models as a diagnostic modality. *Mark Potse*, Visiting Professor, Institute of Computational Science, University of Lugano, Switzerland, Research Scientist, INRIA Bordeaux Sud-Ouest & LIRYC |
| 14.30 | **Oral presentations from regular papers**  
A Non-parametric Statistical Shape Model for Assessment of the Surgically Repaired Aortic Arch in Coarctation of the Aorta. How Normal is Abnormal? *Jan L Bruse, Kristin McLeod, Giovanni Biglino, Hopewell N Ntsinjana, Claudio Capelli, Tain-Yen Hsia, Maxime Sermesant, Xavier Pennec, Andrew M. Taylor, Silvia Schievano*  
Patient Metadata-Constrained Shape Models for Cardiac Image Segmentation. *Marco Pereañez, Karim Lekadir, Xènia Alba, Pau Medrano-Gracia, Alejandro Frangi*  
Myocardial Infarct Localization using Neighbourhood Approximation Forests. *Heloise Bleton, Jan Margeta, Hervé Lombaert, Hervé Delingette, Nicholas Ayache*  
Traversed Graph Representation for Sparse Encoding of Macro-Reentrant Tachycardia. *Mihaela Constantinescu, Su-Lin Lee, Sabine Ernst, Guang-Zhong Yang*  
P-3 Towards Left Ventricular Scar Localisation Using Local Motion Descriptors. Devis Peressutti, Wenjia Bai, Wenzhe Shi, Catalina Tobon-Gomez, Thomas Jackson, Manav Sohal, Aldo Rinaldi, Daniel Rueckert, Andrew King

P-4 Prediction of infarct localization from myocardial deformation. Nicolas Duchateau, Maxime Sermesant

P-5 Confidence Measures for Assessing the HARP Algorithm in Tagging Magnetic Resonance Imaging. Hanne Kause, Aura Hernandez, Patricia Márquez-Valle, Andrea Fuster, Luc Florack, Hans van Assen, debora gil

P-6 Papillary Muscle Segmentation from a Multi-Atlas Database. A Feasibility Study. Benedetta Biffi, Maria A. Zuluaga, Sébastien Ourselin, Andrew M. Taylor, Silvia Schievano

P-7 Electrophysiology model for a human heart with ischemic scar and realistic Purkinje network. Toni Lassila, Matthias Lange, Antonio R. Porras Perez, Karim Lekadir, Xènia Alba, Gemma Piella, Alejandro Frangi

Challenge Participants’ Papers

P-8 Systo-diastolic LV shape analysis by Geometric Morphometrics and Parallel Transport highly discriminates myocardial infarction. Paolo Piras, Luciano Teresi, Stefano Gabriele, Antonietta Evangelista, Giuseppe Esposito, Valerio Varano, Concetta Torromeo, Paola Nardinocchi, Paolo Emilio Puddu


P-10 Classification of Myocardial Infarcted Patients by Combining Shape and Motion Features. Wenjia Bai, Ozan Oktay, Daniel Rueckert

P-11 Detecting Myocardial Infarction using Medial Surfaces. Pierre Ablin, Kaleem Siddiqi

P-12 Left ventricle classification using Active Shape Model and Support Vector Machine. Nripesh Parajuli, Allen Lu, James Duncan

P-13 Supervised Learning of Functional Maps for Infarction Classification. Anirban Mukhopadhyay, Ilkay Oksuz, Sotirios A. Tsaftaris

P-14 Joint Clustering and Component Analysis of Spatio-Temporal Shape Patterns in Myocardial Infarction. Catarina Pinto, Serkan Çimen, Ali Gooya, Karim Lekadir, Alejandro Frangi

P-15 Myocardial Infarction Detection from Left Ventricular Shapes using a Random Forest. Jack Allen, Ernesto Zacur, Erica Dall’Armellina, Pablo Lamata, Vicente Grau

P-16 Combination of Polyaffine Transformations and Supervised Learning for the Automatic Diagnosis of LV Infarct. Marc-Michel Rohé, Nicolas Duchateau, Maxime Sermesant, Xavier Pennec

P-17 Automatic detection of cardiac remodeling using global and local clinical measures and random forest classification. Jan Ehrhardt, Matthias Wilms, Heinz Handels, Dennis Säring

P-18 Automatic Detection of Myocardial Infarction Through a Global Shape Feature Based on Local Statistical Modeling. Mahdi Tabassian, Martino Alessandrini, Peter Claes, Luca De Marchi, Dirk Vandermeulen, Guido Masetti, Jan D’hooge

Challenge Collation Paper

P-20 Statistical shape modeling of the left ventricle. myocardial infarct classification challenge. Pau Medrano-Gracia, Xingyu Zhang, Avan Suinesiaputra, Brett Cowan and Alistair A. Young
CLUST: Challenge on Liver Ultrasound Tracking

09.15 Welcome and instructions for on-site challenge
V. De Luca, E. Harris, M. Lediju Bell, C. Tanner

09.30 On-site Challenge
Chair: Emma Harris, Institute of Cancer Research

10.30 Coffee Break

11.00 On-site Challenge
Chair: Emma Harris, Institute of Cancer Research

12.30 Lunch

14.00 Introduction

14.10 Oral Session 1 – 2D Tracking
Chair: Muyinatu A. Lediju Bell, Johns Hopkins University

- Liver Ultrasound Tracking using a Learned Distance Metric. Daniel Nouri, Alex Rothberg
- Liver Ultrasound Tracking Using Kernelized Correlation Filter With Adaptive Window Size Selection. Satoshi Kondo
- Motion Tracking in 2D Ultrasound Using Vessel Models and Robust Optic-Flow. Maxim Makhinya, Orcun Goksel
- Robust Liver Ultrasound Tracking using Dense Distinctive Image Features. Andre Hallack, Bartlomiej W. Papiez, Amalia Cifor, Mark J. Gooding, Julia A. Schnabel

15.30 Coffee Break

16.00 Oral Session 2 – 3D Tracking
Chair: Christine Tanner, ETH Zurich

- A combined tracking and registration approach for tracking anatomical landmarks in 4D ultrasound of the liver. Jyotirmoy Banerjee, Camiel Klink, Erwin Vast, Wiro J. Niessen, Adriaan Moelker, Theo van Walsum
- Overall Results and Conclusions. Valeria De Luca, ETH Zurich

17.00 Discussion and Outlook
Chair: Emma Harris, Institute of Cancer Research

Head and Neck Auto Segmentation Challenge

13.30 Welcome

13.35 On-site segmentation of additional training cases

15.30 Coffee break

15.45 Oral presentations
10–12 min for each participant/team

17.30 Announcement of the results and Adjourn
EndoVis: Endoscopic Vision Challenge

08.45 Opening Remarks

09.00 Keynote
Computer-assisted laparoscopy. achievements and challenges. Prof. Greg Hager

09.45 Instrument Segmentation and Tracking
S. Speidel, S. Bodenstedt, D. Stoyanov, M. Allan, L. Maier-Hein, H. Kenngott, M. Wagner

10.30 Coffee Break

11.00 Workflow detection from laparoscopic videos
R. Stauder, D.Ostler, A. Schneider, H. Feußner

11.45 Automatic polyp detection in colonoscopy videos
J. Bernal del Nozal, A. Histace, J. Liang

12.30 Lunch

13.45 Keynote
Computer-aided detection of abnormalities in gastrointestinal endoscopy. achievements and challenges. Prof. Dimitris K. Iakovidis

14.45 Early Barrett’s cancer detection
F. van der Sommen, S. Zinger, P. de With, E. J. Schoon

15.30 Coffee Break

16.00 Detection of abnormalities in gastросcopic images
Y. Cong, S. Wang, Y. Tang, Y. Yang

16.45 Closing Remarks

Multi-Atlas Labeling beyond the Cranial Vault: Workshop and Challenge

08.30 Opening Remarks

08.45 Multi-Resolution Dictionary Learning for Abdominal Multi-Organ Segmentation
Dr. Tong Tong, Imperial College London

09.10 Multi-level deep convolutional networks for improved computer-aided detection and organ segmentation
Dr. Holger Roth, NIH Clinical Center

09.35 Utilizing bladder and rectum filling in the segmentation of pelvic organs
Dr. Thomas Robin Langerak, Erasmus MC Cancer Institute

10.00 Probabilistic models for multi-atlas segmentation and label fusion
Dr. Juan Eugenio Iglesias, Basque Center on Cognition Brain and Language

10.25 Poster Session and Coffee Break
For list of posters, please check the event website

11.00 Challenge Overview

11.15 Oral Presentations of Challenge Entries

12.00 Discussion

12.15 Closing Remarks
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