

MICCAI 2010 Workshop -- Computational Imaging Biomarkers for Tumors: From Qualitative to Quantitative (CIBT)

Beijing, China, 20 September 2010

Program

09:00-09:10 **Opening speech by one of the organizers**

09:10-09:55 **Invited talk 1**

Theory and Applications of Image-Based Predictive Control of Prostate Cancer Surgery and Experimental Validation in vivo

by Prof. Yusheng Feng, The University of Texas at San Antonio

09:55-10:20 **Oral presentation 1**

Modelling Tumor Cellularity in Newly Diagnosed GBMs using MR Imaging and Spectroscopy

by Alexandra Constantin, Sarah Nelson and Ruzena Bajcsy (paper 2)

10:20-10:45 **Tea break**

10:45-11:30 **Invited talk 2**

A Label Free Approach for Molecular Imaging Guided Diagnosis and Therapy

by Prof. Stephen T. Wong, The Methodist Hospital Research Institute

11:30-11:55 **Oral presentation 2**

Biomarker Detection in Whole Slide Imaging Based on Statistical Color Models

by Jie Shu, Guoping Qiu, Mohammad Ilyas, et al (paper 4)

11:55-12:20 **Oral presentation 3**

Atlas to Image-with-Tumor Registration Based on Demons and Deformation Inpainting

by Hans Lamecker and Xavier Pennec (paper 1)

12:20-13:30 **Lunch break**

13:30-14:15 **Invited talk 3**

Ultra-low Dose CT Imaging for Cancer Radiotherapy

By Prof. Steve B. Jiang, University of California, San Diego

14:15-14:40 **Oral presentation 4**

Validation of Liver Tumor Segmentation in CT Scans by Relating Manual and Algorithmic Performance - A Preliminary Study

by Jan Hendrik Moltz, Jan Rühaak, Christiane Engel, et al (paper 5)

14:40-15:05 **Oral presentation 5**

Localization of Language Areas in Brain Tumor Patients Based by Functional Geometry Alignment

by Georg Langs, Yanmei Tie, Laura Rigolo, et al (paper 3)

15:05-15:30 **Tea break**

15:30-16:15 **Invited talk 4**

Title to be announced

By Prof. Simon K. Warfield, Harvard Medical School and Children's Hospital Boston

16:15-16:40 **Oral presentation 6**

Automatic Classification of Glioma Subtypes and Biomarker Identification Using DESI Mass Spectrometry Imaging

by Vandana Mohan, Nathalie Agar, Ferenc Jolesz, et al (paper 6)

16:40-17:00 **Discussion and sharing**

17:00 **Closure of the workshop**

Abstracts and introduction of speakers of the invited talks:

Talk 1:

Theory and Applications of Image-Based Predictive Control of Prostate Cancer Surgery and Experimental Validation in vivo

Dr. Yusheng Feng

Department. of Mechanical Engineering, The University of Texas at San Antonio

http://engineering.utsa.edu/~mechanical/faculty_staff/Feng.html



Abstract: Advances in computational sciences and imaging techniques have shown unprecedented potential to assist oncologists, radiologists, and surgeons by providing advanced computational models for biological studies and clinical applications such as model-based treatment outcome prediction and image-guided control in real-time. Recently, we have demonstrated, in collaboration with UT Austin and M.D. Anderson Cancer Center in Houston, that MR temperature imaging (MRTI) guided laser therapy can be modulated by predictive real-time control on in vivo canine prostate with high precision. In this talk, I will discuss the main ideas of a general computational infrastructure that consists of modules for image analysis tools for treatment planning, 3D numerical model generation from MRI scan for treatment optimization, and a systematic approach to calibrate and modulate laser surgery through predictions of computational models. The in vivo experiments show that the damage zone of tumor regions detected from MRI coincide very well with images taken after the treatment. Other modules in the computational framework permit predictions of cellular and tissue response to thermal therapy, as well as applications in treatment planning and surgical control.

Talk 2:

A Label Free Approach for Molecular Imaging Guided Diagnosis and Therapy

Dr. Stephen T. Wong

Center for Bioengineering & Informatics, The Methodist Hospital Research Institute

<http://www.methodisthealth.com/tmhri.cfm?id=38354>



Abstract: N/A

Talk 3:

Ultra-low Dose CT Imaging for Cancer Radiotherapy

Dr. Steve B. Jiang
Department of Radiation Oncology, Univ. of California, San Diego

<http://radonc.ucsd.edu/Research/CART/Jiang.asp>



Abstract: Cone-beam computed tomography (CBCT) has been broadly used in image guided radiation therapy (IGRT) and adaptive radiation therapy (ART), to acquire the updated patient's geometry for precise targeting and treatment adaptation. However, the repeated use of CBCT during a treatment course has raised a serious concern on excessive x-ray imaging doses delivered to patients, which has greatly limited the maximal exploitation of the potential of modern radiotherapy. Especially for pediatric patients, this concern has prohibited the use of IGRT and ART, leading to compromised treatment outcome. Advanced iterative reconstruction algorithms, based on compressed sensing techniques, have demonstrated tremendous power in reconstructing CBCT images from very few and/or noisy projections, resulting in dramatically reduced imaging dose. However, these algorithms are very computationally inefficient and thus cannot be used in most clinical applications. We have recently developed an innovative CBCT reconstruction algorithm with a mathematical structure perfect for parallelization on a graphics processing unit (GPU) platform. Our preliminary results have shown that we can improve the efficiency by a factor of 100 over existing iterative algorithms and reduce the imaging dose by factor of 40~100 compared to the current clinical standard. Similar algorithms have also been used for ultra-low dose CT, 4DCT, helical CT and 4D CBCT reconstruction.

Talk 4:

Title to be announced

Dr. Simon K. Warfield
Department of Radiology, Harvard Medical School and Children's Hospital Boston

<http://www.crl.med.harvard.edu/people/warfield/>



Abstract: N/A