

Medical Imaging 2015

Digital Pathology

Metin N. Gurcan
Anant Madabhushi
Editors

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- 1 Keynote and Trends
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(United States)
Anant Madabhushi, Case Western Reserve University (United States)
- 2 Emerging Applications
Elizabeth A. Krupinski, The University of Arizona (United States)
- 3 Gastro-Intestinal/Genito-Urinary
John E. Tomaszewski, State University of New York at Buffalo
(United States)
- 4 Breast
Ulysses J. Balis, University of Michigan Health System (United States)

Tuesday/Wednesday Posters

Anne L. Martel, Sunnybrook Research Institute (Canada)

Introduction

In 2013, we introduced a new conference, Digital Pathology, at the SPIE Medical Imaging Symposium in Orlando, Florida. This year continued to see the same sort of attention that made digital pathology one of the prominent conferences at the SPIE Medical Imaging Symposium both in 2013 and in 2014. The quality of the presented talks, posters and the resulting papers (just like last year and the year before) continued to be outstanding. While in 2015 we saw a marginal decrease in the total number of submissions, a rigorous peer-review process ensured that only the top papers were selected for presentation at the meeting.

The third Digital Pathology conference took place on February 24th, 25th and 26th in the Renaissance Orlando at SeaWorld, Orlando, Florida. The meeting began on the evening of the 24th with a workshop entitled *Power of pathology: predicting disease aggressiveness from tissue slides* with expert pathologists Drs. John Tomaszewski (University of Buffalo), Ulysses Balis (University of Michigan), and Hannah Gilmore (Case Western Reserve University). This workshop built on the success of a related workshop entitled *What do pathologists see on a slide: Implications for Digital Pathology* in the 2014 version of the digital pathology meeting, which drew over 50 attendees. However, unlike the 2014 workshop that was intended as a "Pathology 101" for the SPIE Medical imaging audience, the 2015 workshop challenged our expert panel to not just diagnose the presence of the disease on the slide, but to also predict the aggressiveness of the disease and risk. The workshop began with an excellent review of breast cancer pathology and histopathology slide preparation by Dr. Hannah Gilmore. Subsequently each of our expert pathologists each reviewed a pathology slide corresponding to a different patient diagnosed with estrogen receptor positive breast cancer. Following a didactic presentation of pathologic features identified on the image, each pathologist was asked to make a call on what the level of risk might be (low, intermediate or high). The risk predictions made by the pathologists based off the pathologic attributes were then compared against those obtained by a 21 gene expression assay called Oncotype DX. In every case the predictions by the pathologist concurred with that obtained from the Oncotype DX test, revealing the ability of the pathologists to predict disease risk based off analysis of routine H&E pathology slides alone. The workshop ended with a very lively interactive Q&A session between the audience and our expert panel of pathologists.

The meeting formally began on February 25th with a plenary talk given by Dr. Ulysses Balis entitled *Twenty years of image-based search technology in review: bright prospects for image-based search and decision support in whole slide imaging*. Dr. Balis, a pathologist with an interest in computational image analysis, discussed work from his group on developing very powerful image-based search algorithms that could be applied to identifying most similar pathology images within large repositories when compared to a query image. Dr. Balis discussed how the image-based search algorithm (called SiVQ) could be used to predict patient

outcome by comparing a query image with similar images in a database that have a known patient outcome. The keynote talk drew in over 200 attendees from all the various conferences as part of the SPIE Medical imaging symposium and resulted in some very lively discussion following the talk. The rest of the conference was similarly very heavily subscribed.

A total of 36 papers were presented during the course of the meeting in both oral and poster form. The presentations were aggregated into three thematic areas covering Emerging Applications, Gastro-Intestinal/Genito-Urinary and Breast. We would like to acknowledge the excellent work in the following papers:

Conference finalist of the Robert F. Wagner Best Student Paper Award for Digital Pathology

Segmentation of digitized histological sections for vasculature quantification in the mouse hind limb

Paper 9420-2

Student Author: Yiwen Xu, Robarts Research Institute (Canada)

Author(s): Yiwen Xu, The Univ. of Western Ontario (Canada); J. Geoffery Pickering, Zengxuan Nong, Robarts Research Institute (Canada); Aaron D. Ward, The Univ. of Western Ontario (Canada)

Poster Awards

Cum Laude Poster Award

An accurate method of extracting fat droplets in liver images for quantitative evaluation

Paper 9420-33

Author(s): Masahiro Ishikawa, Naoki Kobayashi, Hideki Komagata, Kazuma Shinoda, Saitama Medical Univ. (Japan); Masahiro Yamaguchi, Tokyo Institute of Technology (Japan); Tokiya Abe, Akinori Hashiguchi, Michiie Sakamoto, Keio Univ. (Japan)

Honorable Mention Poster Award

An automated approach to improve efficacy in detecting residual malignant cancer cell for facilitating prognostic assessment of leukemia: an initial study

Paper 9420-32

Author(s): Yuchen Qiu, The Univ. of Oklahoma (USA); Xianglan Lu, The Univ. of Oklahoma Health Sciences Ctr. (USA); Maxine Tan, The Univ. of Oklahoma (USA); Shibo Li, The Univ. of Oklahoma Health Sciences Ctr. (USA); Hong Liu, Bin Zheng, The Univ. of Oklahoma (USA)

The continued success of the new Digital Pathology conference was in no small part to the outstanding efforts of the program committee, who carefully constructed the program, SPIE Conference Chairs Drs. David Manning and Steven Horii, and SPIE staff, who kindly guided us through all the steps of the program organization.

Next year, the Digital Pathology conference at SPIE Medical Imaging will take place in San Diego, California. We look forward to seeing you there for another successful conference.

Metin Gurcan
Anant Madabhushi

2015 Medical Imaging Award Recipients

Robert F. Wagner Best Student Paper Award

Robert F. Wagner was an active scientist in the SPIE Medical Imaging meeting, starting with the first meeting in 1972 and continuing throughout his career. He ensured that the BRH, and subsequently the CDRH, was a sponsor for the early and subsequent Medical Imaging meetings, helping to launch and ensure the historical success of the meeting. The Robert F. Wagner All-Conference Best Student Paper Award (established 2014) is acknowledgment of his many important contributions to the Medical Imaging meeting and his many important advances to the field of medical imaging.



This award is cosponsored by:



The Medical Image Perception Society



2015 Recipients:

First Place: **Automatic discrimination of color retinal images using the bag of words approach** (9414-54)

I. Sadek, D. Sidibé, F. Meriaudeau, Univ. of Burgundy (France)

Second Place: **Automated pulmonary lobar ventilation measurements using volume-matched thoracic CT and MRI** (9417-42)

F. Guo, S. Svenningsen, E. Bluemke, M. Rajchl, J. Yuan, A. Fenster, G. Parraga, The Univ. of Western Ontario (Canada)

Conference Awards

2015 Recipients:

Cum Laude Poster Award: **An accurate method of extracting fat droplets in liver images for quantitative evaluation** [9420-33]

M. Ishikawa, N. Kobayashi, H. Komagata, K. Shinoda, Saitama Medical Univ. (Japan); M. Yamaguchi, Tokyo Institute of Technology (Japan); T. Abe, A. Hashiguchi, M. Sakamoto, Keio Univ. (Japan)

