

October 11, Anant Madabhushi, Radiomics, Pathomics and Deep Learning



Traditional biology generally looks at only a few aspects of an organism at a time and attempts to molecularly dissect diseases and study them part by part with the hope that the sum of knowledge of parts would help explain the operation of the whole. Rarely has this been a successful strategy to understand the causes and cures for complex diseases. The motivation for a systems based approach to disease understanding aims to understand how large numbers of interrelated health variables, gene expression profiling, its cellular architecture and microenvironment, as seen in its histological image features, its 3 dimensional tissue architecture and vascularization, as seen in dynamic contrast enhanced (DCE) MRI, and its metabolic features, as seen by Magnetic Resonance Spectroscopy (MRS) or Positron Emission Tomography (PET), result in emergence of definable phenotypes. At the Center for Computational Imaging and Personalized Diagnostics (CCIPD) at Case Western Reserve University, we have been developing computerized knowledge alignment, representation, and fusion tools for integrating and correlating heterogeneous biological data spanning different spatial and temporal scales, modalities, and functionalities. These tools include computerized feature analysis methods for extracting subvisual attributes for characterizing disease appearance and behavior on radiographic (radiomics) and digitized pathology images (pathomics). Unlike radiomics and pathomics which are supervised feature analysis approaches, there has also been a great deal of recent interest in deep learning which enables unsupervised feature generation. In this talk I will discuss the development work in CCIPD on new radiomic and pathomic and deep learning approaches for capturing intra-tumoral heterogeneity and modeling tumor appearance. I will also focus my talk on how these radiomic and pathomic and deep learning approaches can be applied to predicting disease outcome, recurrence, progression and response to therapy in the context of prostate, brain, rectal, oropharyngeal, and lung cancers. Additionally I will also discuss some recent work on looking at use of

pathomics in the context of racial health disparity and creation of more precise and tailored prognostic and response prediction models.

[Session details...](#)

BIO:

Dr. Anant Madabhushi is the Director of the Center for Computational Imaging and Personalized Diagnostics (CCIPD) and the F. Alex Nason Professor II in the Departments of Biomedical Engineering, Pathology, Radiology, Radiation Oncology, Urology, General Medical Sciences, and Electrical Engineering and Computer Science at Case Western Reserve University. He is also a member of the Case Comprehensive Cancer Center.

Dr. Madabhushi received his Bachelors Degree in Biomedical Engineering from Mumbai University, India in 1998 and his Masters in Biomedical Engineering from the University of Texas, Austin in 2000. In 2004 he obtained his Ph.D. in Bioengineering from the University of Pennsylvania. He joined the Department of Biomedical Engineering, Rutgers University as an Assistant Professor in 2005. He was promoted to Associate Professor with Tenure in 2010. In 2012 he accepted the position of Associate Professor at Case Western Reserve University, Department of Biomedical Engineering and is currently directing a center on computational imaging and personalized diagnostics. He was promoted to full professor in 2014.

Dr. Madabhushi has authored over 120 peer-reviewed journal publications and over 150 conferences papers and delivered over 175 invited talks and lectures both in the US and abroad. He has 25 issued patents in the areas of medical image analysis, computer-aided diagnosis, and computer vision. He is an Associate Editor for IEEE Transactions on Biomedical Engineering, IEEE Transactions on Biomedical Engineering Letters, BMC Cancer, BMC Medical Imaging, Journal of Medical Imaging and Medical Image Analysis (MedIA). He is also on the Editorial Board of the Journal Analytical and Cellular Pathology. He has been the recipient of a number of awards for both research as well as teaching, including the Department of Defense New Investigator Award in Lung Cancer (2014), the Coulter Phase 1 and Phase 2 Early Career award (2006 and 2008), and the Excellence in Teaching Award (2007-2009), along with a number of technology commercialization awards. He is also a Wallace H. Coulter Fellow, a Fellow of the American Institute of Medical and Biological Engineering (AIMBE), and a Senior IEEE member. In 2015 he was named by Crains Cleveland Business Magazine as one of Forty under 40 making positive impact to business in North East Ohio. His research work has received grant funding from the National Cancer Institute (NIH), National Science Foundation, the Department of Defense, private foundations, and from Industry.

He is also the co-founder of Ibris Inc. a startup company focused on developing image based assays for breast cancer prognosis. He is also the conference chair for the new Digital Pathology Conference to be held annually in conjunction with the SPIE Medical Imaging Symposium.

SUMMARY:


Topic: Radiomics, Pathomics and Deep Learning: Role of Computational Imaging in Precision Medicine

Speaker: Anant Madabhushi, Ph.D., Case Western Reserve University

Date: Wednesday, October 11, 2017

Time: 11 AM – 12 PM ET

You are invited to listen to Dr. Madabhushi's presentation in the NCI Shady Grove Building on Medical Center Drive or via WebEx. **Dr. Madabhushi will give his presentation on site at the NCI Shady Grove Building.**

Presentation: A screen cast of the presentation will be available for viewing after the event on the [NCI CBIIT Speaker Series YouTube Playlist](#) 

About the NCI CBIIT Speaker Series:

The National Cancer Institute (NCI) Center for Biomedical Informatics and Information Technology (CBIIT) Speaker Series presents talks from innovators in the research and informatics communities. The biweekly presentations allow thought leaders to share their work and discuss trends across a diverse set of domains and interests. The goals of the Speaker Series are: to share leading edge research; to inform the community of new tools, trends, and ideas; to inspire innovation; and to provide a forum from which new collaborations can begin. For additional information, including past speaker series presentations, visit the [CBIIT Speaker Series page](#).

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