The Case of the Hidden Signatures: Designing Imaging AI to Bridge Patterns, Predictions & Precision Medicine

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Tuesday, February 3, 2025

12:00 – 1:00 PM

BMI Classroom 4004

Woodruff Memorial Research Building

Or

Join us on Zoom link:

https://zoom.us/j/96439304257

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Abstract: Developing artificial intelligence (AI) schemes to assist the clinician towards enabling precision medicine approaches requires development of objective markers that are predictive of disease response to treatment or prognostic of longer-term patient survival. The solutions being developed in my group in this regard involve designing computational imaging features together with histology or molecular data for detailed tissue and disease characterization in vivo as well be associated with patient outcomes. The key innovation in this approach lies in "handcrafting" unique tools that can capture biologically relevant and clinically intuitive measurements from routinely acquired imaging (MRI, CT, PET) or digitized images of tissue specimens. Further, by conducting cross-scale associations between imaging, pathology, and -omics, we can not only "unlock" and integrate the information captured by these different, disparate data modalities but also develop an interpretable and intuitive understanding of what drives their performance. Specific problems addressed via the new computerized imaging markers we have developed include: (a) predicting response to treatment to identify optimal therapeutic pathways, as well as (b) evaluating therapeutic response to guide follow-up procedures. We will further examine how to account for differences between sites, scanners, and acquisition parameters to ensure generalizable performance of AI tools and computational imaging features; crucial for wider clinical translation and widespread adoption. These will be discussed in the context of clinical applications in colorectal and renal cancers, digestive diseases, as well as pediatric conditions.

Biography: Dr. Viswanath is an Associate Professor in the Departments of Pediatrics and Biomedical Engineering at Emory University. He is also a Research Scientist & Biomedical Engineer at the Cleveland VA Medical Center. The primary focus of his research has been developing new artificial intelligence (AI) approaches including image analytics, radiomics, digital pathology, and machine/deep learning schemes; applied to problems in computer-aided diagnosis & detection, disease characterization, as well as quantitative evaluation of response to treatment. He has authored over 55 peer-reviewed journal publications, over 120 conference papers & abstracts, 1 book chapter, as well as delivered over 90 invited talks and panel discussions both in the US and abroad. He has 10 issued patents in the areas of medical image analysis, computer-aided diagnosis, and pattern recognition. Dr. Viswanath is also an Associate Editor or Editorial Board Member for 9 leading international peer-reviewed journals, serve as Program Committee Member or Area Chair for 3 major medical imaging conferences, and have been elected to Senior Member in the National Academy of Inventors, the IEEE, and the SPIE. He was selected for the Fulbright Specialist Award, in addition to multiple awards from SIIM, SPIE, and Crain's Cleveland Business. His lab's research has been funded since 2016 through the DOD/CDMRP, the NIH (NCI, NIBIB, NINR, NHLBI), the VA, and the State of Ohio.