Biomedical Informatics Grand Rounds

Wednesday, September 25, 2024
3:00 pm – 4:00 pm

Deep-Learning Meets Clinical Imaging

Moti Freiman, Ph.D.

Assistant Professor, Biomedical Engineering, Technion – Israel Institute of Technology, Israel

In-person: MART Building, 7M-0706
Join Zoom Meeting https://stonybrook.zoom.us/j/95617197636?pwd=KytzZ2pVRG9SZGpKZUtpNXJISjNjZz09
Meeting ID: 956 1719 7636 Passcode: 924293

Bio: Moti Freiman is an assistant professor of biomedical engineering at the Technion–Israel Institute of Technology. He is the director of the Technion's computational MRI lab and the academic director of the May-Blum-Dahl human MRI research center at the Technion. In addition, he is a principal computer vision engineer at Asensus Surgical LTD, a Karl Storz company. Previously he was a staff research scientist at Philips Healthcare, an Instructor of Radiology at Harvard Medical School, and a post-doctoral fellow at the Computational Radiology lab at Boston Children's Hospital. Dr. Freiman holds a PhD in Computer Science from the Hebrew University of Jerusalem. His main research interests include deep-learning-based methods (vision and natural language processing) for quantitative MRI analysis and reconstruction, inflammatory bowel disease, breast cancer, and digital pathology. Dr. Freiman has more than 50 scientific papers in peer-reviewed journals and conferences and more than 10 granted patents.

Abstract: This seminar will explore cutting-edge deep learning applications across multiple areas of medical research, demonstrating the crucial integration of domain expertise with machine and deep learning for successful implementation. Topics include physically primed deep-learning models for motion-robust cardiac T1 mapping, a physiologically decomposed machine-learning model for predicting response to neoadjuvant chemotherapy in breast cancer using Diffusion-Weighted MRI data, natural language processing (NLP) methods for structured data extraction from Hebrew radiological reports of Crohn's disease patients, and multi-cohort analysis of whole slide images (WSI) for colorectal cancer classification. These advancements underscore how combining AI with specialized medical knowledge can enhance diagnostic accuracy, treatment planning, and data-driven insights in healthcare.

Educational Objectives:

1. Understand the Importance of Domain Expertise in AI Integration: Students will learn how integrating domain-specific knowledge with machine and deep learning is essential for successful AI applications in healthcare.
2. Explore AI Applications in Medical Imaging: Students will gain insights into the development and implementation of deep-learning models for motion-robust cardiac T1 mapping and predicting treatment responses in breast cancer using Diffusion-Weighted MRI data.
3. Learn About Natural Language Processing (NLP) in Healthcare: Students will explore how NLP techniques are applied to extract structured data from Hebrew radiological reports, emphasizing the role of AI in managing and analyzing real-world clinical data.
4. Analyze Multi-Cohort Approaches in Digital Pathology: Students will understand how AI-driven multi-cohort analysis of whole slide images can be applied to cancer classification, specifically colorectal cancer, and how it improves classification performance across diverse patient groups.

Disclosure Statement: The faculty and planners have no relevant financial relationship with ineligible companies, whose primary business is producing, marketing, selling, reselling, or distributing health care products used by or on patients.

Continuing Medical Education Credits: The School of Medicine, State University of New York at Stony Brook, is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians. The School of Medicine, State University of New York at Stony Brook designates this live activity for a maximum of **1** ***AMA PRA Category 1 Credits™.*** Physicians should only claim credit commensurate with the extent of their participation in the activity.