Biomedical Image Computing and Informatics Seminar

"Precision Medicine for Glioblastoma Patients "

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John Morgan Auditorium

John Morgan Building, Basement

Thursday, February 7, 2019 at 1pm

Pizza lunch at 12:45pm*

Abstract

Glioblastoma tumors exhibit significant molecular, histological, and imaging heterogeneity across and within patients, as well as variable proliferation, which poses several diagnostic and therapeutic challenges. Current standard of care is generally uniform across glioblastoma patients and does not take into account the patient specific characteristics. In fact, the heterogeneous landscape, different response to the same treatment, and resistance to standard treatment regimens render the "same treatment for all" approach inadequate. Thus, accurate non-invasive characterization of the heterogeneity of glioblastoma is critical not only for better understanding of this poor-prognosis cancer, but also for developing personalized therapies to improve patient outcome, and for facilitating targeted enrollment into clinical trials. In this talk, I will discuss novel computational approaches that leverage advanced machine learning techniques to address these challenges from various complementary viewpoints. First, I will describe our supervised multivariate analysis techniques that optimally summarize high dimensional data of glioblastoma patients through a set of highly interpretable and reproducible imaging patterns, thereby yielding the models for tumor diagnosis, patient prognosis, relative tumor heterogeneity, peritumoral heterogeneity/infiltration, non-invasive assessment of genomic markers without the need for advanced genetic testing, and assessment of pseudo-progression. Second, I will discuss an unsupervised multivariate machine learning technique that revealed meaningful, robust and reproducible radiographic subtypes of glioblastoma. Third, I will describe the application of our method that identifies the regions at highest risk for tumor recurrence by utilizing advanced machine learning methods in a single-arm, single institutional clinical trial of dose-escalated radiation therapy. The aim of the study is to lengthen the recurrence-free survival by boosting the radiation dose to the regions that are more likely to recur, using sophisticated radiation delivery methods designed to reduce the risk of toxicity.

Bio

Dr. Saima Rathore is a postdoctoral researcher at Center for Biomedical Image Computing and Analytics in the Radiology Department of the University of Pennsylvania. Her interest, in particular, lies in developing the mathematical foundations and the computational methods for constructing computer-aided diagnostic systems that infer information from medical images, eventually leading to non-invasive disease diagnosis and image-guided surgery. She is an active member of the Society of Photographic Instrumentation Engineers (SPIE) and Institute of Electrical and Electronics Engineering (IEEE). Dr. Saima obtained her PhD in Computer Science with the specialization in analysis of Medical Images from Pakistan Institute of Engineering and Applied Sciences in 2015. Previous to her PhD studies, she acquired MSc in Computer Engineering from University of Engineering and Technology, Pakistan, and BS in Software Engineering from Fatima Jinnah Women University, Pakistan. She has more than 10 years of industry experience and teaching in public/private sector universities. More information about her research activities can be found on her google-scholar profile: https://scholar.google.com.pk/citations?user=ntSoZN4AAAAJ&hl=en&oi=ao.