

TCIA Sessions at RSNA 2017

TCIA-Sponsored

- **All Day | ML005 | Machine Learning Community, Learning Center**
 - **Crowds Cure Cancer: Help Annotate Data from The Cancer Imaging Archive**
 - Attendees at this year's RSNA meeting are encouraged to participate in an exciting new activity that will provide valuable data to cancer researchers working in deep learning, radiomics and radiogenomics. This kiosk offers radiologist attendees an opportunity to participate in a 'crowd-sourcing' experiment to accelerate quantitative imaging research. Images are provided by The National Cancer Institute's Cancer Imaging Archive (<http://www.cancerimagingarchive.net/>), which is a massive public-access resource of cancer radiology images linked to genetic/proteomic, pathology images and clinical data. Many of these cases lack the tumor-location labels needed by computer scientists to jump-start their work on machine learning and quantitative imaging radiomics. Participants will be asked to spend a few minutes anonymously reviewing cases and visually marking their tumor locations. Upon completion, they will receive a ribbon to add to their RSNA badge acknowledging their participation. The data resulting from this process will be openly shared on TCIA with the radiology and computer science communities to accelerate cancer research.
- **Wednesday 8:30-10:00 AM | RCC41 | Room: S501ABC**
 - **Research Opportunities Using the NIH The Cancer Imaging Archive (TCIA) That Links Cancer Imaging to Clinical Data, Genomics, Proteomics, Quantitative Imaging and Deep Learning**
 - Diagnostic images, analyzed by expert radiologists with computational analytic tools assistance can offer reliable, reproducible data that connect tumor tissue genetics, proteomics and pathology images. This didactic session will highlight major projects utilizing TCIA with presentations from leading researchers using projects such as the Moonshot/APOLLO, proteomics (CPTAC Phase III), The Cancer Genome Atlas (TCGA), Immunotherapy, Challenges, Precision Medicine, NCI Quantitative Imaging Network.
- **Wednesday 4:30-6:00 PM | RCC45 | Room: S501ABC**
 - **Deep Learning—An Imaging Roadmap**
 - Deep Learning, 'an independent self-learning computational environment that uses multilayered computational neural nets, has generated considerable excitement (as well as concerns and misperceptions) in medical imaging. Deep learning computational techniques, such as convolutional neural networks (CNNs) generate multiple layer feature classifiers that extract disease relevant features from entire regions of medical images without the need for localization or pre-segmentation of lesions. Although CNNs require training on very large image datasets that encompass particular disease expressions, they can be diagnostically effective since no human input of segmentation features such as size, shape, margin sharpness, texture, and kinetics are required. But their immediate and future applicability as tools for unsupervised medical decision-making are, as yet, not well understood by most clinical radiologists. This overview session of Deep Learning will provide a clearer picture by presenters who are active in that field and who can clarify how the unique characteristics of Deep Learning could impact clinical radiology. It will address how radiologists can contribute to, and benefit from, this new technology. Topics of this multi-speaker session will cover: 1) the general principles of deep learning computational schemas and their mechanisms of handling image inputs and outputs. 2) new technology including hardware shifts in microprocessors from CPU's to GPU devices that offer significant computational advantages 3) how to ensure that Deep Learning results are consistently clinically relevant and meaningful including nodal element tuning and provability so as to assure medical care consistency and reproducibility. 4) how to develop and leverage datasets for deep learning on archives such as the NIH The Cancer Imaging Archive (TCIA) including requirements for input image dataset magnitude and completeness of disease spectrum representation. 5) how to embed

essential non-imaging data needed as inputs, (e.g. EHR, outcome, cross-disciplinary metadata, and the data pre-processing required to make DICOM ready for Deep Learning. The presentations will be at a level understandable and relevant to the RSNA radiologist audience.

- **Thursday 2:30-4:00 PM | RCB54 | Room: S401CD**

- **Using Publicly Accessible 'Big Data' from the NIH/NCI's Cancer Imaging Archive (TCIA) to Research Quantitative Radiomics, Proteomics, Genetics and Pathology (Hands-on)**

- Access to large, high quality data is essential for researchers to understand disease and precision medicine pathways, especially in cancer. However HIPAA constraints make sharing diagnostic clinical images outside an individual institution a complex process. The NCI's Cancer Imaging Archive (TCIA) addresses this challenge by providing hosting and de-identification services which take the burden of data sharing off researchers. TCIA now contains over 70 unique data collections of more than 28 million images. Recognizing that images alone are not enough to conduct meaningful research, most collections are linked to rich supporting data including patient outcomes, treatment information, genomic / proteomic analyses, and expert image analyses (segmentations, annotations, and radiomic / radiogenomic features). This hands-on session will teach the skills needed to fully access TCIA's existing data as well as learn how to submit new data for potential inclusion in TCIA.

Community sessions

Do you have a TCIA-related presentation at RSNA that's not listed below? Contact the [helpdesk](#) to request it be added!

- **Monday 9:10-9:20 AM** | RC205-03 | Room: S406B
 - Radiogenomics Analysis in Hemodynamic Abnormality of Patients with Newly Diagnosed Glioblastomas: Combination with TCIA Database
- **Monday 3:00-3:10 PM** | SSE02-01 | Room: E450A
 - Phenotypic Biomarkers of Intra-Tumor Heterogeneity in Breast DCE-MRI Can Augment Tumor Volume Measures in Predicting Survival after Neoadjuvant Chemotherapy for Locally Advanced Breast Cancer: Results from the ACRIN 6657/I-SPY-1 Trial
- **Tuesday 8:30-10:00 AM** | RC325 | Room: S404AB
 - Radiomics Mini-Course: From Image to Omics
 - Image Annotation and Semantic Labeling
 - Image Feature Computation and Considerations
 - Correlating Image Features with Multi-Omics Data
- **Tuesday 4:30-6:00 PM** | RC425 | Room: S103CD
 - Radiomics Mini-Course: Informatics Tools and Databases
 - The Role of Challenges and Their Requirements
 - Quantitative Image Analysis Tools: Communicating Quantitative Image Analysis Results
 - Public Databases for Radiomics Research: Current Status and Future Directions
- **Wednesday 3:10-3:20 PM** | SSM12-02 | Room: S404CD
 - Personalized Survival Prediction Using Random Forest Survival Model on MR Radiomic Features in Gliomas
- **Wednesday 3:40-3:50 PM** | SSM12-05 | Room: S404CD
 - A Clinically-Actionable Fully Convolutional Network for Brain Tumor Segmentation
- **Lakeside Learning Center Exhibits**
 - DICOM4QI Demonstration and Connectathon: Structured Communication of Quantitative Image Analysis Results Using the DICOM Standard (Meet-the-Experts Schedule: Mon/Tues/Weds 12:15pm - 1:15pm)
 - The Quantitative Image Feature Pipeline (QIFP): Automated Radiomic Feature Extraction to Derive Associations with and Prediction of Clinical Variables from Image Features (Meet-the-Experts Schedule: Mon/Tues/Weds 12:15pm - 1:15pm)
 - Cancer Imaging Phenomics Toolkit (CaPTk): A Radio(geno)mics Software Platform Leveraging Quantitative Imaging Analytics for Computational Oncology (Meet-the-Experts Schedule: Tues/Weds /Thurs 12:15pm - 1:15pm)
 - Standardizing Radiomic Feature Descriptions for Quantitative Imaging: A Preliminary Report of the Cooperative Efforts of the NCI's QIN PET-CT Subgroup (Meet-the-Experts Schedule: Mon/Tues/Weds 12:15pm - 1:15pm)