Deep learning estimates cardiovascular disease risk from low-dose CT

Wednesday, Nov 11, 2020 3 pm - 4 pm

Abstract:
Cardiovascular diseases (CVDs) affect nearly half of American adults and result in more than 30% of all deaths. Studies demonstrate alarming statistics - patients at-risk of cancer have a ten-fold greater risk of CVD mortality than the general population. Low-dose computed tomography (LDCT) is an effective lung cancer screening technique, which can result in 20% reduction in the cancer-related mortality rate in at-risk subjects. Although subjects undergoing LDCT screening have an intermediate to high risk for CVDs, the current guidance and consensus is lacking in the best way for a simultaneous and quantitative evaluation of CVD risks due to a number of difficulties. Here we present an innovative deep learning model to address this challenge. Our deep model was trained with 30,286 LDCT volumes and achieved the state-of-the-art performance (area under the curve (AUC) of 0.869) on 2,085 National Lung Cancer Screening Trial subjects, and effectively identified patients with high CVD mortality risks (AUC of 0.768). Our deep model was further calibrated against the clinical gold standard CVD risk scores from ECG-gated dedicated cardiac CT. The promising results demonstrate that our deep learning model has the potential to convert LDCT for lung cancer screening into dual-screening quantitative tool for CVD risk estimation.

Bio:
Dr. Pingkun Yan is an Assistant Professor at the Department of Biomedical Engineering at Rensselaer Polytechnic Institute (RPI). He obtained his Ph.D. from National University of Singapore. Before he joined RPI in 2017, he was a senior scientist of Philips Research and deployed as an onsite clinical scientist at the NIH Clinical Center. His research interests include medical image computing and image-guided intervention using machine learning and computer vision techniques with the goal of bench-to-bedside translation. For instance, Dr. Yan was a core engineering team member of the world first FDA approved MR-TRUS fusion guided prostate biopsy device. Dr. Yan has published over 90 peer reviewed articles in well recognized journals including PNAS, IEEE TMI, and Medical Image Analysis. His publications have been cited for more than 4,900 times with H-index of 35. His research work has also been recognized by a number of best paper awards including MICCAI, SPIE Medical Imaging, IJCARS. He is currently serving as an associate editor of multiple international journals and a member of proposal study sections for NIH and NSF.

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 1.00 AMA PRA Category 1 Credit(s)™. Physicians should only claim the credit commensurate with the extent of their participation in the activity. Disclosure Policy: All those in control of CME content are expected to disclose any relevant financial relationship with a commercial interest (defined as any entity producing, marketing, reselling, or distributing health care goods or services consumed by, or used on, patients) that relates to the content that will be discussed in the educational presentation. All commercial relationships that create a conflict with the planners, speakers, authors’ control of content must be resolved before the educational activity occurs.

Remote Access
Join Zoom Meeting https://stonybrook.zoom.us/j/95617197636?pwd=KytzZ2pVRG9SZGpKZUpnNXjISjNgZz09
Meeting ID: 956 1719 7636  Passcode: 924293
Join by One tap mobile
+16468769923, 95617197636# US (New York)
+13017158592,95617197636# US (Germantown)
Dial by your location
+1 646 876 9923 US (New York)  Meeting ID: 956 1719 7636
Find your local number: https://stonybrook.zoom.us/u/abyLdgcoB
Find your local number: https://stonybrook.zoom.us/u/abyLdgcoB

Questions? Please call the Biomedical Informatics Department at 631-638-2590.