מכון ויצמן למדע

# THE WEIZMANN INSTITUTE OF SCIENCE

## FACULTY OF MATHEMATICS AND COMPUTER SCIENCE

Vision and Robotics Seminar

on Thursday, Apr 08, 2021
at 12:15

https://weizmann.zoom.us/j/92845638929?pwd=MGM0RWY4TTc3UVNUOHpFMWlLcms3Zz09

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## Ultrasound. Lung. Deep Learning

Abstract:

Lung ultrasound (LUS) is a cheap, safe and non-invasive imaging modality that can be performed at patient bed-side. However, to date LUS is not widely adopted due to lack of trained personnel required for interpreting the acquired LUS frames. In this work we propose a framework for training deep artificial neural networks for interpreting LUS, which may promote broader use of LUS. In our framework we explicitly address the issue of incorporating domain-specific prior knowledge to DL models. In our framework, we propose to provide a deep neural network not only the raw LUS frames as input, but explicitly inform it of these important anatomical features and artifacts in the form of additional channels containing pleural and vertical artifacts masks. By explicitly supplying this domain knowledge in this form to deep models standard off-the-shelf neural networks can be rapidly and efficiently finetuned to perform well various tasks on LUS data, such as frame classification or semantic segmentation. Our framework allows for a unified treatment of LUS frames captured by either convex or linear probes. We evaluated our proposed framework on the task of COVID-19 severity assessment using the ICLUS dataset. In particular, we finetuned simple image classification models to predict per-frame COVID-19 severity score. We also trained a semantic segmentation model to predict per-pixel COVID-19 severity annotations. Using the combined raw LUS frames and the detected lines for both tasks, our off the shelf models performed better than complicated models specifically designed for these tasks, exemplifying the efficacy of our framework.