SAMPLLAB
Signal Acquisition Modeling Processing and Learning

מכון ויצמן למדע
WEIZMANN INSTITUTE OF SCIENCE

Super Resolution Ultrasound via Model Based Deep Learning for Improved Breast Lesion Characterization

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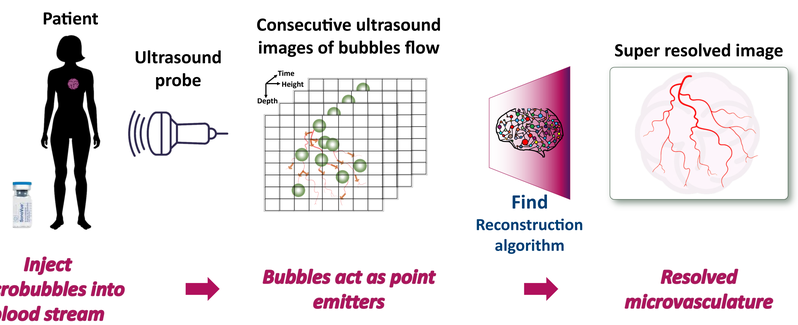
1

Goal: reconstruct breast lesion microvasculature via contrast enhanced ultrasound



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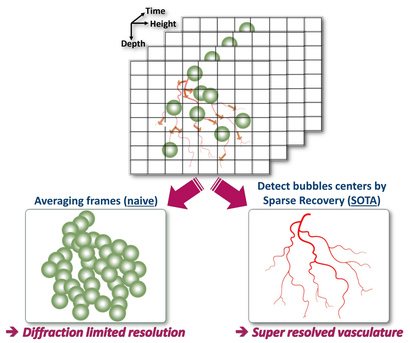
Existing methods for microvasculature reconstruction



3

Problems with sparse recovery approaches:

i. ***Slow inference*** **due to the iterative structure of the algorithms**
➔ **Impairs the translation of super-resolution US into the clinic**

ii. ***Manual calibration*** **of the system PSF is required**
➔ **High user dependency**

Our approach:

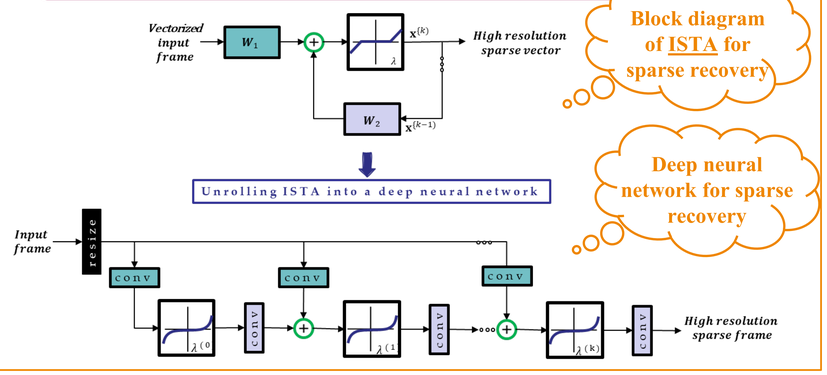
Training a model-based deep neural network with architecture inspired from sparse recovery:

i. **One shot inference**
➔ **Short & known inference time**

ii. **No prior knowledge about the system PSF is required**
➔ **Alleviate dependency on user's experience**

4

Model-based network architecture for microvasculature reconstruction



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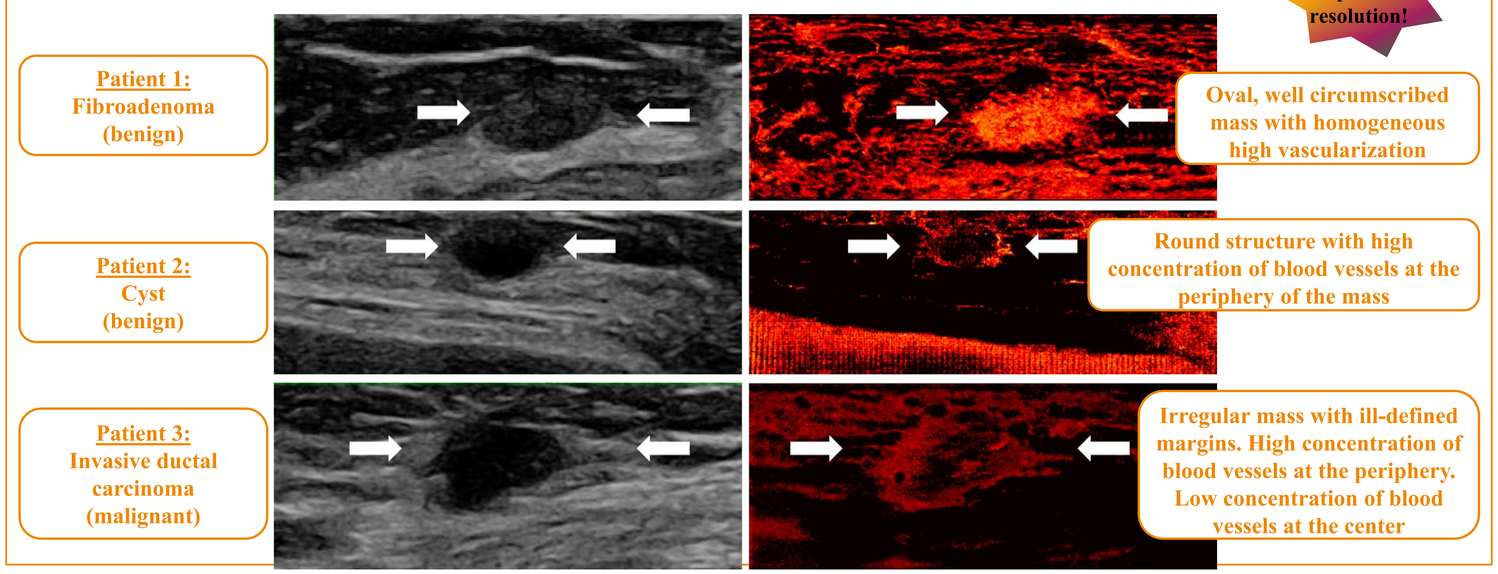
Results demonstrates our method on clinical data for the first time showing super resolved microvasculature recoveries of breast lesions



6

We implemented a **model-based deep learning framework** for super resolution ultrasound on **clinical scans** using a **clinical ultrasound scanner** and **standard clinical procedure**.

7

We showed super resolved microvasculature recoveries in human patients with various breast lesions. Our results **demonstrate different morphological features**, which are characteristic of the various lesions, thus **assisting diagnosis**.