Locating small and deeply embedded tumors in ill-posed imaging modalities using a template-matching reconstruction

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August 6, 2019

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Template-matching better captures small, deeply-embedded inclusions

- Uniformly high-resolution images are not necessary for detecting inclusions
- Re-pose problem : identification of sparse set of high-contrast inclusions.
- Interrogating with “template” high contrast inclusion improves image contrast by up to 10-50x

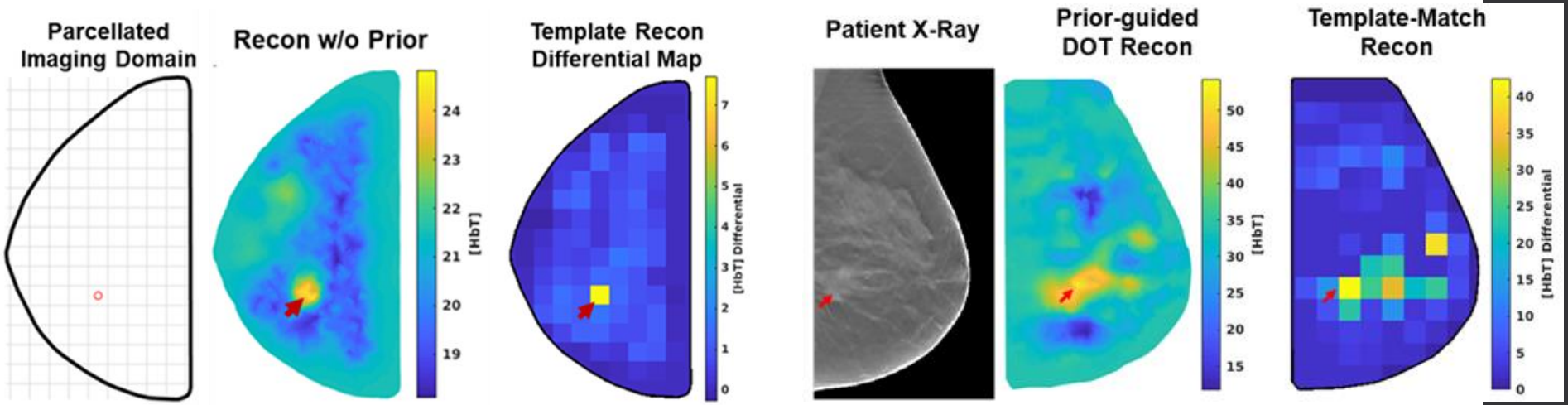

Fig. 1 – (left) Unguided and template-matching reconstruction of Digibreast phantom + inclusion. (right) Mammography, conventional DOT reconstruction, and template-matching recon of in vivo *malignant tumor.*

Further Applications – Shape Recovery

- Non-isotropic profiles may be also used for interrogation. The degree of overlap affects reconstruction contrast.
- Enables shape recovery of fine structures (~2-3 mm diameter) embedded centimeters deep within diffusive media.

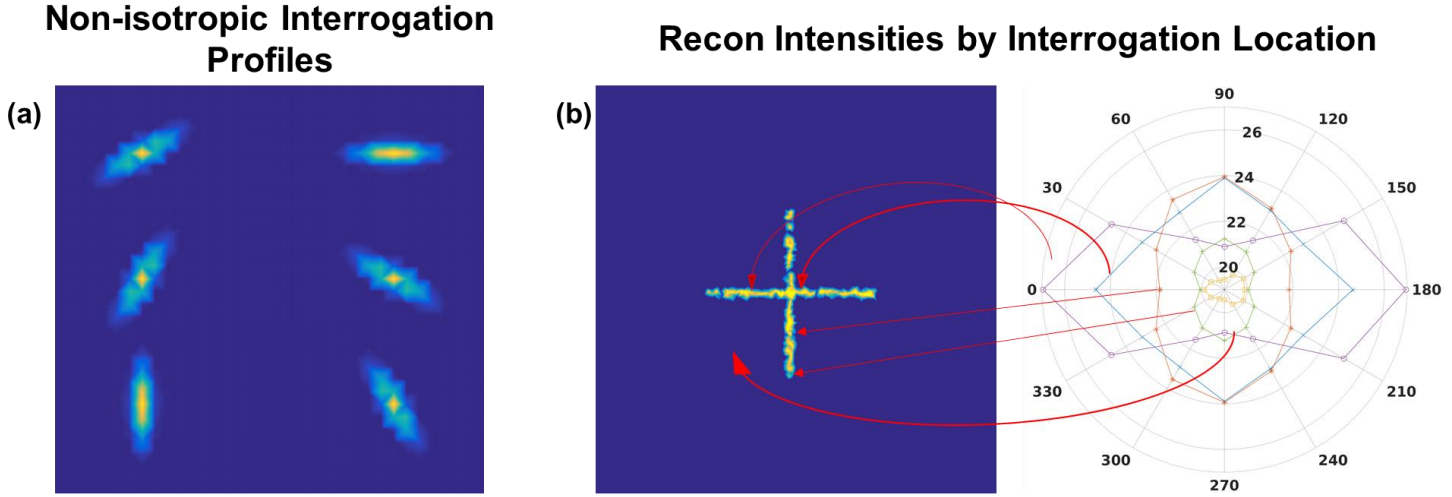

Fig. 2 – (a) Non-isotropic profiles can assess for orientation or shape. (b) Each location is interrogated by concentric ellipsoids of varying orientation. Ground truth (left) and recovered intensity in [HbT] is plotted in polar plot (right).